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Financial Literacy in Developing Countries

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Abstract

Focusing on different façades of financial well-being such as wealth accumulation and retirement planning, various determinants of financial well-being have been unearthed, and financial literacy has emerged as a crucial factor that increases financial well-being. Hence, financial literacy has been an important policy instrument to increase the financial well-being of individuals, particularly given that it is relatively easy to implement. This paper is an attempt to pave the way for such policies in a group of middle income countries, namely Mexico, Lebanon, Uruguay, Colombia and Turkey. After establishing financial literacy levels, we identify the least financially literate groups in each country to facilitate targeting of public policy. We find that women, younger adults and individuals who cannot read or write in the official language of their country of residence have lower financial literacy scores. In line with the previous findings in the literature on the developed countries, our results indicate that financial literacy increases with education. We also show that it is not only the years of education, but also the quality. In Mexico and Turkey, there are large regional differences that must be addressed. We also find that differences in financial literacy across countries persist even when differences in structural characteristics are taken into account. A partial explanation may be provided by differences in financial inclusion.

Keywords Financial literacy · Financial well-being · Financial inclusion · Gender · Developing countries

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1 Introduction

A relatively early study on the predictors of life satisfaction by Oishi et al. (1999) shows that financial satisfaction is an important ingredient of life satisfaction, a relationship that is relatively stronger in lower income countries. Being an essential axis of general well-being, financial well-being has attracted considerable attention from scholars particularly after the Global Economic Recession. The efforts to study financial well-being required a definition of financial well-being, and different measures were used in the literature. For instance, Hira and Mugenda (1998) provided a concise definition summarizing six different dimensions: amount of savings, money owed, current financial situation, ability to meet long term goals, preparedness to meet emergencies and financial management skills.

Some prime examples of quantifying financial well-being measures included wealth accumulation, indebtedness, subjective financial satisfaction, and retirement planning. Using these measures, the literature expanded fast on analysing the covariates of financial well-being, and it has unequivocally demonstrate that financial literacy is a crucial ingredient. Ali et al. (2015) show that financial literacy is a significant determinant of financial satisfaction as it helps individuals plan their spending and savings. In a similar vein, Chu et al. (2017) find that households with higher financial literacy levels have higher financial well-being levels as measured by positive returns on investment. Again, Xiao et al. (2013) demonstrate that higher financial literacy levels indicate higher financial satisfaction. Atkinson and Messy (2012) use these finding when defining financial literacy as "a combination of awareness, knowledge, skills, attitude and behaviors necessary to make sound financial decisions and ultimately achieve financial well-being" whereby they solidify the connection between financial literacy and financial well-being. .

Hilgert et al. (2003) document that financial management skills are strongly related to financial literacy. So, it is not surprising that a major route through which financial literacy affects financial well-being is retirement planning and accumulation of retirement wealth. In many countries around the World, individuals are expected to calculate and plan their savings to have sufficient funds to pay for their retirement so that they do not outlive their assets. This calculation requires at least an understanding of present value, basic and compound interest, etc. Lusardi and Mitchell (2005, 2007) are prime examples where the authors use these concepts as a stepping stone, and investigate the effects of financial literacy on retirement planning and saving for retirement, and thus financial well-being. Their results clearly show that financial literacy is strongly and positively correlated with financial well-being. Several other papers have reinstated their findings, such as Alessie et al. (2011), Fornero and Monticone (2011), Klapper and Panos (2011), Sekita (2011). Agnew et al. (2011) find that individuals with lower financial literacy levels are more likely to tap into their retirement funds, such as 401(k) and pension accounts.

Similarly, financial literacy is linked to higher wealth accumulation, which again is another measure of financial well-being. Behrman et al. (2010) as well as van Rooij et al. (2012) document the positive and strong relationship between financial literacy and wealth accumulation. Stango and Zinman (2009) show that the ability to calculate interest payments is correlated with accumulating higher levels of wealth. Chu et al. (2017) concentrate on the effects of financial literacy on household portfolio choice and demonstrate that households with higher financial literacy levels are more likely to invest in mutual funds, and thus are more likely to receive positive returns. Lower financial literacy levels are also correlated with self-reported excessive debt loads as reported in Lusardi and Tufano (2009). Santos and Abreu (2013) show that low levels

of financial literacy may lead to credit problems, bankruptcy and over-indebtedness. Tsai et al. (2016) demonstrate that indebtedness has adverse consequences on well-being. Furthermore, de Bassa Scheresberg (2013) show that higher levels of financial literacy indicate higher probability of holding precautionary savings. Similarly, Lusardi et al. (2011) find that financial literacy also increases the ability to cope with financial emergencies.

Financial literacy has also been linked with the households' financial costs. Research has shown that households with lower levels of financial literacy have higher mortgage costs as discussed by Moore (2003), and higher credit card costs as discussed by Mottola (2013). Similarly, lower financial literacy levels lead to higher transaction and borrowing costs as detailed in Lusardi and Tufano (2009) as well as in Lusardi and Scheresberg (2013). Furthermore, numerical ability, which forms the basis of financial literacy, has been shown to have a significant effect on mortgage defaults (Gerardi et al. 2010).

As discussed in Vlaev and Elliott (2014), the importance of financial well-being has been well established. Nevertheless, how to increase it or how to foster it is a more difficult question to answer. Among structural factors, such as age, gender and attitudes that are covariates of financial well-being, financial literacy is the most suitable for policy implementation. More importantly, the relation between financial well-being and financial literacy has been well-established both for perceived and actual financial literacy as discussed in Allgood and Walstad (2016). Under such circumstances, financial education started becoming an important policy tool to ameliorate the financial well-being of individuals. To start thinking about how to consolidate isolated efforts across countries and institutions, the OECD and its International Network on Financial Education (INFE) took the lead in setting principles for building national strategies on financial education, starting in 2010. In 2012, under Russia's Presidency, G20 leaders highlighted the importance of national strategies for financial education by endorsing the principles set by the OECD/INFE. A key element in developing such strategies is to employ tools to measure financial literacy, as summarized in OECD (2014). Many high income countries conducted thorough assessments of the financial literacy levels of their consumers to identify the groups within each country that are in dire need, as the identification of target group is the first step in designing and implementing policies to increase financial education. The analysis in this paper is has the same goal.

The financial literacy levels in five middle income countries are established and analyzed here to facilitate any policy design and implementation aimed at increasing financial literacy, and hence financial well-being. These countries are Mexico, Lebanon, Uruguay, Colombia and Turkey. This choice was essentially dictated by availability of data on financial literacy. When the World Bank Russia Trust Fund issued a call on implementing a survey instrument as a part of its Financial Literacy and Education Program, these five countries all applied to be a part of this initiative. It is not surprising that these five countries share similarities in terms of development in general and financial development in particular. Some key statistics of these five countries are provided in Table 1. The GDP data indicates that all of them are middle income countries, albeit some small differences. Even though their populations range between 3.5 million and 122.5 million, their GDP per capita levels are strikingly similar.

Two other statistics are reported, namely urbanization levels and education levels. The urbanization level may reflect the access to financial institutions. In Uruguay and Lebanon, a considerably higher share of the population lives in urban areas (95 and 87.5% respectively), while in Colombia, Turkey and Mexico, approximately three quarters do. As for education levels, the share of the population with at least a high school degree is reported.

Table 1 Key statistics. *Source*: 2013 Global Financial Development and World Development Indicators, OECD PISA 2015 Results in Focus

	Turkey	Colombia	Uruguay	Mexico	Lebanon
GDP per capita (constant 2010 USD, in thousands)	13	7	13	9	8
GDP per capita (PPP, 2011, in thousands)	22	12	19	16	14
Population 15–64 (in millions)	50.3	32.4	2.2	80.2	3.6
Share of urban population (%)	72.4	75.9	95	78.7	87.5
Share with at least a HS degree (%)	32.8	41.4	27.5	33.8	32.9[a]
PISA Math scores (2015)	420	390	418	408	396
Bank deposits to GDP	50.4%	22.6%	40.0%	27.3%	219.9%
Private credit to GDP	61.3%	48.1%	25.3%	27.4%	83.6%
ATMs per 100 thousand adults	72	39	45	47	38
Bank branches per 100 thousand adults	20	142	13	15	26
Deposit accounts per 1000 adults	3463	1369	–	1229	1214

[a]The education data refers to 2012 for all countries except Lebanon, where it refers to numbers in 2007, the closest year available

Uruguay has the lowest share where only 27.5% of the population holds at least a high school degree. Meanwhile, in Colombia 41.4% of the population does.

Clearly, the level of education may not be a good indicator for the quality of education, which in itself is difficult to measure and to compare. The PISA Math scores of these countries provide an insightful measure of the education quality as the PISA program is well established. We pick the math scores as opposed to reading and science because basic financial calculations are more likely to be covered in math classes. Note that Turkey has the highest PISA score among the countries studied here while Colombia has the lowest, and the difference between the two is less than 10%. Interestingly, Uruguay and Turkey have lower shares of more educated individuals, but they score higher on the PISA math tests. It may be the case that education is not readily available to the entire population, but to those who have access, it is of relatively higher quality.[1]

To provide some insight into the level of financial development of the aforementioned countries, Table 1 presents the ratio of bank deposits to GDP and the ratio of private credit to GDP. Lebanon is a clear outlier in terms of bank deposits to GDP. A recent report by the IMF (2017) lists the underlying reasons as high interest rates, exchange rate stability and the remittances of the large Lebanese diaspora. In Turkey and in Uruguay, the bank deposits are 50 and 40% of the GDP, respectively. The ratio of private credit to GDP also shows variation across the countries, where the highest ratio is in Lebanon at 83.6% in Lebanon, and the lowest in Uruguay at 25.3%.

Some banking sector statistics are also provided in Table 1. Corrected for differences in population, Turkey has the highest number of ATMs and one of the lowest number of bank branches. In Colombia, it is the opposite. A rough way of putting together these two statistics would be adding them up. Then, Colombia and Turkey stand out as the countries where access to a bank branch or an ATM is relatively easier. Such availability may be reflected in

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[1] PISA tests are administrated to students who are currently enrolled, thereby excluding school dropouts in the sample.

Table 2 Financial inclusion statistics. *Source*: 2014 Global Financial Inclusion Database; The World Bank

	Turkey	Colombia	Uruguay	Mexico	Lebanon
Account at a financial institution	57	38	45	39	47
Withdrawal in the past year (% with an account)	70	78	87	81	79
Saved any money in the past year	41	44	39	58	47
Saved at a financial institution	9	12	12	14	17
Borrowed any money in the past year	50	39	39	51	35
Credit card	33	14	40	18	11
Debit card	43	30	38	27	33
Outstanding mortgage	11	10	15	8	18
Coming up with emergency funds: not at all possible	50	27	23	25	18

the number of deposit accounts. In Turkey, there are 3463 accounts per 1000 adults, while Columbia has almost 1400. Uruguay and Lebanon have roughly 1200 accounts each.[2]

In all the countries studied here, the overall statistic suggests that there is more than one account per adult. Nevertheless, it may well be the case that not all adults have one. The Global Financial Inclusion Database of the World Bank sheds further light into financial inclusion. In Table 2, the share of the population that has access to certain financial tools is provided. The share of the population that has an account at a financial institution is lowest in Colombia (38%) and highest in Turkey (57%). The share that saved any money in the past year ranges between 39 and 58. At stark contrast stands the share that saved at a financial institution, which is much lower at 9 to 17%.

Very roughly, about one third of the population holds a debit card, and a smaller share holds a credit card. The shares are relatively higher in Uruguay and in Turkey. The share of the population with an outstanding mortgage is also low at 8% in Mexico (the lowest), and 18% in Lebanon (the highest). These statistics demonstrate that even though financial services may not be widely used compared to high income countries, a substantial share of the population borrows money, holds bank card and a non-negligible share has an outstanding mortgage.

The literature on the financial literacy levels of the countries analyzed here is scant. Among the Latin American and Caribbean countries studied by Garca et al. (2013) through a descriptive analysis, Colombia is the only country that we also cover. Akin et al. (2012) provide the first study on financial literacy in Turkey where they study the effect of financial literacy on consumer credit card satisfaction. In their paper, there is no direct measure of financial literacy, and the authors use financial information, financial activeness and financial sophistication as proxies. Our study is the first to establish financial literacy levels in Turkey. To the best of our knowledge, no other work exists on the financial literacy levels of the countries under study in this paper.

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[2] In Lebanon, the bank deposits are highly concentrated. The largest 1 percent of the accounts hold 50% of the bank deposits as reported by IMF (2017).

2 Data

As stated above, the data used in this study comes from the Financial Capability Survey implemented by the World Bank Russia Trust Fund as a part of their Financial Literacy and Education Program.[3]

The Financial Capability Survey was conducted in 11 countries around the World and its main goal was to deepen the understanding of financial capability in low- and middle-income countries. Within the larger context of Financial Capability, a smaller module was developed with the help of the OECD to measure financial literacy in participating countries. The implementation of the Financial Literacy Module was optional. Only five countries chose to use the Financial Literacy Module, i.e. Mexico, Lebanon, Uruguay, Colombia and Turkey. To ensure the comparability across countries, each country team was asked to translate the questionnaire from English to the official language of their respective countries, and then asked again to translate again the translated version from the official language back to English. The back translations were then checked for inconsistencies. The teams from countries where the survey would be conducted in Spanish coordinated their translations to maximize comparability.

The survey was administered to individuals and the samples drawn were representative of the national adult population of each country. A respondent was selected randomly in each household among the adults who either participate in the financial decision making in the household or are at least partially responsible for their own spending.

In this study, we focus on the financial literacy module completed by the five countries. First, we document the financial literacy levels of the countries under study. Then we try to identify the subgroups within each country that has lower levels of financial literacy. This module consists of five short questions which aim to measure basic mathematical and financial concepts, such as division, time value of money, calculation of interest on a loan, calculation of interest and principle as well as the concept of compound interest. These five questions correspond to the first five question of the eight questions used by Atkinson and Messy (2012). The questions are as follows.[4]

Each individual got a score of 1 for every correct answer and 0 for every incorrect answer they provided to these questions. Then, the financial literacy levels were calculated as the sum of correct answers to the 5 financial literacy questions, as recommended by the OECD in Atkinson and Messy (2012).[5] Therefore, financial literacy scores range from 0 to 5. Mean scores for each country are provided in Table 3 as well as the standard deviations.

Turkey has the lowest financial literacy score, 2.65 and Uruguay has the highest, 3.35. The distribution of scores is provided for each country in Table 4. Clearly, regardless of the

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[3] The Central Bank of Armenia, The Central Bank of Colombia, The Institute of Finance in Lebanon, CNBV and CONDUSEF in Mexico, The National Bureau of Statistics in Nigeria, the Capital Markets Board of Turkey, the Central Bank of Turkey, Turkish Statistical Agency and the Central Bank of Uruguay co-funded the project as explained at the following web site. https://www.finlitedu.org/measurement/wb/data/ accessed at 23 December 2013.

[4] Country teams worked with the main team at the World Bank to ensure that the questionnaire was adapted to the specific conditions of each country. Needless to say, all the US dollars in the questions were replaced with local currencies, e.g. 1000 TL.

[5] In the second question, the interviewer read out loud the first three answers to the interviewee. If the interviewee's answer was either (d) or (e), their answer was coded accordingly. We choose to accept these as correct answers. We also experimented with another definition where these answers were taken to be wrong, and the results were qualitatively and quantitatively similar.

Table 3 Mean and standard deviation of financial literacy scores

	Mean	SD
Mexico	2.80	0.028
Lebanon	3.13	0.034
Uruguay	3.35	0.034
Turkey	2.65	0.025
Colombia	2.85	0.029

Table 4 The distribution of the number of correct answers (%)

	0	1	2	3	4	5	Total
Mexico	6.4	9.3	19.9	32.6	26.1	5.7	100
Lebanon	2.1	9.7	13.6	32.7	31.9	10.1	100
Uruguay	3.8	5.9	11.8	26.7	33.8	18.1	100
Turkey	8.5	12.7	22.3	27.3	19.9	9.2	100
Colombia	4.2	7.7	20.6	38.1	25.5	3.9	100

Table 5 Share of correct answers (%)

	Division	Time value of money	Interest on a loan	Basic interest	Compound interest
Mexico	80	56	82	31	31
Lebanon	87	69	70	66	22
Uruguay	84	79	86	46	39
Turkey	84	47	72	35	26
Colombia	86	68	86	18	26
Germany	84	61	88	64	47
UK	76	61	90	61	37
Ireland	93	58	88	76	29

country, a majority of the population answered at most 3 questions correctly. In Turkey, Mexico and Colombia, about two thirds of the population scored at most 3.

The first panel of Table 5 presents the share of correct answers by question in each country. Looking at different questions, we see that about 85% of respondents answered the division question correctly. Note that there is not much variation across countries in this basic division question. More than 80% of participants can perform a basic division. As we progress from one question to the next, the share of correct answers fall. More than two thirds of the respondents in Lebanon, Uruguay and Colombia understand the time value of money. Lusardi and Mitchell (2011) also shows that countries that experienced inflation in the past have a better understanding of inflation. Nevertheless, it is surprising to see that only 56% of Mexican and 47% of Turkish participants could answer this question correctly, especially given that these countries, too, battled high inflation rates not so long ago. Calculation of the interest on a loan seems to be relatively easy as well. More than 70% can calculate the interest and the principle. This time, the share of correct answers in Lebanon and Turkey are lower than in other

Table 6 Share of correct answers by gender (%)

	Mexico	Lebanon	Uruguay	Turkey	Colombia	Total
Math—Male	79.79	91.98	87.17	90.24	90.36	90.01
Math—Female	80.50	82.87	82.43	77.89	83.20	81.03
Inflation—Male	54.95	76.34	78.25	51.73	71.82	63.89
Inflation—Female	56.06	63.28	80.63	41.81	66.39	59.83
Basic interest rate 1—Male	81.37	79.58	87.17	76.25	89.09	80.93
Basic interest rate 1—Female	82.37	62.55	85.32	68.35	84.43	74.89
Basic interest rate 2—Male	31.26	65.65	54.19	42.17	24.73	45.13
Basic interest rate 2—Female	30.97	65.89	41.16	28.20	14.86	34.21
Compound interest—Male	32.42	27.10	43.32	29.97	29.82	31.82
Compound interest—Female	30.22	17.42	36.94	21.91	23.87	24.78

countries. The last two questions prove more difficult for the residents of these developing countries as the share of correct answers fall dramatically. In Mexico and Turkey, only one third of the participants can calculate a basic interest, and can understand (and not necessarily be able to calculate) compound interest. Surprisingly in Lebanon even though 66% can calculate simple interest, only 22% understand the concept of compound interest. The share of correct answers to interest rate questions in Colombia point to an anomaly. About 87% of respondents answered the interest on a loan question correctly, but only 18% answered the basic interest correctly. Even more surprisingly, the share of correct answers increase to 26% for the compound interest question. One would have expected that respondents who understand compound interest, would have a better understanding of simple interest and thus answered that question correctly as well.

We can look at Atkinson and Messy (2012) to put these numbers in perspective as they provide the same shares for the same five questions in their paper. Even though their study has eight financial literacy questions, the first five ones coincide. We include comparable data on the UK, Germany and Ireland in Table 5. A general comparison shows that variation between countries is smallest in the division and the interest on a loan questions. On the other hand, variations in the time value of money, basic and compound interest rate questions are much greater. Data also shows that even in more developed countries, less than half of the population understands the concept of compound interest.

Previous literature has shown that gender gaps in financial literacy prevail in many countries across the World. Atkinson and Messy (2012) find that there is a gender gap in financial literacy in Albania, Armenia, Germany, Ireland, Norway, Poland, the UK and the British Virgin Islands. In another study, Bucher et al. (2012) show that females have significantly lower scores of financial literacy in the US, Germany and the Netherlands. Lusardi and Mitchell (2011) use a different international data set and find that gender gaps in financial literacy exist in Sweden, Japan, Italy and New Zealand as well. Conducting a study across Latin America and the Carribean, Garca et al. (2013) indicate that females have lower levels of financial knowledge in these countries, too. Our data points in the same direction. Table 6 reveals that financial literacy may differ substantially across genders. There are sizeable gender differences in the share of correct answers to each question in all countries, although the gender gap is considerable smaller in Uruguay and there is virtually no gender gap in Mexico. On the other end of the spectrum is Turkey, where the gender gap is the widest.

Other variables that we consider are age, marital status, education, being literate in the official language, labor market status, personal income and region, whenever possible. Previous studies show that financial literacy is a quadratic function of age, and follows an inverted-U shaped relationship across ages, with younger individuals and older individuals scoring lower as discussed by Lusardi and Mitchell (2011), Chen and Volpe (1998) and Lusardi et al. (2010). Stanculescu (2010) and Cole et al. (2011) show that those within the 25–45 age brackets score higher. We follow their lead and include age and its square to allow for non-linear effects.

Marital status variable is a dummy that takes on the value 1 if the individual is single given that the majority of the sample is married. Especially in developing countries single individuals may choose to reside with their parents until they get married, and may start managing household financing only then. In that case, single individuals may be engaging in fewer financial transactions and may have lower financial literacy levels. When they get married, they are more likely to make financial decisions and may spend more effort in increasing financial literacy.

Education may also affect financial literacy levels to the extent that more educated individuals access and process more information more easily. Atkinson and Messy (2012) find that incomplete schooling implies lower financial literacy levels and education beyond secondary schooling implies higher levels. Other studies also report that education increases financial literacy. Lusardi and Mitchell (2011) use data from Germany, Norway, Sweden, Italy, Japan, New Zealand and the US, while Bumcrot and Lusardi (2011) use state-level data in the US. Reflecting the findings in the data, education is included as a potential covariate in this analysis as well. The education variable was constructed such that the education levels in each countries were classified according to the ISCED categorization. Data in Table 7 indicates that the education levels are generally low in all five countries. The education level is relatively lower in Turkey where 44% of the population holds at most a primary education degree, and relatively higher in Lebanon where this share is limited to 28%. The share with a tertiary education degree is high in Lebanon and Colombia, and low in Turkey and Mexico.

In the literature on financial literacy, there are some papers that study differences across ethnic groups. Lusardi and Mitchell (2011) demonstrate that in the US, white and Asian ethnic groups have higher financial literacy scores. Fonseca et al. (2012) also show that minorities and ethnic groups score lower in tests of financial literacy. Even though we do not have data on ethnic background, the survey contains a question on whether the individual is literate in the official language of the respective country, which is closely related to ethnic background. The official languages of these five countries are as follows: Turkish (Turkey), Spanish (Mexico, Uruguay, Colombia), and Arabic (Lebanon). Individuals may even find it impossible to gain financial literacy if all available resources are only in the official language. Knowing how to read or write in the official language of a country may facilitate gaining financial knowledge or being illiterate in the official language may impede it. About 4 to 6% of the population was not literate in the official language of the country they resided in. For example, 6 percent of the survey participants in Lebanon said that they are not literate in Arabic. Note that in Uruguay only one percent of the population is illiterate in Spanish.

There is also evidence presented by Lusardi and Tufano (2009) that income may be an important factor as higher personal income levels may indicate either higher education or financial inclusion. Individuals with higher income levels have more opportunities to make financial decisions and therefore may spend more time and resources investing in financial education. Personal income is available only for Uruguay, Turkey and Colombia. Each

Table 7 Descriptive statistics

	Mexico	Lebanon	Uruguay	Turkey	Colombia	Total
Gender						
Male	47	43	40	52	36	45
Female	53	57	60	48	64	55
Total	100	100	100	100	100	100
Marital status						
Married	67	66	54	65	58	63
Single	33	34	46	35	42	37
Total	100	100	100	100	100	100
Education level						
Primary or below	36	28	35	44	36	37
Secondary	55	46	47	42	43	46
Tertiary	9	26	17	14	21	16
Total	100	100	100	100	100	100
Literate in official language						
No	5	6	1	4	4	4
Yes	95	94	99	96	96	96
Total	100	100	100	100	100	100
Labor market status						
Inactive	37	42	42	42	32	40
Employed	40	35	41	42	26	38
Self-employed	2	21	9	11	10	10
Unemployed	4	1	4	2	3	3
Other	16	0	4	3	29	10
Total	100	100	100	100	100	100
Personal income						
Quartile 1			9	8	52	21
Quartile 2			28	22	32	26
Quartile 3			33	32	8	26
Quartile 4			30	38	8	27
Total			100	100	100	100

country customized the questionnaire to categorize personal income into quartiles, with the hope that it would help increase the low response rates to income questions in general.[6]

Similarly, the employment status may have an effect on the financial literacy of individuals as discussed by Lusardi et al. (2011). Their analysis shows that financial literacy levels are higher for the employed and for the self-employed than for the non-employed.

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[6] When the income quartiles were being calculated, each country team was responsible for calculating the cutoff income levels from nationally representative data sets. Note that in Uruguay and Turkey, the share of the population in the higher income quartiles is higher than 25%. In other words, the individuals in the sample are relatively from higher income groups. As shown below, financial literacy is positively correlated with income, which implies that the actual financial literacy levels in Uruguay and Turkey could be even lower. A converse argument implies that financial literacy may be higher in Colombia. We would like to thank a referee for pointing this out.

Table 8 Regional distribution

Turkey	%	Colombia	%	Lebanon	%	Mexico	%
Istanbul	18	Bogota	16	Beirut	12	Central	21
Western Marmara	5	Antioquia Eje Cafetero	20	Mount Lebanon	42	East	24
Aegean	14	Centro Oriental	25	North Lebanon	18	North Central	14
Eastern Marmara	10	Sur Occidental	17	Bekaa	12	North East	4
Western Anatolia	10	Norte Caribe	22	South Lebanon	10	North West	2
Mediterranean	13	Total	100	Nabatieh	6	South	19
Central Anatolia	5			Total	100	Southeast	5
Western Black Sea	7					West	11
Eastern Black Sea	4					Total	100
Northeastern Anatolia	3						
Middleeastern Anatolia	5						
Southeastern Anatolia	7						
Total	100						

We also investigate this issue in the regression analysis. The reference category consists of the employed individuals. Data in Table 7 presents the distribution of labor market statuses among the survey participants. Surprisingly, the share of the inactives is similar across the five countries, and so is the share of the employed, with the exception of Colombia, where these shares are relatively lower. Note that the category "other" has a much larger share in Colombia.[7] Lebanon stands out as a country where self-employment is more common.

Regional information is another correlate that has potential impact on financial literacy. We include regional information in the regressions for Mexico, Turkey, Colombia and Lebanon as these are the only countries with data on regions. Table 8 presents the data.[8] Although it is not very clear why different regions would have different financial literacy levels, such a characterization may help policymakers design more directed policies to increase financial literacy as reported by Lusardi and Mitchell (2013). This issue is discussed in detail in Bumcrot and Lusardi (2011) as well as in Fornero and Monticone (2011) for the US and Italy respectively.

3 Regression Analysis

In this study, we run a linear regression model of financial literacy where the dependent variable is the financial literacy score of the individual. As discussed above, the independent variables considered in the regression analysis are as follows: age, gender, marital status, education level, knowledge of the official language in their respective country and labor market status. The reference category is an employed, married male with a high school diploma who is literate in the official language.

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[7] The "other" category was defined to be the residual category. Substantially higher shares in this category are in Mexico and in Colombia may reflect measurement issues in these two countries.

[8] Note that not all 31 states of Mexico are covered in the survey data. We contacted the country team to clarify this issue, but they did not respond.

Table 9 Regression results

	Mexico	Lebanon	Uruguay	Turkey	Colombia
Female	0.0493	− 0.270***	− 0.222***	− 0.320***	− 0.254***
	(0.0638)	(0.0725)	(0.0661)	(0.0530)	(0.0592)
Single	0.0151	− 0.0890	− 0.131**	0.0183	− 0.0434
	(0.0638)	(0.0702)	(0.0666)	(0.0546)	(0.0556)
Age	0.00220	0.0113	0.0348***	0.0316***	0.0446***
	(0.0107)	(0.0117)	(0.0101)	(0.00985)	(0.00925)
Age square	− 1.40e−05	− 0.000226*	− 0.000358***	− 0.000406***	− 0.000529***
	(0.000116)	(0.000123)	(0.000101)	(0.000108)	(9.76e−05)
Less than high school	− 0.254***	− 0.410***	− 0.714***	− 0.762***	− 0.343***
	(0.0703)	(0.0780)	(0.0751)	(0.0579)	(0.0661)
University	0.404***	0.335***	0.341***	0.193***	0.392***
	(0.101)	(0.0772)	(0.0898)	(0.0712)	(0.0716)
Not literate in official language	− 0.333**	− 0.996***	− 0.00639	− 1.199***	− 1.092***
	(0.134)	(0.136)	(0.291)	(0.124)	(0.140)
Inactive	− 0.0721	− 0.322***	− 0.0221	− 0.0999	− 0.241***
	(0.0758)	(0.0851)	(0.0860)	(0.0644)	(0.0787)
Self-employed	− 0.120	− 0.0375	− 0.0141	0.0774	− 0.181*
	(0.187)	(0.0860)	(0.120)	(0.0791)	(0.100)
Unemployed	− 0.139	− 0.0307	0.204	− 0.546***	− 0.183
	(0.146)	(0.248)	(0.173)	(0.173)	(0.162)
Other LM status	0.129	− 0.0490	− 0.153	0.415***	− 0.128*
	(0.0844)	(0.729)	(0.168)	(0.144)	(0.0727)
Constant	2.793***	3.542***	3.035***	2.649***	2.447***
	(0.237)	(0.275)	(0.249)	(0.217)	(0.214)
Observations	2012	1214	1388	3005	1524
Adjusted R-squared	0.028	0.268	0.131	0.201	0.197

Standard errors in parentheses

***$p < 0.01$, **$p < 0.05$, *$p < 0.1$

Table 9 presents the regression results for each country separately. Mirroring the international findings, our results indicate that females have lower financial literacy scores in all of the countries in the sample, except in Mexico where there is no gender gap. The lowest significant gender gap is in Uruguay. Financial literacy scores of females in Uruguay are 0.222 lower. On the other hand, Turkey has the largest gender gap, where females score 0.32 points lower. Note that the gender gap persists even when educational differences are taken into account. To investigate further the effects of gender, an interaction term between gender and marital status was included in the regressions. Such an interaction term allows the gender effects to differ for married versus single individuals. The coefficient on the interaction term was insignificant.[9] Except for Mexico, our results for gender gap in financial literacy level mirror other international comparison studies which reveal a significant gap for the countries of Armenia,

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[9] The results are available from the authors upon request.

Germany, Japan, Ireland, Netherlands, New Zealand, Norway, Poland, Sweden, the UK, the US, and the British Virgin Islands as found in Atkinson and Messy (2012). Al Tamimi and Bin Kallli (2009) report a wide gender gap in the UAE as well. In addition, our results suggest that the gender gap in the correct answer to compound interest rate question disappear. In other words, the more difficult the question for measuring one dimension of financial literacy, the smaller the gender gap.

Another persistent result is the effect of education on financial literacy. Individuals who do not hold high school degrees have lower financial literacy scores. In Mexico, they score 0.254 points lower, and in Turkey, they score 0.762 points lower. Similarly, having a university degree increases financial literacy scores, by 0.193 in Turkey versus 0.404 in Mexico. These findings are in line with the previous studies that found substantial differences in financial literacy by education: Focusing on USA, Netherlands, Switzerland and Germany, Mitchell and Lusardi (2015) report that those without college degree are much less likely to know basic financial concepts. Similarly, Atkinson and Messy (2012) find significantly higher scores for the individuals who completed their education compared to the individuals who dropped out of from secondary school even after controlling for other factors for most of the countries which they studied.

Furthermore, not being able to read and write in the official language of the country lowers financial literacy scores in all countries considered except in Uruguay where only one percent of the sample was not literate in Spanish. In Lebanon, Turkey and Colombia, not being literate in the official language decreases financial literacy scores by about 1 point; in Mexico, by 0.3 points. Not being able to read and write in the official language is one of the most important barriers to financial education. These individuals may not have access to schooling in their primary language, but the effect of being illiterate in the official language is over and above that of education. In other words, being illiterate affects financial literacy very adversely even when differences in education are accounted for. Lower education quality could be one explanation. Individuals who are illiterate in the official language may attend educational institutions of lower quality. Another explanation may be that financial information is only available in the official language of the respective country. In this case, individuals who reside in the country, but are illiterate in the official language, may find it difficult to access financial education, particularly if it is not part of the compulsory education curricula.

Regression results also indicate that financial literacy is a concave function of age. As individuals get older, their financial literacy scores increase, albeit at a decreasing rate. In Mexico, age does not significantly affect financial literacy scores. As discussed in the literature, the hump-shape of the financial literacy levels that prevails as individuals get older is reflected here as well. Even though it is impossible to distinguish age and cohort effects on financial literacy level here, similar results are found, an inverted U-shaped pattern of financial literacy, especially for Uruguay, Turkey and Colombia with respect to the previous findings studied for the countries such as Germany, Romania, Switzerland, the USA as discussed in Stanculescu (2010) and Mitchell and Lusardi (2015).

We find that single individuals in Uruguay score 0.13 points less compared to married ones. In addition, there is no gender gap in financial literacy scores among the single individuals in Uruguay. Nevertheless, marital status is not a significant factor in other countries. The literature is inconclusive. For example, Fonseca et al. (2012) find significantly lower levels for cohabiting couples and widows compared to singles in the USA whereas Bucher-Koenen and Ziegelmeyer (2014) reveal no statistical differences in financial literacy between married and single individuals. In addition, Cole et al. (2011) found no significant effects of marital status either in India or in Indonesia.

To study the effects of employment on financial literacy scores, we include controls for labor market status. In Lebanon, an individual who is inactive in the labor market scores 0.322 points lower. A similar finding is observed in Colombia. In other words, the findings on Lebanon and Colombia are in line with those reported in Lusardi et al. (2011) as well as in Al Tamimi and Bin Kallli (2009). Although the coefficient on being inactive in the labor market is negative in Uruguay and in Turkey as well, it is not significantly different than zero. Other results regarding employment status differ across countries. In Colombia, those who are self-employed score 0.181 points lower. The unemployed in Turkey score almost half a point lower. The group of "other labor market status" is a more mixed group. In Turkey, individuals in this category score 0.415 points higher, whereas in Colombia they score 0.128 points lower. It is impossible to tell from the data the employment status of these individuals in different countries. Let us remind you that the labor market status in the survey are employed, self-employed, unemployed and others. The usual classification in this category would also contain employers and unpaid family workers. It may well be that the shares of these two groups may differ significantly across different countries, and this, in its turn, may affect financial literacy scores differently.

Looking at the regression results provided in Table 9, we suspect that the coefficients on different variables may differ across countries. However, we need a more thorough analysis to test whether the coefficients are statistically different from each other. To this end, we conduct the relevant Chow tests.[10] The results of the Chow tests indicate that the gender coefficient is not the same across countries, i.e. the differences between the gender coefficients are statistically different than zero. The coefficients on lowest levels of education, i.e. the variable "less than high school", are different across countries. Finally, the coefficients on not being literate in the official language are different as well. All other coefficients are not statistically different across countries. Given that the coefficients on various variables are statistically not the same across countries, we proceed without pooling the data. That is, we continue our analysis with separate regressions for each country under study. Nevertheless, we conduct a basic regression on pooled data. However, we also include a basic analysis using pooled data below to test whether the differences in financial literacy levels across different countries stem from differences in structural characteristics of the population that are being considered here.

Note that the marginal effects of the variables seem relatively small. For instance, the largest gender gap is merely 0.32 points in Turkey. However, the standard deviations are low, ranging between 0.025 and 0.034, implying that the relative effect is non-negligible. In other words, the financial literacy scores are distributed around the mean, and hence the marginal effects estimated have substantial effects. To dig deeper into the marginal effects, each question was estimated separately for each country.[11] The results are presented in Table 10.

The regression results indicate that the gender gap in financial literacy scores stems from certain questions. More specifically, women are less likely to answer the mathematical division and interest rate questions, i.e. the interest on a loan and basic interest on a savings account. For the math question, the gender gap is largest in Turkey where the probability that a woman answers this question correctly is 7.75 percentage points lower. Women in Lebanon are 9.29 percentage points less likely to correctly calculate the interest

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[10] The econometric results are available upon request from the authors.

[11] We would like to thank one of our referees for suggesting this.

Table 10 Marginal effect estimates for gender, education and literacy in the official languages using probit and linear probability models

	Mexico		Colombia		Lebanon		Turkey		Uruguay	
	Probit	LPM	Probit	LPM	Probit	LPM	Probit	LPM	Probit	LPM
Mathematical division										
Female	0.00872	0.00718	-0.0435*	-0.0451**	-0.0554*	-0.0584**	-0.0723***	-0.0775***	-0.0384	-0.0398*
	(0.43)	(0.35)	(-2.21)	(-2.65)	(-2.45)	(-2.99)	(-5.31)	(-5.87)	(-1.95)	(-2.07)
Less than high school	-0.0857***	-0.0886***	-0.0428*	-0.0474*	-0.0444*	-0.0541*	-0.142***	-0.147***	-0.143***	-0.166***
	(-3.93)	(-3.77)	(-2.08)	(-2.11)	(-2.19)	(-2.13)	(-9.27)	(-9.85)	(-6.95)	(-6.79)
Higher education	0.0769*	0.0628*	0.0456	0.0333	0.0165	0.0108	-0.0199	-0.0168	0.0686*	0.0482*
	(2.14)	(2.38)	(1.75)	(1.82)	(0.64)	(0.66)	(-0.87)	(-1.25)	(2.10)	(2.44)
Not literate in official language	-0.0670	-0.0866	-0.219***	-0.386***	-0.160***	-0.365***	-0.199***	-0.396***	0.0518	0.0565
	(-1.77)	(-1.72)	(-6.32)	(-5.89)	(-5.55)	(-5.98)	(-7.85)	(-8.89)	(0.65)	(0.63)
Interest on a loan										
Female	0.00454	0.00448	-0.0492*	-0.0448**	-0.0931**	-0.0929***	-0.0470**	-0.0471**	-0.0128	-0.0143
	(0.23)	(0.22)	(-2.56)	(-2.60)	(-3.15)	(-3.32)	(-2.58)	(-2.59)	(-0.68)	(-0.76)
Less than high school	-0.0356	-0.0357	-0.0490*	-0.0538*	-0.155***	-0.190***	-0.121***	-0.123***	-0.116***	-0.131***
	(-1.71)	(-1.68)	(-2.40)	(-2.43)	(-5.62)	(-5.41)	(-6.26)	(-6.29)	(-5.75)	(-5.63)
Higher education	0.0600	0.0537	0.0148	0.0101	0.0548	0.0451	-0.0252	-0.0241	0.0287	0.0218
	(1.80)	(1.94)	(0.57)	(0.54)	(1.66)	(1.62)	(-0.99)	(-1.02)	(1.00)	(1.07)
Not literate in official language	-0.0311	-0.0345	-0.181***	-0.316***	-0.264***	-0.301***	-0.293***	-0.356***	0.138	0.145*
	(-0.81)	(-0.77)	(-5.12)	(-4.61)	(-4.72)	(-5.80)	(-7.21)	(-7.79)	(1.21)	(2.05)
Time value of money										
Female	0.0303	0.0299	-0.0362	-0.0372	-0.0908**	-0.0907**	-0.0626**	-0.0625**	0.0237	0.0231
	(1.20)	(1.18)	(-1.36)	(-1.43)	(-2.86)	(-2.91)	(-3.05)	(-2.99)	(1.08)	(1.03)
Less than high school	-0.0204	-0.0208	-0.0574*	-0.0601*	-0.0984**	-0.110**	-0.149***	-0.152***	-0.0788**	-0.0855**
	(-0.74)	(-0.74)	(-2.01)	(-2.00)	(-3.13)	(-3.07)	(-6.81)	(-6.73)	(-3.23)	(-3.15)
Higher education	0.115**	0.111**	0.101**	0.0910**	0.106**	0.0946**	0.0518	0.0533	0.0973**	0.0815**
	(2.81)	(2.90)	(3.06)	(3.13)	(3.08)	(3.12)	(1.89)	(1.91)	(2.93)	(3.23)

Table 10 (continued)

	Mexico		Colombia		Lebanon		Turkey		Uruguay	
	Probit	LPM	Probit	LPM	Probit	LPM	Probit	LPM	Probit	LPM
Not literate in official language	−0.0625	−0.0630	−0.218***	−0.247***	−0.258***	−0.301***	−0.227***	−0.186***	−0.175*	−0.228
	(−1.18)	(−1.17)	(−3.63)	(−3.71)	(−4.60)	(−5.03)	(−4.10)	(−4.84)	(−2.12)	(−1.95)
Basic interest rate										
Female	0.0246	0.0251	−0.0729***	−0.0793***	0.0363	0.0361	−0.0911***	−0.0897***	−0.120***	−0.123***
	(1.06)	(1.06)	(−3.58)	(−3.42)	(1.08)	(1.08)	(−4.96)	(−4.63)	(−4.72)	(−4.66)
Less than high school	−0.0719**	−0.0699**	−0.134***	−0.120***	−0.0146	−0.0150	−0.227***	−0.240***	−0.197***	−0.204***
	(−2.75)	(−2.74)	(−5.20)	(−5.42)	(−0.40)	(−0.41)	(−11.78)	(−11.25)	(−7.05)	(−6.89)
Higher education	0.145***	0.162***	0.117***	0.162***	−0.0330	−0.0337	0.113***	0.139***	0.156***	0.163***
	(4.16)	(4.04)	(5.17)	(4.98)	(−0.92)	(−0.93)	(4.82)	(4.96)	(4.49)	(4.57)
Not literate in official language	−0.116*	−0.101*	−0.168	−0.0640**	−0.00785	−0.00906	−0.438***	−0.131***	−0.199	−0.157
	(−2.16)	(−2.39)	(−1.67)	(−2.83)	(−0.12)	(−0.14)	(−3.61)	(−8.27)	(−1.54)	(−1.87)
Compound interest										
Female	−0.0172	−0.0174	−0.0484*	−0.0472	−0.0738**	−0.0717*	−0.0456*	−0.0434*	−0.0672*	−0.0679*
	(−0.73)	(−0.73)	(−1.96)	(−1.82)	(−2.78)	(−2.40)	(−2.49)	(−2.29)	(−2.53)	(−2.51)
Less than high school	−0.0395	−0.0393	−0.0629*	−0.0616*	−0.0583	−0.0470	−0.0989***	−0.101***	−0.127***	−0.127***
	(−1.54)	(−1.56)	(−2.21)	(−2.21)	(−1.81)	(−1.81)	(−5.06)	(−5.00)	(−4.18)	(−4.16)
Higher education	0.0133	0.0141	0.0837**	0.0960**	0.158***	0.207***	0.0354	0.0425	0.0257	0.0267
	(0.36)	(0.37)	(2.93)	(2.88)	(6.25)	(5.98)	(1.55)	(1.57)	(0.72)	(0.72)
Not literate in official language	−0.0538	−0.0481	−0.114	−0.0789	−0.0782	−0.0148	−0.306***	−0.130***	0.174	0.177
	(−1.03)	(−1.05)	(−1.56)	(−1.81)	(−1.02)	(−0.46)	(−3.99)	(−6.67)	(1.48)	(1.44)

on a loan. Similarly, women in Colombia (0.0793%), in Turkey (0.0897%) and in Uruguay (0.123%) are less likely to answer the basic interest rate calculation question correctly. It is interesting to see that in Uruguay, the gender gap is large and highly significant only in the basic interest rate question. The gender gaps disappear in the question regarding the compound interest rate. This finding indicates that men and women are finding it equally difficult to answer these questions.

As for the effects of education on separate financial literacy questions, the findings indicate that not having a high school degree is major obstacle to financial literacy. It is telling that individuals who do not hold a high school degree have significantly lower probabilities of performing a basic division problem, as this mathematical skill is commonly taught in compulsory primary education. This finding is common across all countries in the sample. In Uruguay, the probability that individuals without a high school degree answer the math question correctly is 16.6% lower compared to individuals with a high school degree. In Turkey, the corresponding probability is 14.7%. A similar pattern is observed in the interest on a loan question. In Lebanon, the probability of answering the interest on a loan question is 19 percent lower among those without a high school degree. In Uruguay, it is 13.1%. The strong effects of education, more specifically that of a high school degree persist across questions on the time value of money and on the basic interest rate. Nevertheless, as questions get relatively more difficult, the negative effect of having a high school degree diminishes. Once again, the difference between having a primary education and having a secondary education disappears, and that they are equally likely to struggle with these questions. Correspondingly, having a tertiary education degree increases financial literacy scores significantly only for the more difficult questions. Compared to a high school graduate, an individual with a tertiary education degree is about 16 percent more likely to answer the basic interest rate question in Uruguay and Colombia. In Lebanon, those with a tertiary education degree are 20% more likely to answer the compound interest rate question.

Illiteracy in the official language is a barrier that is difficult to surmount. Those who are not literate in the official language score consistently lower in all countries, and across most of the questions although the size of the effect diminishes as the questions get tougher. In Colombia, Lebanon and Turkey, not being literate in the official language implies a 40% lower probability of answering the math division question correctly.

3.1 Region and Income

Given that regional information is provided for only four of the countries of our sample, i.e. Mexico, Lebanon, Turkey and Colombia, we run a separate regression including regional controls for these four countries (See Table 13). One striking finding is that the coefficients on other control variables are pretty robust to the inclusion of regional dummies in Mexico, Lebanon and in Colombia. In other words, regional differences in these countries are not strongly correlated with any of the other factors that are being considered. In Mexico, participants in Northwestern, South Central, Southwestern and Western regions score significantly lower in financial literacy than those in Eastern regions. Participants living in Northwestern and Western regions score about half a point lower. Residents in regions 1 and 4 in Lebanon have significantly higher scores than residents elsewhere in Lebanon, but the differences are relatively small, i.e. around 0.2 points. In Columbia, residents in Norte Caribe have significantly lower scores by 0.253 points.

The regional outlook in Turkey is different. In Turkey, the coefficients shrink when regional controls are added. The negative effects of less education, not being literate in

Table 11 Regression results: personal income included

	Uruguay	Turkey	Colombia
Female	− 0.145**	− 0.165***	− 0.203***
	(0.0700)	(0.0596)	(0.0600)
Single	− 0.132*	− 0.122**	− 0.0256
	(0.0700)	(0.0613)	(0.0575)
Age	0.0302***	0.0256**	0.0409***
	(0.0109)	(0.0115)	(0.00964)
Age square	− 0.000333***	− 0.000426***	− 0.000507***
	(0.000108)	(0.000125)	(0.000101)
Less than high school	− 0.654***	− 0.552***	− 0.233***
	(0.0813)	(0.0717)	(0.0727)
University	0.263***	0.0905	0.277***
	(0.0962)	(0.0761)	(0.0783)
Not literate in official language	0.413	− 1.148***	− 1.053***
	(0.318)	(0.187)	(0.148)
Inactive	0.0502	0.210**	− 0.185**
	(0.0985)	(0.0904)	(0.0850)
Self-employed	0.0785	0.0698	− 0.151
	(0.126)	(0.0799)	(0.101)
Unemployed	0.263	− 0.356	− 0.109
	(0.191)	(0.352)	(0.168)
Other LM status	− 0.0719	0.469***	− 0.0864
	(0.170)	(0.147)	(0.0737)
Personal income quantile-2	0.0407	0.00733	0.201***
	(0.129)	(0.112)	(0.0672)
Personal income quantile-3	0.452***	0.0860	0.146
	(0.128)	(0.112)	(0.111)
Personal income quantile-4	0.494***	0.421***	0.475***
	(0.135)	(0.116)	(0.120)
Constant	2.787***	2.649***	2.371***
	(0.286)	(0.262)	(0.222)
Observations	1221	2211	1349
Adjusted R-squared	0.160	0.156	0.206

Standard errors in parentheses

***$p < 0.01$, **$p < 0.05$, *$p < 0.1$

the official language and being unemployed on financial literacy are considerably smaller. Moreover, the effects of having a tertiary education degree and being older are also mitigated. More interestingly, the detrimental effects of gender on financial literacy grow. When region of residence is controlled for, females score 0.336 points lower in financial literacy. Also note that regional differences are stark and large. Istanbul has the highest financial literacy scores. Compared to Istanbul, the lowest scores are in Southeast Anatolia (1.226 points), Eastern Marmara (1.234 points) and Northeast Anatolia (1.834 points). To reiterate, region of residence has large and statistically significant effects on financial

literacy in Turkey. Given that regions can predetermine 1–2 points in financial literacy scores, regional differences should become a primary concern for policymakers in Turkey. Conducting further research on regional differences in financial literacy in Turkey is imperative for the design of any meaningful policy.

Even though we control for various structural characteristics such as education, regional differences persist. Regional differences may stem from educational quality differences that we fail to control for. Alternatively, if financial education is not a part of the compulsory education curricula, access to financial information may also vary by region. Clearly, any policy to increase financial literacy should focus on the reasons behind remaining differences and tailor policies accordingly.

Another exercise is to control for income, an arguably endogenous variable. Personal income variable is provided only for Uruguay, Turkey and Colombia. Results are in Table 11. In Uruguay, financial literacy scores increase with personal income. Respondents in the upper two income groups score about half a point higher. There are similar effects for the highest income groups in Turkey and Colombia. However, there are no other significant effects in other income groups in Turkey. In Colombia, financial literacy scores of respondents in the second income group are 0.2 points higher.

The coefficients on other controls change when income controls are added to the model. For example, the gender gap in financial literacy decreases by half in Turkey, i.e. when income controls are included, the gender gap decreases from − 0.336 points to − 0.165 points. A similar, albeit smaller fall is observed in Uruguay (from − 0.222 to − 0.145) and Colombia (from − 0.254 to 0.203). Likewise, the effects of education are smaller in size in all three countries. Both the negative effects of having a primary education degree and the positive effects of having a university degree shrink in absolute terms.

Why does higher income imply higher financial literacy levels? Higher income individuals have more resources to invest in financial education. Not only do they have the resources, but they probably also have the opportunity. In other words, given higher income levels, they probably save more, make more financial decisions, etc. This may increase the returns to investing in financial education for higher income individuals as well. Reverse causality may also be a concern here as higher levels of financial literacy will help individuals make better financial decisions, and therefore increase their income. Unfortunately, it is impossible to disintegrate the two effects given the nature of the data collected for this analysis.

Lastly, we include both income and regional variables and run the regression for Turkey and Colombia, the only two countries for which both variables are available. The results are available in Table 14. The gender gap in Colombia does not change, however, that in Turkey becomes − 0.186. Remember that when only regions were included, it was − 0.320, and when only income levels were included, it was − 0.165. Again, the effects of education are further mitigated in both countries. The coefficients are generally robust otherwise.

3.2 Pooled Data

To shed light onto what may be lying underneath the cross-country differences, we run regressions on a pooled data set. Our implicit assumption in these model is that the coefficients on structural characteristics we consider are common across countries, e.g. education has the same coefficient in Mexico and in Lebanon. However, we state above that the Chow tests conducted show that the coefficients on gender, lowest level of education and not being literate in the official language are statistically different from each other in

Table 12 Regression results using pooled data

	(1)	(2)	(3)
Female	− 0.210***	− 0.168***	− 0.144***
	(0.0280)	(0.0283)	(0.0281)
Single	− 0.0121	− 0.00975	− 0.00725
	(0.0279)	(0.0283)	(0.0284)
Age	0.0219***	0.0164***	0.0168***
	(0.00458)	(0.00464)	(0.00465)
Age square	− 0.000264***	− 0.000161***	− 0.000160***
	(4.83e−05)	(4.86e−05)	(4.87e−05)
Less than high school	− 0.532***	− 0.592***	− 0.605***
	(0.0308)	(0.0310)	(0.0310)
Higher education	0.357***	0.355***	0.389***
	(0.0368)	(0.0373)	(0.0374)
Not literate in official language	− 0.833***	− 0.898***	− 0.893***
	(0.0659)	(0.0666)	(0.0668)
Inactive	− 0.146***	− 0.199***	− 0.194***
	(0.0344)	(0.0347)	(0.0349)
Self-employed	0.0348	0.0298	0.0781*
	(0.0458)	(0.0460)	(0.0465)
Unemployed	− 0.182**	− 0.163**	− 0.155*
	(0.0782)	(0.0794)	(0.0795)
Other LM status	0.0398	− 0.0866*	− 0.0262
	(0.0478)	(0.0472)	(0.0461)
Mexico	0.151***		
	(0.0353)		
Lebanon	0.399***		
	(0.0415)		
Uruguay	0.720***		
	(0.0408)		
Colombia	0.159***		
	(0.0399)		
Account at the financial institution		0.0106***	
		(0.00195)	
Credit to GDP ratio			− 0.00186***
			(0.000676)
Constant	2.630***	2.443***	2.947***
	(0.107)	(0.133)	(0.110)
Observations	9143	9143	9143
R-squared	0.171	0.143	0.141

Standard errors in parentheses

***$p < 0.01$, **$p < 0.05$, *$p < 0.1$

different countries. In other words, aggregating the data is not totally justified. Nevertheless, the coefficients on other characteristics are statistically similar, and the pooled data allows the comparison across countries. Therefore, we present the results from pooled regression, but they should be taken with a grain of salt.

Regression results using pooled data are provided in Table 12. In Model 1, we try to see whether the structural characteristics (such as differences in education levels, etc.) considered here may explain these differences. The regression results show that the coefficients on the country dummies remain significant even when the covariates are included. All previous findings are confirmed. We find that females' financial literacy scores are 0.210 points lower than those of males. Financial literacy scores increase with age and with education. Being illiterate in the official language and being inactive in the labor market are an obstacle to financial literacy. Yet, controlling for all these structural factors, important differences across countries remain. The reference country in this exercise is Turkey, and the regression results clearly show that Turkey has lower financial literacy scores than all the other countries considered. Mexican participants score 0.151 points, Colombians 0.159 points, Lebanese 0.399, Uruguayans 0.720 points higher than Turkish participants.

In Model 2 and in Model 3, instead of using country dummies, we turn to the variables discussed in the introduction to test whether the differences in financial systems may be informative. In Model 2, a variable "account at a financial institution" is included as a covariate, and it reflects the share of the adult population with an account at a financial institution for each country. Note that this is a country-level variable. Reverse causality is a potential problem here, however, we are merely trying to understand whether the differences across countries in financial inclusion, as measured by the share of the population that has an account at the financial institution, help explain differences in financial literacy. The regression results indicate the having an account at a financial institution is positively related to financial literacy. In countries where a higher share of the population has an account at a financial institution, the financial literacy levels are higher.

In Model 3, another variable introduced above, i.e. "credit to GDP ratio" is included, again as a country-level variable. The coefficient on this variable is negative, indicating that having a high credit to GDP ratio is related to having low financial literacy levels. We believe that this variable may be picking up a reverse causal relationship where low financial literacy causes high indebtedness, as found commonly in the literature.

Unfortunately, other variables pertaining to the financial development of these countries provides little explanation as to why the financial literacy levels may differ. If anything, the individuals in Turkey have wider access to bank accounts, to credit card, and to debit cards. Moreover, Turkey is comparable to Uruguay in this respect. Yet, the financial literacy levels are the lowest in Turkey and highest in Uruguay when differences in structural factors are taken into account.

4 Conclusion

The literature has unequivocally demonstrated that financial literacy is a crucial ingredient of financial well-being. Furthermore, financial literacy opens up a relatively easier route for policy design and implementation. Therefore, high income countries have been focusing on financial literacy programs since the early 2010s in an effort to invest in the financial well-being of individuals. Taking the results of the literature as a stepping stone, this paper focuses on establishing the financial literacy levels of individuals in five middle income

countries, namely Turkey, Colombia, Mexico, Uruguay and Lebanon to shed light on the design and implementation of future policies to improve financial well-being.

Using data collected by the World Bank on financial literacy as part of the Financial Capability Survey, we try to understand financial literacy and how it changes across different demographic and socioeconomic groups using a series of regressions. The results indicate that women have lower financial literacy scores than men. Some of the gender gap seems to be due to lower income levels of females, but the gender gap persists even after controlling for personal income. Education is another important determinant of financial literacy. Individuals who have at most a primary education degree have lower, and individuals who have a university degree have higher financial literacy scores than those with a high school degree in all countries that we study. Again, the effects of education are still large and significant even after controlling for income and region of residence, albeit somewhat mitigated. Not being literate in the official language is an important impediment to financial literacy, the effect of which persists even when education is taken into account.

In line with other findings in the literature, our regression results indicate that financial literacy increases with income. This finding may indicate that income is correlated with education quality and/or access to financial information. On the other hand, individuals with higher income levels may be making more financial decisions which require financial literacy. Therefore, they may invest more money and resources in acquiring financial information. Regional differences do not seem to be important in Lebanon, Uruguay and Colombia, but are sizeable in Mexico and in Turkey. Clearly, some of these differences may be due to income levels. However, regional disparities remain large and significant when income is included in the regressions.

Chow tests indicate that the effect of gender, low levels of education and not being literate in the official language on financial literacy differ in magnitude across countries. Therefore, we conduct only a basic regression on pooled data to test whether there are significant differences across countries in terms of financial literacy. We show that significant differences across countries remain even when we control for various structural characteristics, that we know affect financial literacy scores. In other words, the financial literacy levels are different even when we control for differences in gender, age, education and labor market status in different countries. The countries rank from lowest to highest scores as follows: Turkey, Mexico, Colombia, Lebanon, Uruguay. We investigate this issue further and demonstrate that differences in financial inclusion may help explain some of these differences.

Taking one question at a time, we show that gender gaps are sizeable and that less difficult questions exhibit larger gender gaps. We reiterate the importance of education. The results show that having a high school degree increases the probability that an individual answers a basic math question whereas this skill should have been obtained in compulsory primary education. In other words, this finding implies that the quality of education is also important.

A Survey Questions on Financial Literacy

1. (Division) Imagine that five brothers are given a gift of $1000. If the brothers have to share the money equally how much does each one get?
2. (Time value of money) Now imagine that the brothers have to wait for one year to get their share of the $1000. In one year's time will they be able to buy:

(a) (Read out) More with their share of the money than they could today;
(b) (Read out) The same amount;
(c) (Read out) Or, less than they could buy today.
(d) It depends on inflation
(e) It depends on the types of things that they want to buy

3. (Interest on a loan) 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?
4. (Simple interest) Suppose you put $100 into a 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?
5. (Compound interest) And how much would be in the account at the end of five years? Would it be: (Read out)

(a) More than $110
(b) Exactly $110
(c) Less than $110
(d) Or is it impossible to tell from the information given

B Further Regression Results

Table 13 Regression results: regional controls included

	Mexico	Lebanon	Turkey	Colombia
Female	0.0439	− 0.261***	− 0.336***	− 0.257***
	(0.0631)	(0.0726)	(0.0497)	(0.0591)
Single	− 0.00846	− 0.0953	− 0.00938	− 0.0537
	(0.0632)	(0.0700)	(0.0514)	(0.0560)
Age	0.00374	0.0118	0.0203**	0.0440***
	(0.0106)	(0.0117)	(0.00923)	(0.00923)
Age square	− 2.87e−05	− 0.000230*	− 0.000314***	− 0.000526***
	(0.000115)	(0.000123)	(0.000101)	(9.74e−05)
Less than high school	− 0.288***	− 0.417***	− 0.661***	− 0.338***
	(0.0703)	(0.0789)	(0.0552)	(0.0662)
University	0.339***	0.347***	0.162**	0.408***
	(0.101)	(0.0776)	(0.0665)	(0.0718)
Not literate in official language	− 0.352***	− 0.967***	− 1.078***	− 1.046***
	(0.132)	(0.137)	(0.119)	(0.140)
Inactive	− 0.0887	− 0.337***	0.0336	− 0.223***
	(0.0749)	(0.0854)	(0.0611)	(0.0786)
Self-employed	− 0.168	− 0.0225	0.166**	− 0.116
	(0.186)	(0.0860)	(0.0747)	(0.103)
Unemployed	− 0.161	− 0.0759	− 0.332**	− 0.184
	(0.144)	(0.248)	(0.162)	(0.161)
Other LM status	0.0495	0.0560	0.380***	− 0.115
	(0.0847)	(0.728)	(0.135)	(0.0728)
Central	− 0.501***			
	(0.0829)			
North Central	− 0.197**			
	(0.0940)			
North East	− 0.255*			
	(0.150)			
North West	− 0.312			
	(0.205)			
South	− 0.245***			
	(0.0849)			
Southeast	− 0.758***			
	(0.136)			
West	− 0.460***			
	(0.101)			
Beirut		0.207**		
		(0.0982)		
North Lebanon		0.130		
		(0.0857)		
Bekaa		0.191*		
		(0.0972)		
South Lebanon		− 0.134		
		(0.104)		

Table 13 (continued)

	Mexico	Lebanon	Turkey	Colombia
Nabatieh		− 0.118		
		(0.125)		
Western Marmara			− 1.000***	
			(0.112)	
Aegeam			− 0.777***	
			(0.0776)	
Eastern Marmara			− 1.234***	
			(0.0854)	
Western Anatolia			− 1.016***	
			(0.0844)	
Mediterranean			− 0.333***	
			(0.0816)	
Central Anatolia			− 0.829***	
			(0.107)	
Western Black Sea			− 1.134***	
			(0.0957)	
Eastern Black Sea			− 0.692***	
			(0.118)	
Northeastern Anatolia			− 1.834***	
			(0.140)	
Middleeastern Anatolia			− 1.175***	
			(0.114)	
Southeastern Anatolia			− 1.226***	
			(0.0981)	
Bogota				− 0.00419
				(0.0837)
Antioquia Eje Cafetero				− 0.0811
				(0.0792)
Sur Occidental				0.0191
				(0.0837)
Norte Caribe				− 0.253***
				(0.0769)
Constant	3.094***	3.479***	3.601***	2.521***
	(0.239)	(0.276)	(0.210)	(0.218)
Observations	2012	1214	3005	1524
Adjusted R-squared	0.052	0.273	0.309	0.203

Standard errors in parentheses

***$p < 0.01$, **$p < 0.05$, *$p < 0.1$

Table 14 Regression result including personal income and region

	(1) Turkey	(2) Colombia
Female	− 0.186***	− 0.203***
	(0.0570)	(0.0599)
Single	− 0.123**	− 0.0327
	(0.0588)	(0.0580)
Age	0.0217**	0.0400***
	(0.0109)	(0.00963)
Age square	− 0.000383***	− 0.000503***
	(0.000118)	(0.000101)
Less than high school	− 0.511***	− 0.227***
	(0.0686)	(0.0728)
University	0.111	0.288***
	(0.0721)	(0.0787)
Not literate in official language	− 1.082***	− 1.018***
	(0.179)	(0.148)
Inactive	0.206**	− 0.158*
	(0.0855)	(0.0854)
Self-employed	0.122	− 0.0897
	(0.0765)	(0.104)
Unemployed	− 0.318	− 0.102
	(0.332)	(0.168)
Other LM status	0.401***	− 0.0738
	(0.140)	(0.0738)
Personal income quantile-2	0.0531	0.208***
	(0.108)	(0.0673)
Personal income quantile-3	0.116	0.163
	(0.111)	(0.111)
Personal income quantile-4	0.275**	0.489***
	(0.116)	(0.120)
Western Marmara	− 1.058***	
	(0.130)	
Aegean	− 0.675***	
	(0.0894)	
Eastern Marmara	− 1.184***	
	(0.101)	
Western Marmara	− 0.852***	
	(0.0958)	
Mediterranean	− 0.199**	
	(0.0972)	
Central Anatolia	− 0.594***	
	(0.135)	
Western Black Sea	− 1.022***	
	(0.107)	
Eastern Black Sea	− 0.574***	
	(0.133)	

Table 14 (continued)

	(1) Turkey	(2) Colombia
Northeast Anatolia	− 1.680***	
	(0.197)	
Central East Anatolia	− 0.925***	
	(0.150)	
Southeast Anatolia	− 0.928***	
	(0.131)	
Bogota		− 0.0112
		(0.0891)
Antioquia Eje Cafetero		− 0.0861
		(0.0818)
Sur Occidental		0.0626
		(0.0894)
Norte Caribe		− 0.196**
		(0.0812)
Constant	3.362***	2.433***
	(0.257)	(0.227)
Observations	2211	1349
Adjusted R-squared	0.253	0.210

Standard errors in parentheses

***$p < 0.01$, **$p < 0.05$, *$p < 0.1$

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