Becoming patient: The effects of financial literacy on time preference

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Abstract

Time preference, the ability to delay gratification, matters for a wide range of life outcomes, but little is known about factors that explain variation in the degree to which individuals discount future payoffs. This paper investigates whether financial literacy changes people's time preference. Existing empirical research is plagued by a classic endogeneity problem: do more patient people have a propensity to acquire financial literacy, or does financial literacy lower their discount rate? I address this fundamental question by conducting a classroom experiment on a sample of undergraduate students. The results indicate that financial literacy lowers discount rates, and that there is not a selection effect. Furthermore, more education in general does not change time preferences, only financial literacy does.

Keywords: Financial literacy, experiment, discount rates, economic behavior, time preference

1 Introduction

Time preference refers to the phenomenon of an individual discounting the value of a reward to be received in the future relative to receiving the reward right now. The degree to which an individual discounts the future reward is referred to as the subjective discount rate or SDR: a higher SDR indicates that the individual is more focused on the present and less patient, a lower one indicates that the individual is more patient and future oriented. Patience is conceptualized as an individual-level disposition: some individuals are more patient than others, and these individuals are more likely to exhibit delayed gratification behaviors in several spheres. Patience plays a prominent role in both the economics and the psychology literatures. Findings suggest that more patient people are more cooperative and that they have better financial outcomes, for instance through searching longer for a good job, having higher credit scores, and being less likely to default on their loans (Curry, M. E. Price, and J. G. Price, 2008; Daly, Delaney, and Harmon, 2009; Della Vigna and Paserman, 2005; Meier and Sprenger, 2007). Recently, scholars have also analyzed how patience is relevant in the political realm, specifically with respect to policy issues with long-term implications (Amdur et al., 2015; Fowler and Kam, 2006; Healy and Malhotra, 2009; Jacobs and Matthews, 2012; Magistro, 2019). To what extent are citizens willing to make sacrifices today in order to enact policies that will bear benefits in the long run? Fowler and Kam (2006) find that patience significantly increases voter turnout. This is intuitive as the costs of voting must be borne before the benefits are realized, so people who are more patient should be more willing to vote. Similarly, Amdur et al. (2015) find that individuals with higher discount rates are significantly less likely to

support the imposition of a carbon tax in comparison with individuals that have lower discount rates. Jacobs and Matthews (2012) find clear evidence that the mass public discounts longer-term policy benefits. However, their data lends little support that this is due to varying time preference. In contrast, they find strong evidence across a diverse set of tests that uncertainty looms large in citizens' intertemporal policy assessments. Conversely, Magistro (2019) finds that financially literate short-term losers from policies with long-term benefits are more likely to favor them than similar financially illiterate individuals. She argues that financially literate individuals may be more patient and finds support for this claim, as these individuals indeed have significantly lower subjective discount rates, albeit without addressing possible endogeneity concerns.

These studies clearly show that discount rates affect economic and political behavior, however the literature has been relatively silent on factors that explain variation in the degree to which individuals discount future payoffs. This study investigates the role that one aspect of education, specifically financial education, has on affecting subjective discount rates. Does financial literacy make people more patient? If so, how does financial literacy affect SDRs? Financial literacy, through learning concepts like the time value of money, compound interest, inflation, capital budgeting, risk and return in financial markets, and risk diversification, is expected to decrease SDRs. When learning about the time value of money, people learn that money available at the present time is worth more than the identical sum in the future due to its earning capacity. One would also learn the basic process to calculate the future value (FV) and the present value (PV) of an amount of money. For example if one were to calculate the future value, one year from now, of $100 one would do:

$$FV = PV \times (1 + i)^n \tag{1}$$

where *i* is the interest rate and *n* is the number of compounding periods. If one were to invest \$100 and the current interest rate *i* were 5%, in one year they would have 105\$. Assuming one does not need that money immediately, it is plausible that people who have learned about the time value of money, when asked about what sum of money would make them indifferent between 100\$ now and that sum one year from now, are more likely to indicate a number close to the FV of 100\$, i.e., 105\$.

To answer this question empirically, I use a classroom experiment among undergraduate students in economics and finance, and political science. In doing this I also attempt to address some endogeneity concerns that have undermined some past studies (Lahav, Rosenboim, and Shavit, 2015). The first question I tackle is whether learning financial concepts such as the time value of money and basic capitalization contributes to changing time preferences and making people more patient. Secondly, I test whether there is a selection effects of students choosing to study economics and finance, and hence whether they have lower SDRs to start with. Finally, I examine whether more education in general, not necessarily financial, decreases SDRs or not. Findings show that financial literacy decreases subjective discount rates significantly; there is not a selection effect into economics and finance, as students enrolling in these fields do not have significantly lower SDRs than other students when they start college; and finally more schooling in general does not change time preferences, only financial education does.

2 Theorizing the effect of financial literacy on discount rates

Although findings increasingly suggest that discount rates affect economic and political behavior, there is surprisingly little empirical evidence regarding the process through which discount rates

are formed. A range of studies find a positive relationship between age and impatience, possibly explained by older people's expectations of a shorter stream of future utility (Becker and Mulligan, 1997; D. Read and N. L. Read, 2004). Furthermore, patience increases with financial resources (Becker and Mulligan, 1997; D. Read and N. L. Read, 2004) and with education, which can be seen as an investment in patience (Bauer and Chytilová, 2010; Perez-Arce, 2011).

A question that has not received much attention, and that is tested here, is that financial literacy may affect subjective discount rates. Financial literacy is the ability to understand basic economic concepts in relation to the functioning of modern economies and the achievement of individual financial well-being.

The relationship between financial literacy and personal financial decisions is well documented in the literature (Behrman et al., 2012; Lusardi, 2015; Lusardi and Mitchell, 2007; Lusardi and Mitchell, 2011; Lusardi and Mitchell, 2017; Monticone, 2010). Financially literate people are more likely to make savvier saving and investment decisions, manage debt better, plan more for retirement, and participate more in the stock market (Lusardi, 2015; Lusardi and Mitchell, 2007; Lusardi and Mitchell, 2011; Lusardi and Mitchell, 2017). Although the literature investigating the relationship between financial literacy and personal decision-making is well-established, recently scholars have also began looking into its association with public decision-making (**Magistro2020a**; Fornero and Lo Prete, 2019; Magistro, 2019; Montagnoli et al., 2016). Financial literacy does not only affect household financial decisions, but it also impacts how people make decisions about public policies, including pension reforms, trade and immigration policies, and EU membership. Regardless of the broad empirical evidence suggesting that financial literacy is a key determinant of economic behavior, financial illiteracy is still widespread and well-documented across countries (Caliendo and Findley, 2013; Rooij, Lusardi, and Alessie, 2011). A fundamental question then

revolves around whether there are factors that determine who chooses or does not choose to become financially literate. If individuals self-select into learning financial and economic concepts based on some unobservable factor that is related to financial outcomes, then the relationship between financial literacy and economic behavior may be confounded. Time preference may be one such confounder. Determining the direction of the relationship between financial literacy and discount rates is thus important to understand the significance of current findings and to inform future policy prescriptions. The direction of this relationship has been a cause of debate. On one side, Meier and Sprenger (2013) show that people who decide to acquire personal financial information through a credit counseling program are more future oriented (have lower discount rates) than individuals who choose not to participate. On the other side, Lahav, Rosenboim, and Shavit (2015) find that financial education, through learning basic fundamentals of cash flow capitalization, significantly decreases discount rates. This important finding, that learning concepts such as the time value of money contributes to changing time preferences, begets other fundamental questions, which this paper aims to address. One is whether students that select into learning economics and finance have fundamentally different SDRs to start with, in line with what Meier and Sprenger (2013) find on a group of people deciding to acquire personal financial information. The other is whether more education in general decreases SDRs, or whether it is something specific to financial and economic education. In Becker and Mulligan (1997)'s model of endogenous time preference, education can be seen as an investment in patience. For instance, Perez-Arce (2011) uses a natural experiment in a public college in Mexico to test whether education affects time preference and he finds that schooling does indeed reduce SDRs, although without accounting for potential heterogeneity effects across majors. Hence, to address these issues, I first investigate whether learning concepts such as the time value of money contributes to changing time preferences. Second, I test whether SDRs are

different between freshmen choosing economics and freshmen choosing a political science class to start with. Third, I test whether SDRs are different for students before and after taking a political science class.

3 Classroom Experiment Design

The classroom experiment attempts to isolate the effect of obtaining financial literacy from the selection process. I want to test whether acquiring financial literacy lowers SDRs, making sure there is not a selection effect into finance and economics, and that it is not just more education in general that lowers discount rates. To do this I identify the treatment group as students who have acquired financial literacy, while the control groups include first-year students (freshmen) selecting into economics before taking any classes, freshmen selecting into a different field (here political science) before taking any classes, and political science students after taking a political science class.

The final number of eligible participants is 227 and they are all undergraduate students at the University of Washington. The survey consists of two pre- and post- parts: the pre-part involved interviewing the groups of freshmen *before* they take any economics or political science class in the first week of the quarter, while the post-part involved interviewing students *after* they take the finance or political science class in the last two weeks of the quarter[1]. The first *before* group includes freshmen students who were enrolled in Introduction to Microeconomics (Fin/Econ *before*) in fall

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[1]More specifically, I am not interviewing the same students. The *after* groups were interviewed in winter and spring of 2019, while the *before* groups were interviewed in fall 2019.The rationale for this is that I wanted to make sure that the same students would not be in both the before and after groups, potentially affecting their answers.

2019. Introduction to Microeconomics is the pre-requisite to any subsequent economics or finance class. The second *before* group includes freshmen students who were enrolled in Introduction to Political Theory, Introduction to Comparative Politics, Introduction to American Politics, or Introduction to International Relations (Poli Sci *before*) in fall 2019, who confirmed that they were not also enrolled in any course from the economics department or the business school[2]. The freshmen in the these two groups were also asked if they had ever taken any economics classes before in high school, to further control for any selection effects and to make sure they were not already familiar with concepts like the time value of money, or basic capitalization. Although in classes like Introduction to Microeconomics concepts like the time value of money may be mentioned in passing, these are only explicitly taught in classes like Business Finance (FIN350) or Financial Economics (ECON422)[3]. This is where students learn concepts like the time value of money, inflation, capital budgeting, risk and return in financial markets, stocks, bonds and diversifiable risk. Hence, the first *after* group includes students who were enrolled in Business Finance in winter 2019 (Fin/Econ *after*). The second *after* group includes students who were enrolled in Introduction to Political Theory in winter 2019 (Poli Sci *after*), who confirmed that they were not at the time and had never been enrolled in any course from the economics department or the business school.

The survey was emailed to the students, it was completely anonymous, and students were incentivized to participate by a separate raffle of 20 $20 Amazon gift cards they could enter upon completing the survey.

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[2]The reason why I could not just use Intro to Political Theory students as in the Poli Sci *after* group is that there were too few freshmen in the class to achieve a large enough sample size.

[3]I did my survey in Business Economics since it is offered every quarter and has over 200 students enrolled each quarter. ECON422 is not offered every quarter and classes are much smaller, around 35 students. Introduction to Microeconomics is a prerequisite for both FIN350 and ECON422.

3.1 Questionnaire

The participants were asked a series of questions including questions on time preferences, risk preferences, income, age, gender, and freshmen were further asked whether they had taken economics classes in high school. Students younger than 18 and students in political science who had taken or were taking at the time classes in economics or finance were excluded.

Similarly to Lahav, Rosenboim, and Shavit (2015), I included a question in the survey that allows me to infer an individual's subjective discount rate. The question asks: 'You are supposed to receive 10,000 $ in your bank account immediately. Instead, we offer you the option of receiving a sum of money one year from now. Fill in the amount that you are willing to receive one year from now, instead of 10,000 $ today. Insert minimum amount' . The annual discount rate for delaying payment was calculated as follows:

$$SDR = \left(\frac{P}{X} - 1\right) \cdot \frac{12}{t} \tag{2}$$

where P is the amount the subject is willing to accept in t months for delaying the receiving of the amount X today.

Table 1 provides summary statistics on the participants. In line with previous studies (Lahav, Rosenboim, and Shavit, 2015; Magistro, 2019), SDRs have a very high mean and very high standard deviation, with some significant outliers, especially for groups not exposed to financial concepts. Just by looking at these descriptive statistics it appears that the students acquiring financial literacy have significantly lower SDRs, hence in the next section I turn to the regression models.

Table 1: Summary statistics for subjective discount rates across groups, excluding negative discount rates (n=196).

	Poli Sci *before*	Fin/Econ *before*	Poli Sci *after*	Fin/Econ *after*
Count	47	46	38	65
Min	4	0.01	1	1
Q25	65	11.87	13	2.2
Median	100	50	100	10
Mean	390	217759.6	14813	50.8
Q75	350	175	389	15
Max	2900	9999900	499900	1000
Standard Deviation	673.5	1474349.7	81055.5	178.4

4 Methods

The first hypothesis that I test is whether acquiring financial literacy decreases SDRs. To rule out a possible self-selection problem, I then test whether SDRs for freshmen enrolling in economics are significantly different from those of students enrolling in political science. To do this, I compare SDRs for freshmen choosing to take Introduction to Microeconomics (again, the prerequisite to any other economics or finance class) and freshmen not choosing any economics class, but a political science class instead. I further ask the freshmen in both groups whether they have taken any economics in high school. If the SDRs of freshmen choosing economics are already lower than those of students in political science, then there is a selection issue. Finally, to rule out the possibility that it is just more college education in general that decreases SDRs across the board, I also test whether students have significantly different SDRs after they have taken a political science class compared to freshmen who have just started the political science class. To do this, I compare SDRs for students who have finished a course in Introduction to Political Theory (making sure these students have not been enrolled in economics or finance), and for freshmen who have just

started a political science class.

To test these hypotheses, the plan is to use linear regression, controlling for potential confounders. However, as Table 1 shows, there are some very significant outliers in the data, which may or may not be the result of misentered numbers. An OLS on this data would be extremely unreliable as it would essentially be a regression on noise. In these cases it is essential to use methods not overwhelmed by those outliers. Hence, I take four steps. First, I run a robust regression[4], which reduces, but does not eliminate, the influence of outliers at a moderate efficiency cost. Secondly, I run a robust and resistant regression[5]. Whereas robust regression methods attempt to only dampen the influence of outlying cases, resistant regression methods use estimates that are not influenced by any outliers. This is best accomplished by trimming the data, which"trims" extreme values from either end (or both ends) of the range of data values. This is a conservative principled method for avoiding giving any weight to cases that are clearly extreme, while only giving weight to the central part of the data. Third, I run an OLS regression on a dataset where I have removed cases with high discrepancy and high leverage. In order to identify such cases I take two steps: I use a measure of leverage - "standardized" hat scores - that tell us how much weight an observation carries in least squares; furthermore, I use a measure of discrepancy - studentized residuals - that tell us how outlying each residual is. These, together, tell us how much influence an observation has. I consider outliers those observations with absolute hat scores and/or studentized residuals above 3. Finally, I run a quantile regression at the 50th quantile, hence a median regression, which is more robust to outliers. In all models I control for potential confounders such as age, gender, family income, and risk aversion. Furthermore, when comparing the two groups of freshmen I also

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[4]I fit a linear model by robust regression using an M estimator in R.

[5]I use the MM method in R, which uses the Biweight influence function initialized by a resistant S-estimator.

control for whether they have taken economics in high school.

5 Results

Tables A2 to A5 in Appendix A show the regression tables for all of the models, while figure 1 shows the coefficients of different groups. Findings show that learning basic capitalization concepts dramatically decreases discount rates, regardless of the models I use. No significant differences in SDRs exist between freshmen who choose economics and those who choose political science, and no significant differences in SDRs exist between students *before* and *after* they take a political science class, suggesting that it is not just more schooling in general that decreases SDRs. Conversely, students in the Fin/Econ *after* group have discount rates between 11 and 59 percentage points lower than those in the Fin/Econ *before* group and between 11 and 83 percentage points lower than those in the Poli Sci *after* group, depending on the model I use. Although these results vary, due to each method's different way of dealing with outliers, they are all in the same direction and statistically significant. Learning how to compute PVs and FVs, the time value of money, how compound interest works, significantly contributes to decreasing SDRs, making people more patient. Furthermore, the size of the effect for the Fin/Econ *before* and *after* groups are very similar to those found in Lahav, Rosenboim, and Shavit (2015).

One key concern is that these results may not be generalizable to the non-college population. However, one preliminary indication that these may have external validity comes from Magistro (2019). More specifically, she measures SDRs in the same way as they are measured here and looks at the relationship between SDR and financial and economic literacy in the general population[6],

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[6]Financial and economic literacy is measured through a series of questions on basic financial concepts, such as the
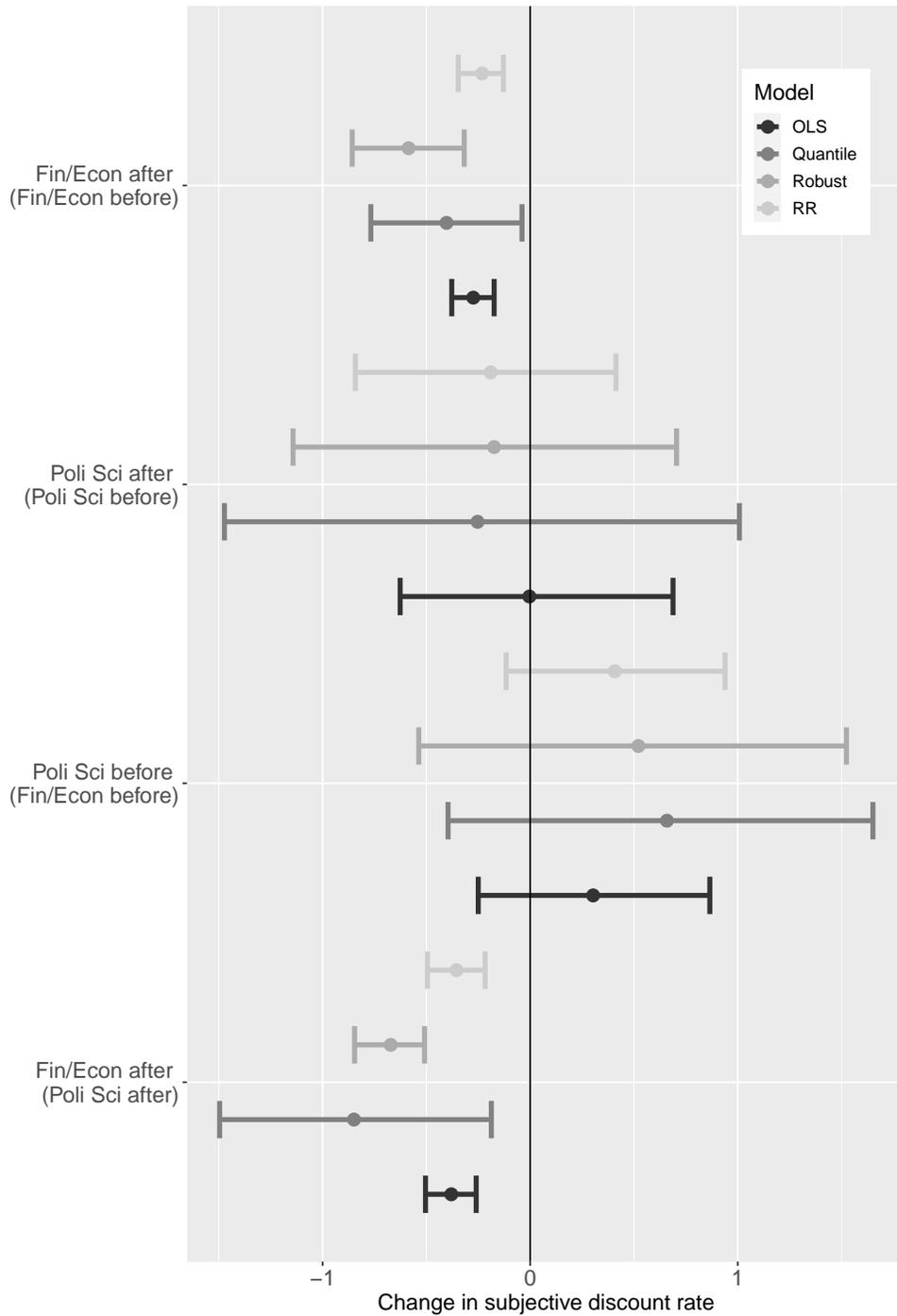
Figure 1: Coefficients estimates of different groups on subjective discount rates. Bars indicate the 95% confidence interval.

expecting financially and economically literate individuals to have lower discount rates and hence to be more patient. Indeed, she finds that financially literate people among the general population have significantly lower SDRs and the mean and standard deviations found in the sample are very similar to the ones found here for college students.

6   Conclusion

Although multiple works in economics, political science, and psychology show that discount rates affect individual behavior, the literature has been relatively silent on factors that form and potentially change subjective discount rates. Can people become more patient? The answer to this question is of utmost importance for understanding many individual choices involving intertemporal trade-offs: from financial decisions to public policy decisions on pensions, free trade, immigration, debts and deficits. In this paper I investigate the effects of financial literacy on time preferences and I attempt to address some potential endogeneity issues. Findings show that financial literacy decreases subjective discount rates significantly; there is not a selection effect into economics and finance, as students enrolling in these fields do not have significantly lower SDRs than other students when they start college; and finally more schooling in general does not change time preferences, only financial education does.

These findings have implications for the economics, psychology, and political science literatures studying the relationship between patience and individual behavior, and for financial education programs and campaigns. Previous studies show that people with lower SDRs and financially literate

working of interest compounding, the difference between nominal and real values, and the basic risk of diversification, and questions on country-specific knowledge on certain policies and on their inherent trade-offs.

people have better financial outcomes and make savvier savings and investment decisions. If indeed learning concepts like the time value of money, compound interest, and basic capitalization dramatically decreases SDRs, then financial education programs have the potential to bring substantial benefits to their recipients, and possibly to society as well, since in situations where policies with intertemporal trade-offs are under consideration, financially literate individuals with lower SDRs may be more patient and willing to favor policies with net long run benefits and net short run costs.

Further research is needed to investigate whether these effects are indeed generalizable to the non-college population and most importantly, it should be tested whether these effects are long-lasting or whether they disappear quickly after having learned the concepts in question.

A   Supplementary Material

Table A1: Summary statistics for control variables across groups: relative frequencies and mean and standard deviation for age (n=227).

	Poli Sci *before*	Fin/Econ *before*	Poli Sci *after*	Fin/Econ *after*
Gender				
Female	62%	45%	69%	52%
Male	38%	55%	31%	48%
Income				
$0 - $24,999	7%	2%	15%	14%
$25,000 - $49,999	12%	9%	13%	10%
$50,000 - $74,999	12%	7%	6%	10%
$75,000 - $99,999	14%	9%	11%	16%
$100,000 - $124,999	16%	19%	15%	17 %
$125,000 - $149,999	9%	19%	4%	9%
$150,000 - $174,999	2%	13%	15%	5%
$175,000 - $199,999	5%	4%	11%	3%
$200,000 and up	21%	19%	11%	16%
Taken Econ Before				
Yes	45%	39%	N/A	N/A
No	55%	61%	N/A	N/A
Risk				
Winning $1,000 in cash right away	84%	82%	83%	90%
Winning $2,000 with prob. of 50%	16%	18%	17%	10%
Age	18.1 (0.23)	18.2 (0.41)	19.3 (1.2)	21.2 (4.1)

Table A2: Regression table for Fin/Econ *after* and Poli Sci *after* groups

	DV: Subjective Discount Rate			
	Robust	Robust and Resistant	OLS (excluding outliers)	Quantile
	(1)	(2)	(3)	(4)
Fin/Econ after (Poli Sci after ref. category)	−66.861***	−10.881**	−43.684***	−84.542*
	(8.645)	(3.433)	(8.500)	(32.593)
Age	−1.349	0.111	0.785	−0.708
	(1.218)	(0.484)	(1.156)	(3.529)
Male (Female ref. category)	−10.165	−1.111	−15.458	−3.333
	(8.027)	(3.187)	(7.775)	(5.641)
Income $25,000 - $49,999 ($0 - $24,999 ref. category)	14.218	−1.378	−16.214	3.042
	(14.965)	(5.942)	(16.352)	(116.635)
Income $50,000 - $74,999	1.318	9.332	18.663	−5.458
	(16.745)	(6.649)	(16.300)	(20.392)
Income $75,000 - $99,999	−0.083	3.510	7.742	−3.333
	(14.860)	(5.900)	(14.181)	(12.548)
Income $100,000 - $124,999	−5.654	3.805	7.980	−4.750
	(14.107)	(5.601)	(13.592)	(12.938)
Income $125,000 - $149,999	−7.745	1.329	−5.000	−4.750
	(16.014)	(6.359)	(15.511)	(12.919)
Income $150,000 - $174,999	−13.150	−2.417	−16.185	−6.417
	(16.073)	(6.382)	(16.329)	(18.753)
Income $175,000 - $199,999	−30.438	4.755	−25.628	−49.292**
	(18.274)	(7.256)	(18.214)	(16.142)
Income $200,000 and up	−6.699	8.297	3.006	−4.042
	(13.461)	(5.345)	(12.751)	(12.110)
Risk-taker (Risk-averse ref. category)	14.561	−2.607	4.491	4.750
	(11.592)	(4.603)	(13.033)	(157.101)
Constant	115.833***	14.950	47.995	112.750
	(26.504)	(10.524)	(26.289)	(79.564)
Observations	102	102	89	102
Residual Std. Error	23.294 (df = 89)	15.896 (df = 89)	34.051 (df = 76)	
F Statistic			3.556*** (df = 12; 76)	

Note: *p<0.05; **p<0.01; ***p<0.001

Table A3: Regression table for Fin/Econ *before* and Poli Sci *before* groups

	DV: Subjective Discount Rate			
	Robust	Robust and Resistant	OLS (excluding outliers)	Quantile
	(1)	(2)	(3)	(4)
Fin/Econ before (Poli Sci before ref. category)	−52.320	−41.879	−31.338	−66.667
	(53.254)	(22.950)	(28.345)	(50.702)
Age	−29.022	−4.756	1.344	−3.333
	(84.274)	(36.318)	(42.667)	(36.343)
Male (Female ref. category)	−12.888	−1.797	−25.606	33.333
	(50.520)	(21.772)	(27.008)	(44.884)
Income $25,000 - $49,999 ($0 - $24,999 ref. category)	43.618	−7.384	−17.542	30.000
	(153.185)	(66.016)	(76.546)	(103.871)
Income $50,000 - $74,999	530.556***	−13.111	−12.050	83.333
	(153.745)	(66.257)	(80.737)	(1,047.338)
Income $75,000 - $99,999	96.191	41.992	81.178	50.000
	(131.041)	(56.472)	(62.902)	(78.050)
Income $100,000 - $124,999	67.988	−9.944	1.266	33.333
	(129.616)	(55.858)	(63.256)	(101.401)
Income $125,000 - $149,999	79.686	−16.684	−16.393	33.333
	(134.113)	(57.797)	(66.734)	(265.178)
Income $150,000 - $174,999	−24.359	−45.241	−67.699	−3.333
	(148.225)	(63.878)	(72.464)	(79.022)
Income $175,000 - $199,999	7.933	−16.278	23.977	−0.000
	(156.453)	(67.424)	(74.846)	(88.151)
Income $200,000 and up	69.080	5.690	23.172	53.333
	(125.665)	(54.156)	(60.983)	(87.322)
Taken Econ before Yes (No ref. category)	−65.648	−24.607	−44.063	−33.333
	(50.970)	(21.966)	(26.144)	(37.056)
Risk-taker (Risk-averse ref. category)	−6.833	−6.590	−13.049	−3.333
	(68.906)	(29.695)	(35.910)	(51.615)
Constant	676.416	198.967	109.943	143.333
	(1,510.397)	(650.911)	(764.746)	(672.848)
Observations	93	93	77	93
Residual Std. Error	185.515 (df = 79)	96.894 (df = 79)	106.761 (df = 63)	
F Statistic			1.273 (df = 13; 63)	

Note: $^{*}p<0.05$; $^{**}p<0.01$; $^{***}p<0.001$

17

Table A4: Regression table for Poli Sci *before* and Poli Sci *after* groups

	DV: Subjective Discount Rate			
	Robust	Robust and Resistant	OLS (excluding outliers)	Quantile
	(1)	(2)	(3)	(4)
Poli Sci before (Poli Sci after ref. category)	17.076	22.239	1.311	27.500
	(47.667)	(39.339)	(36.005)	(64.488)
Age	−18.645	−8.405	−15.921	−10.000
	(21.423)	(17.680)	(16.189)	(29.509)
Male (Female ref. category)	7.782	−11.686	−23.489	−5.000
	(41.374)	(34.145)	(32.965)	(52.811)
Income $25,000 - $49,999 ($0 - $24,999 ref. category)	317.568***	−2,227.086***	97.865	335.000
	(82.331)	(67.947)	(66.384)	(293.494)
Income $50,000 - $74,999	19.390	−2,299.711***	8.748	77.500
	(91.189)	(75.257)	(67.308)	(125.837)
Income $75,000 - $99,999	17.557	−2,283.911***	27.111	20.000
	(78.807)	(65.038)	(57.216)	(85.584)
Income $100,000 - $124,999	12.605	−2,309.326***	1.221	27.500
	(74.297)	(61.317)	(55.060)	(144.162)
Income $125,000 - $149,999	−65.795	−2,367.718***	−58.776	−77.500
	(88.439)	(72.988)	(66.120)	(95.791)
Income $150,000 - $174,999	−8.345	−2,365.319***	−62.873	−60.000
	(85.585)	(70.632)	(66.535)	(4,188.657)
Income $175,000 - $199,999	−8.526	−2,279.521***	39.094	−22.500
	(85.489)	(70.553)	(60.434)	(135.959)
Income $200,000 and up	19.379	−2,289.919***	5.246	−0.000
	(73.193)	(60.406)	(54.027)	(138.934)
Risk-taker (Risk-averse ref. category)	17.886	−13.215	1.908	−27.500
	(54.514)	(44.990)	(42.293)	(70.827)
Constant	454.087	2,559.696***	406.812	280.000
	(417.457)	(344.523)	(315.573)	(639.548)
Observations	84	84	69	84
Residual Std. Error	110.469 (df = 71)	148.656 (df = 71)	115.988 (df = 56)	
F Statistic			0.838 (df = 12; 56)	

Note: *p<0.05; **p<0.01; ***p<0.001

Table A5: Regression table for Fin/Econ *before* and Fin/Econ *after* groups

	DV: Subjective Discount Rate			
	Robust	Robust and Resistant	OLS (excluding outliers)	Quantile
	(1)	(2)	(3)	(4)
Fin/Econ after (Econ before ref. category)	−58.050***	−10.804***	−27.295***	−39.417*
	(14.146)	(3.258)	(5.447)	(18.653)
Age	0.032	−0.132	−0.612	−0.194
	(2.169)	(0.500)	(0.756)	(0.461)
Male (Female ref. category)	1.199	2.167	4.041	4.889
	(12.430)	(2.863)	(4.756)	(3.901)
Income $25,000 - $49,999 ($0 - $24,999 ref. category)	−17.767	−2.752	−2.089	−0.389
	(30.460)	(7.016)	(10.785)	(7.743)
Income $50,000 - $74,999	66.000*	0.582	−11.827	4.306
	(31.094)	(7.162)	(11.855)	(15.650)
Income $75,000 - $99,999	13.997	0.423	−10.795	4.889
	(26.892)	(6.194)	(10.197)	(14.278)
Income $100,000 - $124,999	−10.641	−0.514	−7.793	0.000
	(26.251)	(6.046)	(9.630)	(7.333)
Income $125,000 - $149,999	34.786	5.175	−9.092	4.889
	(26.831)	(6.180)	(10.348)	(41.959)
Income $150,000 - $174,999	−33.997	−2.472	−21.417	−20.000**
	(30.734)	(7.079)	(11.089)	(6.548)
Income $100,000 - $124,999	−27.513	3.062	−13.281	−0.389
	(38.785)	(8.933)	(13.553)	(94.313)
Income $175,000 - $199,999	−12.892	1.981	−0.159	4.694
	(24.966)	(5.750)	(8.935)	(6.630)
Income $200,000 and up	8.505	−4.835	−17.346*	−4.500
	(18.605)	(4.285)	(7.572)	(8.842)
Risk-taker (Risk-averse ref. category)	75.528	21.134	56.023**	48.611*
	(49.084)	(11.305)	(17.136)	(21.772)
Observations	111	111	93	111
Residual Std. Error	52.742 (df = 98)	15.240 (df = 98)	22.006 (df = 80)	
F Statistic			3.660*** (df = 12; 80)	

Note: *p<0.05; **p<0.01; ***p<0.001

B   Questionnaire

- **Age**: How old are you? (Students below 18 are excluded).

- **Gender**: What is your gender? (*Male, Female*)

- **Income**: What is your family's income? (*$0 - $24,999, $25,000 - $49,999, $50,000 - $74,999, $75,000 - $99,999, $100,000 - $124,999, $125,000 - $149,999, $150,000 - $174,999, $175,000 - $199,999, $200,000 and up*)

- **Economics before**: Have you ever taken an economics class in high school? (This is only asked to freshmen in Poli Sci and Econ/Fin *before* groups.)

- **Economics in college**: Have you taken in the past or are you taking a class from the Economics department and/or the Foster Business School? (This is only asked to Poli Sci *before* and *after* groups and those answering yes are excluded.)

- **Subjective discount rate**: 'You are supposed to receive 10,000 $ in your bank account immediately. Instead, we offer you the option of receiving a sum of money one year from now. Fill in the amount that you are willing to receive one year from now, instead of 10,000 $ today. Insert minimum amount' [7]. The annual discount rate for delaying payment was

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[7]I excluded individuals that reported numbers below 10,000 $, implying negative discount rates, as they likely resulted from misentering numbers or misunderstanding the question. Most of these observations were in the three control groups. Furthermore, 7 students in the Fin/Econ *after* group, rather than writing a number, wrote that the amount they would be willing to take one year from now depended upon the current market interest rate. I hence put in $10,200, which corresponds to the future value of $10,000 with a market interest rate of 2%, which is currently the highest rate paid on savings accounts.

calculated as follows:

$$SDR = \left(\frac{P}{X} - 1\right) \cdot \frac{12}{t} \tag{3}$$

where P is the amount the subject is willing to accept in t months for delaying the receiving of the amount X today[8].

- **Risk aversion**: 'Suppose you participate in a TV show. The host offers two options. Which one would you choose?'

  0) Winning \$1,000 in cash right away,

  1) Win \$2,000 with a probability of 50%

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[8]Two methods are mainly used to measure SDRs: the choice-based methods and the matching method. Choice-based methods present participants with a series of binary comparisons and use these to infer an indifference point, which is then converted into a discount rate. Conversely, with the matching method, which is used here, subjects reveal an indifference point, and hence an exact discount rate can be imputed for a single response. Most often these indifference points can then converted to discount rates, using two popular equations: exponential or hyperbolic. The hyperbolic model has been found to descriptively model discounting data better than the exponential model and hence it is used here (Hardisty et al., 2013). As to the choice between choice-based methods or the matching method, there is no theoretical basis for preferring one of these methods over any other, but there are trade-offs for each and they actually yield very different discount rates. The former is often associated with an anchoring problem, where the discount rates may simply be recovering the expectation of the experimenter(Frederick et al., 2008). The latter though, although much quicker to ask, appears harder for participants to understand (Hardisty et al., 2013).

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