Financial Literacy and Student Debt*

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Abstract

We use a large sample of over 1,000 students from a major, land-grant, public university in Massachusetts to examine the level of financial literacy and its implications on the repayment of student debt. We find low levels of financial literacy (39.5%), particularly among female (26%), minority (24%) and first-generation (33%) students. We show that low literacy students are more likely to underestimate future student loan payments both at the extensive and intensive margin; 38.2%(19.5%) of students with low (high) literacy levels underestimate future payments by more than $1,000 annually. As a result, low literacy students are more exposed to unexpectedly higher payment-to-income ratios post-graduation (18% higher on average) that can impair their future creditworthiness and undermine their ability to service student debt.

Keywords: Financial literacy, debt literacy, student debt, gender gap, student loan default

JEL Classification: D84, I22, I23, J16

Introduction

In recent years, the increase in outstanding student debt (Looney and Yannelis (2015)) and student loan default rates (Mueller and Yannelis (2018)) have raised concerns regarding the value of outcomes in higher education and the consequences of overindebtedness for young borrowers. These facts also highlight the importance of financial literacy for young adults that are more susceptible to financial mistakes (Agarwal et al. (2009)). This is because nowadays students are more oftenly asked to make long-term, life-changing decisions related to investing on their human capital and accumulating debt, despite evidence that they exhibit low levels of financial literacy (Lusardi et al. (2010).

In this study, we explore the links between financial literacy and student debt using a large sample of 1,040 students from a land-grant, public University in Massachusetts. We assess financial literacy from three questions on interest compounding, inflation and risk diversification that have been extensively used in the past literature (Lusardi and Mitchell (2008), Lusardi et al. (2010)). Our survey also includes information on demographics and student loan characteristics (outstanding amount, interest rate, maturity) that we use to estimate future student loan payments. We compare these estimates to expected payments, as per our survey responses, to examine whether financial literacy is systematically associated with differences between actual and expected amounts. Finally, we use responses on expected starting salaries to assess the impact of payment underestimations on payment-to-income ratios.

Our results indicate low levels of financial literacy among undergraduate students; we find a 39.5% literacy rate (36%, if weighted by college). We document a significant financial literacy gender gap, as female students exhibit very low literacy rates (26%) compared to their male peers (56%), consistent with findings of previous studies (Chen and Volpe (2002), Ford and Kent (2010), Lusardi et al. (2010)). We also find a significant deficit in literacy among minority (24%) and first generation students (33%), and higher literacy rates for Honors students (44%). We show that there is significant variation on financial literacy rates among colleges; students in schools with focus on financial knowledge (Mahdavi and Horton (2014)) and numeracy (Christelis et al. (2010), Gerardi et al. (2013)), such as Business, Engineering and Computer Science, exhibit significantly higher financial literacy levels than their peers majoring in Humanities, Natural Sciences and Public

Health (see Table 1, Figures 1 & A.I).

Next, we use survey responses on student loan characteristics to estimate actual future loan payments and compare them to expected payments provided by the respondents. We find that students with low literacy levels significantly underestimate their future loan payments both in the intensive and the extensive margin. We show that 38% of respondents with low literacy underestimate their future loan payments by at least $1,000 annually, while for financially literate students this rate is just 19.5%. Overall, we find that the average student with low literacy underestimates student loan payments by $575 annually, while the average literate student overestimates actual payments by just $25. The importance of this bias is not symmetric, as underestimation (overestimation) of the debt payments is associated with an unexpected, negative (positive) cash flow shock post-graduation (see Table 2, Figure 2).

Furthermore, we use a sub-sample of business majors, for which we have information on both expected and realized starting salaries to show that low literacy students expect significantly lower starting salaries ($48,596) than their literate peers ($57,410). This difference remains significant across genders, and it is double as large as the well-documented gender wage gap (Becker (1957)). It also persists within majors, which alleviates concerns that the financial literacy wage gap is a result of self-selection of literate students into high-earning majors. We also provide evidence that the financial literacy expected wage gap is pervasive across campus (see Tables 4 & A.I).

We combine the findings on the underestimation of student loan payments and expected starting salaries to assess the effect on the future debt burden for students of different literacy levels. We find that low literacy students not only have higher expected payment-to-income (PTI) ratios (8.23%) than their literate peers (6.78%), but also, due to the underestimation bias, they are exposed to unexpectedly higher actual PTI ratios post-graduation (9.72% on average). The impact is more severe at the right tail of the distribution, where instead of 14.5% (6.5%) of low literacy students that expect to graduate with a PTI above 10% (15%), the actual percentage is 39.5% (16.9%). This unexpected shock on the payment to income ratios for low literacy students can impair their future creditworthiness and undermine their ability to service student loans post-graduation.

Our study contributes to the growing body of literature on the importance of financial literacy that documents low literacy levels across various groups of interest (see Lusardi and Mitchell (2014)) and countries (Lusardi and Mitchell (2011)), consistent with our findings. The deficit in

financial literacy is shown to be associated with debt problems (Lusardi and Tufano (2015)) and increased propensity to default (Gerardi et al. (2013)), sub-optimal investment strategies (Van Rooij et al. (2011), Hastings and Tejeda-Ashton (2008)), lower rates of wealth accumulation (Lusardi et al. (2017)) and less efficient wealth management (Hilgert et al. (2003)) and retirement planning (Lusardi and Mitchell (2007), Lusardi and Mitchell (2008)). We contribute to this line of literature by providing evidence on the financial literacy level of undergraduates from a large-scale survey that documents significant literacy gaps for female, minority and first generation students.

More importantly, our results provide a causal link between financial literacy and financial behaviors. Klapper et al. (2013) note that correlations between literacy levels and financial outcomes do not imply causation. Threfore, in order to establish a causal link, one has to rely on an exogenous source of variation in financial literacy that is subject to the strenght of the instrument used (see Fernandes et al. (2014)), or focus on the relation between financial mistakes and literacy levels, since it is hard to argue that the former cause the latter (Klapper et al. (2013)). In this study, we explicitly show that students with low levels of financial literacy are more likely to underestimate future loan payments, which in turn can impair their ability to repay student debt.

Finally, our findings suggest that financial literacy can have an important role in explaining the increasing rate of student loan defaults. Looney and Yannelis (2015) show that the rise of student loan default rates, in recent years, is mainly associated with the increase of non-traditional borrowers, students that come from disadvantaged backgrounds and attend non-selective institutions. Furthermore, the traditional household default literature identifies unexpected changes in the debt-to-income ratios, caused by an adverse life event (i.e. job loss, death in the family, illness, divorce), as a key factor for household delinquincies (see Fay et al. (2002)). Here, we show that low literacy students are more exposed to unexpected shocks in their debt-to-income ratios, originating from the underestimation of future payments rather than an income shock. These unexpected shocks may explain the higher default rates of non-traditional borrowers compared to traditional borrowers, if the former exhibit lower levels of financial literacy.

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Figures

Figure 1: **Financial Literacy by College and Gender**
The figure presents the percentage of financial literate male and female students within each college ($N = 1,040$). Survey participants are defined as financial literate, if they have responded correctly to all three financial literacy questions.
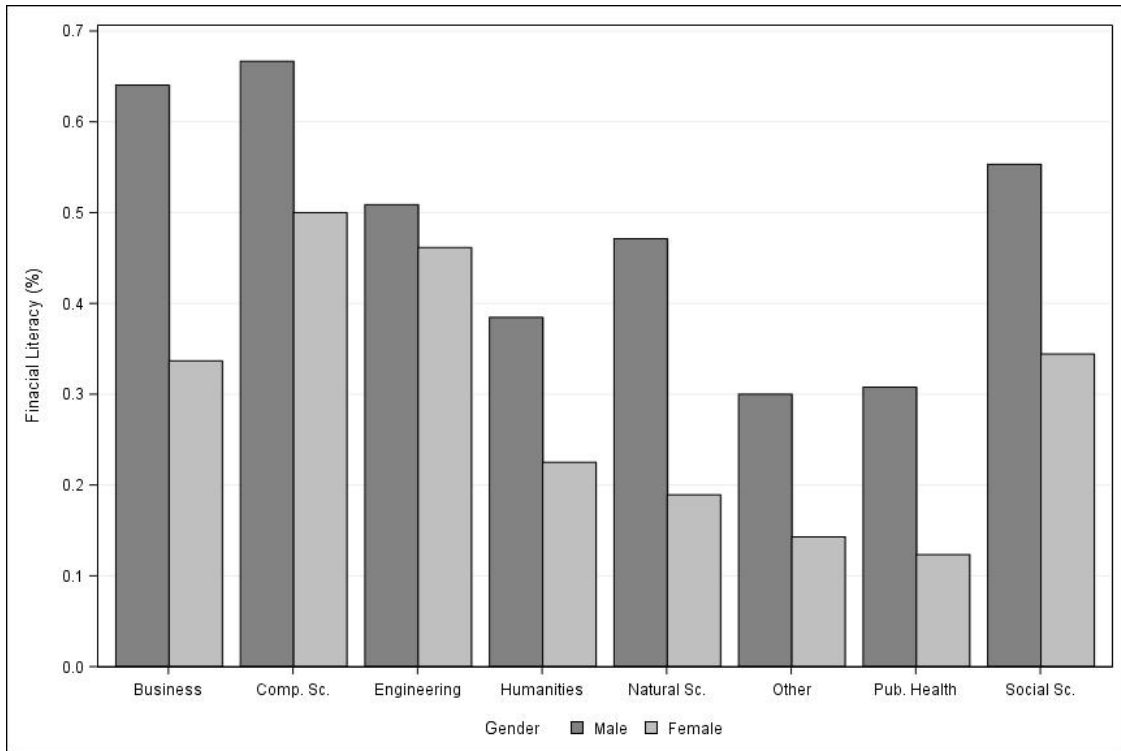
Figure 2: **Underestimation of Student Loan Payments**
The figure presents a histogram of the annual underestimation of student loan payments for literate and illiterate students ($N = 213$). Underestimation is defined as the difference between the mid-point of the expected payment bucket minus the actual payment calculated using the loan inputs provided by the respondents.
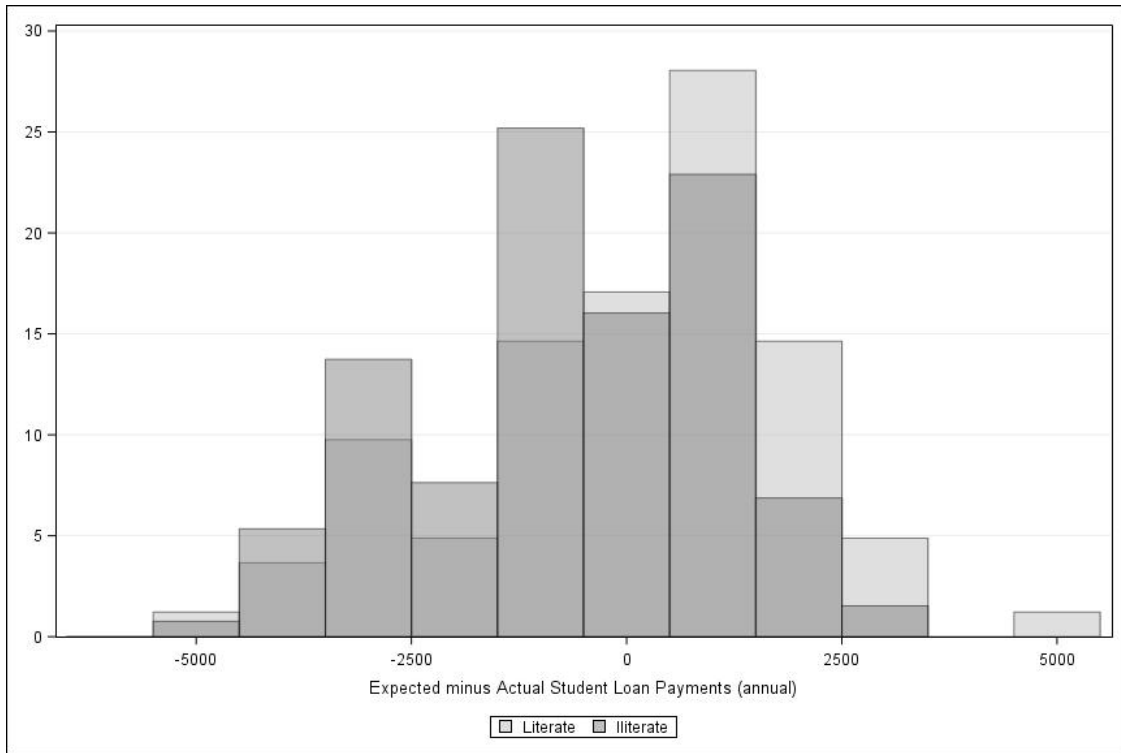
Figure 3: **Expected and Actual Payment-to-Income Ratios**
This figure presents the distribution of expected and actual payment-to-income (PTI) ratios for student with low and high financial literacy. Expected PTI is defined as ratio of the midpoint of expected payments to the midpoint of expected salary from survey responses. Actual PTI is defined as the ratio of annual student loan payments, estimated from loan characteristics provided by survey responses to the expected starting salary.
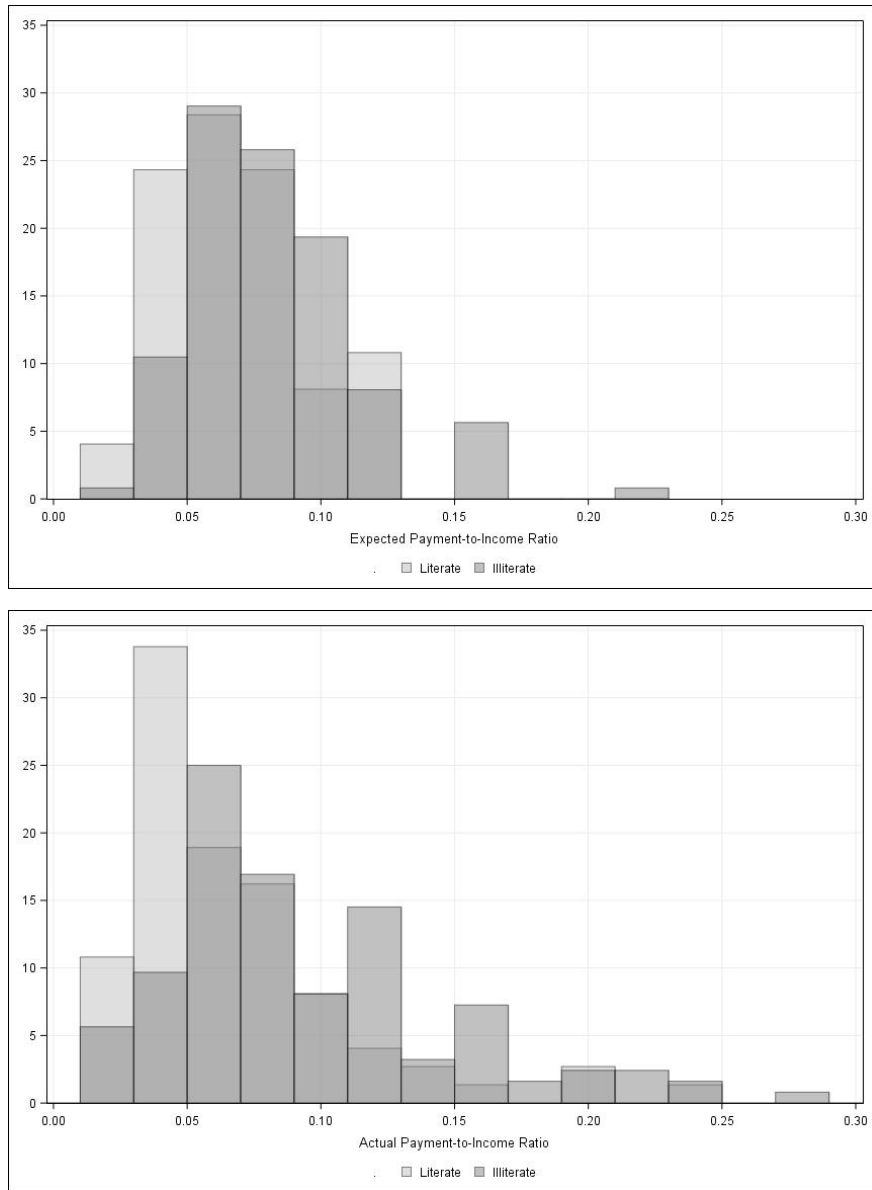
Tables

Table 1: **Financial Literacy Across Groups of Interest**
The table presents the percentage of students that responded correctly to the all three questions (Fin.Literate) and to each question (Interest rate, Inflation, Diversification) separately within each group. Column "Diff" shows differences in means with respect to the reference group (in italics) with significance at the 1%, 5%, and 10% levels indicated by ***, **, and *, respectively. The last column reports sample size for each group.

	Fin.Literate (All 3)	Dif.	Int.Rate (Q1)	Inflation (Q2)	Diversify (Q3)	N
Total	39.52		87.6	67.88	53.27	1,040
Gender						
Male	56.22		92.92	79.61	66.31	466
Female	25.96	-30.26***	83.28	58.36	42.68	574
Ethnicity						
White	40.49		86.85	69.01	53.78	768
Asian	41.29	0.80	93.53	68.66	52.74	201
Hispanic	27.27	-13.22*	77.27	59.09	56.82	44
Afr. American	18.52	-21.98**	81.48	44.44	37.04	27
Year						
Freshman	41.84	6.09	85.82	72.34	55.32	141
Sophomore	44.82	9.07**	86.55	71.43	57.70	357
Junior	35.24	-0.51	88.83	65.33	49.00	349
Senior	35.75		88.60	62.69	51.30	193
College						
Business School	49.12		91.98	70.43	64.16	399
Comp. Sciences	63.64	14.51*	95.45	84.09	70.45	44
Engineering	50.00	0.88	91.43	82.86	58.57	70
Humanities	26.42	-22.71***	88.68	50.94	41.51	53
Natural Sc	29.79	-19.34***	81.70	68.09	42.13	235
Public Health	15.12	-34.01***	82.56	47.67	26.74	86
Social Sciences	43.52	-5.60	85.19	68.52	61.11	108
Other	17.78	-31.35***	80.00	62.22	35.56	45
Parents Education						
NonFirstGen	41.03		87.36	68.59	54.87	831
FirstGen	33.49	-7.54**	88.52	65.07	46.89	209
Honors						
NonHonors	36.67		86.27	67.69	51.21	619
Honors	43.71	7.03**	89.55	68.17	56.29	421

Table 2: **Summary Statistics on Student Debt and Expected Salaries**
The table summarize student responses for characteristics of student debt and expected salaries as percentages of the respective sample. For questions on interest rate, maturity and expected monthly payment the sample includes only respondents that reported a non-zero total student debt (upon graduation).

	Total	Female	Minority	First Gen.	Honors
Funding Source(s)					
Private Funds	83.85	83.62	83.85	72.25	90.50
Student Loans	64.42	63.94	64.42	83.25	56.53
Scholarships	62.50	64.63	62.50	63.64	75.53
Loan Type					
Federal Loans	39.52	41.11	39.52	52.15	37.29
Private Loans	6.44	6.27	6.44	3.83	5.70
Both	18.08	16.38	18.08	27.75	11.64
None	35.96	36.24	35.96	16.27	45.37
Total Student Debt					
None	36.15	36.93	36.15	18.18	43.94
<$10,000	11.25	12.20	11.25	7.66	12.59
$10-20,000	16.35	16.03	16.35	21.05	14.25
$20-30,000	15.87	15.68	15.87	21.53	15.20
$30-40,000	7.31	6.27	7.31	15.79	4.75
$40-50,000	6.35	6.79	6.35	7.18	3.56
>$50,000	6.73	6.10	6.73	8.61	5.70
Exp. Starting Salary					
<$30,000	11.81	15.24	14.29	10.63	11.93
$30-40,000	16.84	22.59	25.71	20.29	14.80
$40-50,000	22.56	24.52	14.29	23.19	19.33
$50-60,000	23.04	19.09	22.86	22.22	21.24
$60-70,000	15.39	11.73	11.43	13.04	18.62
>$70,000	10.36	6.83	11.43	10.63	14.08
N	1,040	574	71	209	421
Interest Rate					
0-3%	15.06	16.57	14.55	15.20	18.22
3-6%	32.23	28.45	32.73	35.09	24.58
6-9%	9.04	9.39	14.55	12.87	8.47
9-12%	1.66	1.66	7.27	2.92	2.12
I don't know	42.02	43.92	30.91	33.92	46.61
Maturity					
<5 years	28.61	30.66	27.27	27.49	34.75
5-10 years	48.19	47.24	49.09	48.54	44.92
11-15 years	15.81	15.47	16.36	16.96	16.10
16-20 years	4.82	3.87	3.64	6.43	2.12
>20 years	2.56	2.76	3.64	0.58	2.12
Exp. Mon. Payment					
<$200	27.11	27.90	29.09	20.47	31.78
$200-300	39.31	40.06	32.73	36.26	40.68
$300-400	21.23	20.44	23.64	25.15	17.80
$400-500	6.78	7.18	5.45	10.53	5.51
>$500	5.57	4.42	9.09	7.60	4.24
N	664	362	55	171	236

Table 3: **Marginal Effects on Financial Literacy**

The table presents marginal effects from a logistic regression on financial literacy (Lit), using the average partial effects method, as in Costa (1995). Corresponding standard errors using the Delta method are shown in brackets. P-values are computed based on the χ_1^2 distribution of the Wald statistic (see Wooldridge (2010)), with significance at the 1%, 5%, and 10% levels indicated by ***, **, and *, respectively.

Dep. Variable:	$Lit = 1$ if financially literate, 0 otherwise			
Male	0.2885***	0.2877***	0.2945***	0.2919***
	[0.0235]	[0.0236]	[0.0234]	[0.0245]
Minority		-0.1731***	-0.1676***	-0.1511**
		[0.0626]	[0.0634]	[0.0655]
Honors			0.0985***	0.1036***
			[0.0324]	[0.0331]
FirstGen			-0.0541	-0.0274
			[0.0412]	[0.0428]
No Debt				0.0912***
				[0.0337]
Business				0.1408***
				[0.0318]

Table 4: **Expected and Actual Starting Salaries**
The table presents average starting salaries of the class of 2017 from the business school of our university by department, gender and honors status (1). In column (2) we report the average expected starting salary for sub-samples with similar characteristics from our survey, that we further refine between literate (4) and illiterate (5). We report differences in means, from a simple t-test (3) and a two-sample t-test (6) and significance at the 1%, 5%, and 10% levels indicated by ***, **, and *, respectively.

	Panel A			Panel B		
	Act. Salary (1)	Exp. Salary (2)	Dif. (1)-(2)	Exp. Salary (Lit=1) (4)	Exp. Salary (Lit=0) (5)	Dif. (4)-(5)
Total	52,971	52,915	56	57,410	48,596	8,814***
Gender						
Female	51,014	49,949	1065	54,697	47,538	7,159***
Male	55,092	55,792	-700	58,798	50,479	8,319***
Department						
Accounting	58,886	54,508	4,377***	57,222	50,600	6,622**
Finance	57,114	55,231	1,883	59,250	48,800	10,450***
HTM	42,998	45,455	-2,457	53,333	42,500	10,833***
Management	55,815	52,222	3,593**	54,333	50,714	3,619
Marketing	48,164	47,619	545	49,706	46,200	3,506
OIM	57,897	58,333	-436	61,296	54,524	6,772***
Sports Mgt	44,427	50,676	-6,249**	55,000	49,483	5,517

Table 5: **Expected & Actual Payment-to-Income Ratios**
The table presents summary statistics (mean, median and the 25th & 75th percentile) of expected and actual payment-to-income (PTI) ratios. Expected PTI is defined as ratio of the midpoint of expected payments to the midpoint of expected salary from survey responses. Actual PTI is defined as the ratio of annual student loan payments, estimated from loan characteristics provided by survey responses to the expected starting salary. The last two columns report the percentage of population with PTI above 10% and 15%, respectively.

	Mean	25th Perc.	Median	75th Perc.	Above 10%	Above 15%
Total						
Expected PTI	7.69%	5.45%	7.64%	9.33%	13.13%	4.04%
Actual PTI	8.62%	4.76%	7.15%	11.24%	30.30%	12.63%
Fin. Literate						
Expected PTI	6.79%	4.62%	6.67%	8.31%	10.81%	0.00%
Actual PTI	6.78%	4.07%	5.24%	8.47%	14.86%	5.41%
Fin. Illiterate						
Expected PTI	8.23%	6.46%	7.64%	9.33%	14.52%	6.45%
Actual PTI	9.72%	5.76%	8.52%	12.24%	39.52%	16.95%

Appendix

Figure A.I: **Financial Literacy of Business School Students by Major and Gender**
The figure presents the percentage of financial literate male and female students in each major of the business school (N=399). Survey participants are defined as financial literate, if they have responded correctly to all three financial literacy questions.
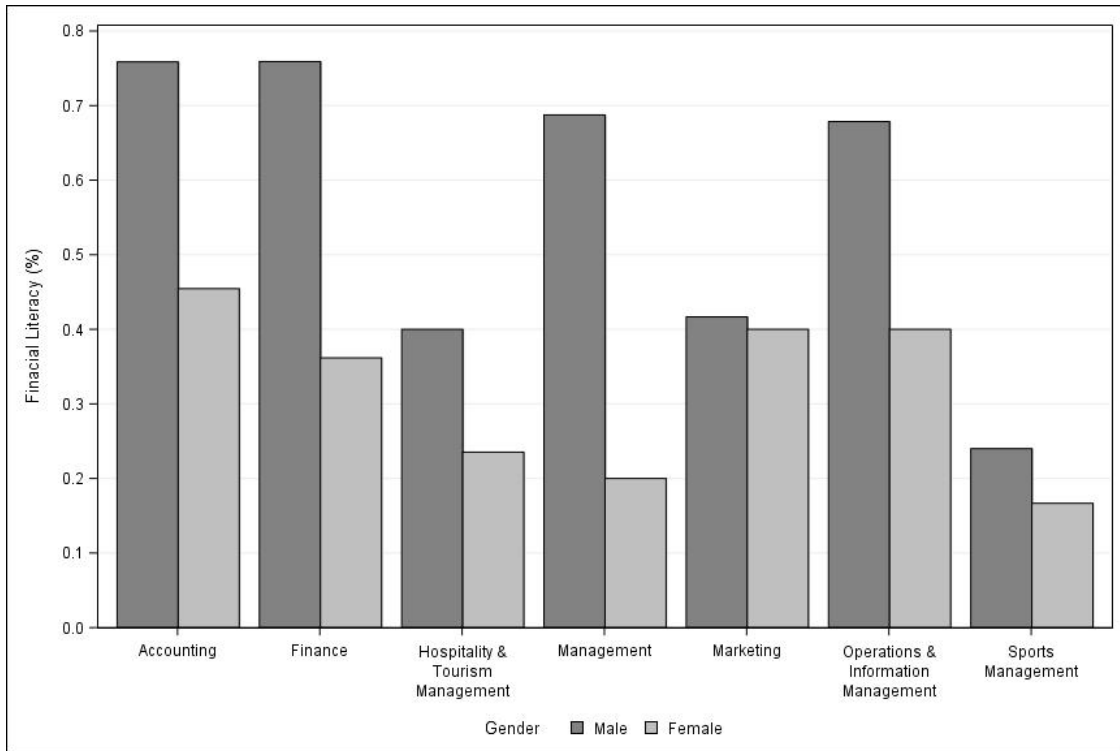
Table A.I: **Expected Starting Salaries across Colleges**
The table reports average expected starting salaries for students of high and low financial literacy.
We report differences in means, from a simple t-test (3) and a two-sample t-test (6) and significance
at the 1%, 5%, and 10% levels indicated by ***, **, and *, respectively.

	Exp. Salary (Lit=1)	Exp. Salary (Lit=0)	Dif.	N
Total	54,167	46,360	7,807***	1,033
Gender				
Female	49,218	44,882	4,336***	571
Male	56,954	49,478	7,476***	462
College				
Business School	57,410	48,596	8,814***	398
Comp. Sciences	66,786	61,875	4,911*	44
Engineering	60,143	60,714	-571	70
Humanities	37,308	38,684	-1,377	51
Natural Sciences	48,478	43,528	4,951***	232
Public Health	45,000	43,611	1,389	85
Social Sciences	46,702	41,557	5,145**	108
Other	40,000	47,432	-7,432	45