

“This is an economist’s argument!” The impact of studying economics and other disciplines on the belief that voluntary transactions make everyone better off

A. Goossens and P-G. Méon

Using a survey of a large group of first and final year students of different disciplines to study their belief in the existence of mutual benefits of voluntary transactions, we observe significant differences between economics and business students on the one hand, and, on the other hand, students of other disciplines. These differences increase over time, partly due to economics students increasingly supporting the belief and partly due to other students increasingly disagreeing with it. The beliefs of economics students become more homogeneous over time. We, therefore, report evidence of a selection and a learning effect of studying different disciplines.

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JEL Classifications: A13, A20, B40, D01, D63.

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October 2010

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1. Introduction

The assumption that voluntary transactions are mutually beneficial lies at the core of mainstream contemporary economics. It is implicit to micro, public, and welfare economics, which represent a large section of economics. Central concepts such as the consumer and producer surplus, the efficiency of competitive markets or the inefficiency of imperfect competition all rest on this basic assumption. The assumption is moreover explicitly emphasized in many textbooks and courses at various stages of economics’ curricula. To cite a few popular examples, the idea that market transactions must be mutually beneficial explicitly appears in Nordhaus and Samuelson (1998, chapter 5) and Stiglitz (1993, chapter 3). It appears in Mankiw’s (1998, p.8) ten principles of economics as “trade can make everyone better off”. Stiglitz (1993, p.55) even writes that “*economists do not have much patience with [these] objections*” to that principle. At higher levels, although the principle remains central to any welfare analysis, it is often taken for granted. Hillman (2009, p.4), who explicitly emphasizes it in the introduction of his graduate public finance textbook, stands as an exception. He recalls the rationale behind it. Namely, if a transaction does not make those involved better off, they can always choose not to engage in it in the first place.

Unsurprisingly, the belief that transactions make everyone better off is consensual among economists, as Blaug (1996) remarks. One may even argue that it is a defining feature of the profession.¹

However consensual it may be among economists, the belief may appear much less widespread amongst other people. Indeed, as Blaug (1996) recalls, the belief is value laden, because it implicitly rests on the value judgment that individuals are the best judges of their own welfare, known to economists as consumer sovereignty. Admittedly, the economic literature acknowledges exceptions to this principle. Musgrave (1957) introduced the concept of merit goods to account, among other things, for various kinds of misjudgment, such as compulsive behavior or myopia. However, as Musgrave (1987) points out, those cases must be viewed as exceptions.

While the majority of economists rely on consumer sovereignty, such reliance may appear much less widespread amongst other people. Such a discrepancy would not be surprising, as lay people have already been found to be less pro-market than professional economists, for instance Caplan (2002), which suggests a smaller confidence in voluntary transactions. The difference is not only striking when economists are compared to lay people, but also when they are compared to other academics and scholars, like in Frey (1986) and Berggren et al. (2009). Since such beliefs are bound to reflect on policy preferences, documenting existing differences and tracing their origins matters. This is particularly true as they determine not only how economists think, but also how they vote, and, most of all, what kind of policy advice they provide.

The existence and origin of such differences directly questions the role of education. If the belief in beneficial transactions is so central to economics, one may wonder whether students of economics share it, and whether other students do too. Indeed, evidence that economics students are different abounds. They have thus been found to perform differently in experiments, for example by Marwell and Ames (1981) and Carter and Irons (1991), and to respond differently to surveys, by Frey (1986) Rubinstein (2006). Kirchgässner (2005) devoted a whole survey to their differences. A natural question is to ask where these differences come from. They could be the result of studying different topics or being exposed to different ways of thinking; in a nutshell, the result of learning. They may, alternatively, result from a selection process whereby students choose a field that is closer to their prior beliefs. Future students would thus choose their discipline, like readers choose their

¹ The title of the present paper cites the reaction that one of the authors elicited in a casual policy discussion with a friend of his, by simply mentioning that a key issue was whether transactions made those involved better off.

newspaper, according to Mullainathan and Shleifer (2005). Their choice would reflect the many guises surveyed by Nickerson (1998), which psychologists call a “confirmation bias”. Frey et al. (1993) summarize this question by opposing the selection and the indoctrination of economists. Some studies only find evidence of the selection hypothesis, for example Carter and Irons (1991), Yezer et al. (1996), Frank and Schulze (2000), Gandal and Roccas (2002) and Frey and Meier (2003). Others also report evidence of a learning effect, Frank et al. (1993), Haucap and Just (2003), Gross (2005) and Cipriani et al. (2009).

Whereas many studies have underlined that economists are, or become, different, none have focused on one of the cornerstone principles of the discipline: that voluntary exchange is beneficial. The focus of this paper is precisely to check whether economics students support the principle more than other students and to determine whether it pre-exists among students choosing different fields, or is a result of learning. Thanks to a survey of students at Université libre de Bruxelles (ULB), which has resulted in a sample that is larger than any other sample used in similar studies, we can compare the prevalence across academic disciplines and years of study on the belief that voluntary transactions benefit participants. We compare students of economics, law, management science, psychology, sciences, and social sciences. The scope of our investigation is, therefore, not limited to the impact of economics, but encompasses the impact of other disciplines. Moreover, we not only take a snapshot of students at a given stage in their studies, but also measure how they evolve over time, from their first week of study to their final year.

We find evidence that economists are different from other students right from the start of their studies, although, they resemble business school students. Moreover, we substantiate that differences between economics students and other students increase over time. We find some evidence that this trend is partially due to economics students increasingly supporting this belief over the course of their studies. We find robust evidence that the trend is, for the other part, due to other students, (psychology students in particular), increasingly disagreeing with it. We moreover document that the beliefs of economics students tend to become more homogeneous over time, which, to our knowledge, had not been studied in the literature. In a nutshell, we report evidence of both an initial selection effect and a learning effect of studying different disciplines, although learning can take various forms and speeds across disciplines.

To explain these conclusions were reached, the next section describes the design of the survey and discusses its interpretation. Section 3 discusses aggregate differences across years and disciplines, whilst section 4 econometrically tests individual answers. Section 5 concludes.

2. The survey

In this section, we describe how the survey was administered and then present and discuss the key question.

2.1. Administration of the survey

The survey took place during the 2007 academic year at Université libre de Bruxelles (ULB). To avoid students answering what they thought would please their professors, we systematically made the same standardized speech before handing out blank questionnaires, which emphasized the following points: 1. the survey was designed purely for scientific purposes by scientists from ULB and other universities studying decision-making, 2. it was completely anonymous, 3. it was not an exam, and 4. there was no such thing as a “good” answer.

Three waves of the survey were undertaken. The first took place amongst first year students, during the first two weeks of the academic year. The point was to administer the questionnaire to students who had not yet experienced teaching.² The second wave of the survey was administered to the same students as in the previous wave, but, at the end of their first academic year. The third wave was administered to students at the end of their final year at the university. Practically, the first wave was administered during lectures, whilst the other two were carried out during exams.

The aim of the three waves was to follow the evolution of students’ preferences over time. The first two waves allowed the assessment of one year’s impact of higher education. The third was aimed at assessing the impact of a full curriculum. Due to time constraints, the students who responded to the third wave did not belong to the same cohort as those who responded to the first two; but, however, they were enrolled in the same departments. Another limitation of the study is that university regulations forbid the identification of questionnaires. Therefore, we could not match the individual questionnaires taken in the first and second waves.

Finally, we undertook the survey in as many departments as possible. In the first wave we carried out the survey in six departments - economics, psychology, social sciences, law, sciences, and the business school. We had to eliminate the sciences department in the second

² This is particularly true for economics, which is not taught at all in secondary schools in Belgium.

wave, because students were scattered across too many optional courses.³ For the same reason, we could only administer the third wave to psychology, law, and economics students.

Overall, we ended up with more than 2500 exploitable questionnaires; a substantially greater number than previous related studies had used.

The next two sections interpret our results.

2.2. The questionnaire

The key question of the survey was designed to capture the agreement of respondents with the idea that voluntary exchange is beneficial. It was framed in such a way that it was equally accessible to all respondents, regardless of their familiarity with the economic jargon. After a series of trials, we asked students to answer the following question on a one-to-seven scale, with one corresponding to total agreement and seven to total disagreement:⁴

Question 1: “In general, do you think that when two individuals exchange a good or a service for money, it is that it makes them both better off?”⁵

An important feature of question 1 is that it abstracts from value judgments. Namely, survey respondents are asked to report their degree of agreement with the idea that two individuals engaging in a voluntary transaction are both made better off from their own point of view. Haferkamp et al. (2009) have shown that preferences for various policies were driven by both fairness and efficiency considerations. Comparing lay people and economists, they found that economists not only differed in the evaluation of both dimensions, but also that they put more weight on the efficiency criterion than lay people. Our question is framed in a way that abstracts from fairness, to focus specifically on the belief in the efficiency of voluntary exchange.

However, many interpretations of the question are possible and one cannot be sure that it is actually interpreted by survey respondents as measuring their confidence in voluntary transactions. One way to check this is to measure the correlation of these answers to those of answers to another question, whose interpretation is consensual in the literature. The survey

³ Getting colleagues' approval to administer the survey during their lectures or exams was also challenging. One of them simply replied that he “despised economists”.

⁴ The scale featured cells, each one corresponding to an integer value of the answer. Many students, however, precisely ticked the line separating two cells. We considered that the value of their answers corresponded to the mean of the two adjacent integers. Our results are, however, robust to dropping those observations.

⁵ The questionnaire was drafted in French. The question's exact wording was “En général, pensez-vous que lorsque deux personnes s'échangent un bien ou un service contre de l'argent, c'est qu'elles y trouvent toutes les deux leur avantage ?”.

also included a variant of Khaneman et al.'s (1986) "snow shovels" question, reframed by Frey et al. (1993) as a "water bottles" question. This question asks respondents how they evaluated various mechanisms to allocate goods for which a temporary shortage is observed. It is commonly interpreted as a measure of peoples' attitudes to the market mechanism, as in Khaneman et al. (1986), Frey et al. (1993), Haucap and Just (2003) and Cipriani et al. (2009). Relating answers to our questions to respondents' preferred allocation mechanism is a way of testing respondents' interpretation. Namely, believing that voluntary transactions make everyone better off should lead to a larger probability to consider that the market mechanism is a desirable mechanism to allocate a scarce good.

We followed Frey and Pommerehne's (1993) study and offered respondents a menu of mechanisms for allocating a scarce good. However, in our questionnaire, we replaced snow shovels with de-icing salt, because trial surveys had revealed that many respondents suggested solving the shortage of snow shovels by passing on the used shovels to someone else. Since re-using de-icing salt is not possible, our wording rules out this possibility. The exact wording of the question was as follows:

Question 2: In a community, the local store sells de-icing salt for one euro per bag. It has a stock of 100 bags. On a morning following an unexpected cold-wave that resulted in black ice, the demand for salt is 200 bags. Please tick the way to allocate bags of salt that is the best according to you.

- a. A price increase to two euro per bag;
- b. Selling bags at one euro per bag according to the principle of "first-come, first-served";
- c. Selling bags at one euro per bag following a random procedure (e.g. to all persons whose surname starts with A through P);
- d. The local authorities buy bags for one euro and distribute them according to their own criteria.

To check the correlation of answers to questions 1 and 2, we used a multinomial logit regression model, where the dependent variable was individual respondents' answers to the "de-icing salt" question and the explanatory variable their response to question 1. The result of our estimation is displayed in table 1a, and the corresponding marginal effects evaluated at the median in table 1b. If respondents interpreted our question as expected, we should observe that those who are more confident in voluntary transactions are more likely to choose to

allocate a scarce good using a price increase. In other words, we should observe a negative association between answers on the zero to seven scale and the probability to choose answer “a” to the de-icing salt question.

Table 1a: Correlation of answers across questions 1 and 2: multinomial logit

	a	b	c
Question1	-0.135*** (4.316)	-0.0316 (0.991)	0.153* (1.882)
Constant	0.299*** (2.856)	-0.222** (2.000)	-3.363*** (10.46)
Observations	2541	2541	2541
Log-likelihood	26.21	26.21	26.21

Absolute z-statistics in parentheses, *** p<0.01, ** p<0.05, * p<0.1

Table 1b: Correlation of answers across questions 1 and 2: Marginal effect

	a	b	c	d
Question 1	-0.0282*** (4.50)	0.0052 (0.91)	0.0042*** (2.74)	0.0189*** (3.07)

Absolute z-statistics in parentheses, *** p<0.01, ** p<0.05, * p<0.1

Table 1a and 1b report a significant correlation between the answers to the two questions. Moreover, the correlation suggests that question 1 indeed captures the respondents’ attitude to voluntary transactions. Table 1b allows being more specific. It shows that at the median, a higher score on question 1’s scale results in a lower probability of answering “a” to question 2. In other words, respondents who disagree more with the statement that voluntary exchange can be beneficial, are less likely to favor increasing the price of de-icing salt if there is a shortage of it.

Furthermore, a higher score on the scale results in a larger probability of choosing to allocate de-icing salt by a random procedure, (response “c”), or by asking public servants to choose the allocation, (response “d”), both of which are non-market mechanisms. All three correlations are significant at the one-percent level.

3. Aggregate results

In this section, we compare groups of students who have chosen different fields, and students of the same department at different stages of their studies. We first compare average answers, then investigate the dispersions of answers.

Table 2: Descriptive statistics by year of study and field of specialization

		Beginning of the first year	End of the first year	Final year
Economics	Mean	2.817	2.970	2.615
	Median	2.5	2.5	2.5
	Mode	1	1	3
	Standard deviation	1.560	1.744	1.231
	Coefficient of variation	0.554	0.587	0.471
Law	Mean	3.032	2.948	3.255
	Median	2.5	2.5	3
	Mode	3	2.5/3	3
	Standard deviation	1.510	1.386	1.704
	Coefficient of variation	0.498	0.470	0.524
Psychology	Mean	3.065	3.474	3.602
	Median	3	3	3
	Mode	3	3	3
	Standard deviation	1.486	1.510	1.402
	Coefficient of variation	0.485	0.435	0.389
Social sciences	Mean	3.248	3.257	
	Median	3	3	
	Mode	3	3	
	Standard deviation	1.657	1.526	
	Coefficient of variation	0.510	0.468	
Business	Mean	2.927	2.929	
	Median	2.5	2.5	
	Mode	2	2	
	Standard deviation	1.568	1.485	
	Coefficient of variation	0.536	0.507	
Sciences	Mean	3.244		
	Median	3		
	Mode	3		
	Standard deviation	1.686		
	Coefficient of variation	0.520		

3.1. Average answers

Table 2 displays the descriptive statistics of the answers of each year of study in each field of specialization.⁶ The average and median answers, ranging from 2.5 to 3.602, suggest that students tend to “rather agree” with the proposition in general. However, there are differences across groups and evolutions within groups over time.

a. Differences across groups

Let us first focus on the differences across students in their first week at the university, which allows testing the existence of a selection bias. The relevant information can be found in the first column of table 2. This column shows that economics and business students are those who agree the most with the proposition that voluntary transactions make everyone better off, with average scores of 2.817 and 2.927 respectively. Conversely, sciences and psychology students are those who least support the proposition, with scores of respectively 3,244 and 3,065. T-tests confirm that the mean answers of economics and business students are not significantly different.⁷ However, the tests show that the mean answers of economics students are smaller than those of other students, well beyond the ten-percent level of significance. Students of social sciences also prove to agree statistically less with the statement than any other group of students, except sciences students. First-week students are, therefore, statistically different in their degree of confidence in voluntary transactions.

When one looks at the statistical mode of the distribution of answers across first year students, the results are more striking. The mode of the distribution of the answers of economics students is equal to one (the value that corresponds to full agreement), while the mode of other students, excluding business students, is three (business students’ mode is two). Finally, the median answer of first year economics students is 2.5, which is the same as the median of business and law students, whilst the median of psychology, social sciences, and sciences students is 3.

These results confirm the selection bias, already reported in the literature, for instance by Carter and Irons (1991), Yezer et al. (1996), Frank and Schulze (2000), Gandal and Roccas (2002) and Frey and Meier (2003).

One may also remark that differences which initially exist tend to persist, as tables 2, A2 and A3, provided in the appendix show. Whenever the average answers of the two groups of students differ significantly at the beginning of the first year, they still do at the end of the

⁶ Bar charts are displayed in Appendix 1.

⁷ A t-test matrix is provided in table A1, in the appendix.

year and at the end of their final year. The only exception is the category of law students, who do not appear different from economists at the end of the first year, but do at the beginning of the year. However, the initial difference re-appears in the final year.

b. Within group evolutions

While students self-select themselves, thus being different right from the start, one may wonder whether these differences increase over time, as students are exposed to different topics which may affect their beliefs. To address this question, we compared the mean answer of first week students with their mean answer at the end of their first year at the university and the mean answer of students of the same field in the final year at their bachelor. Since the impact of teaching takes time, it should increase with the length of the exposure to a topic. One should expect differences, if any, to be strongest between the first week and final year students.

This is what we check by comparing the columns of table 2.⁸ Generally, we find no significant difference in the mean answers of first year students between the beginning and the end of their year of study. This is true for almost all topics for which we have data for the beginning and the end of the first year (economics, law, business, and social sciences). Psychology, however, contradicts the general findings. The survey reveals that psychology students tend to agree less, with the proposition that voluntary exchange benefits those who are involved, at the end of their first year than at the beginning of their first year. Their mean answer thus rises from 3.065 to 3.474, and the difference is significant at the one-percent level of confidence.⁹

To grasp the long term impact of studying a topic one may compare the mean answer of first week students with the mean answer of final year students.¹⁰ There are three fields for which we could obtain the necessary information: economics, law, and psychology. Here the impact of learning seems to depend on the topic. Final year economics students agree more than their younger fellows, and the difference is significant at the ten-percent level. Namely, the mean answer of final year economics students is statistically smaller than that of their first

⁸ The relevant t-test matrix is provided in the appendix in table A4.

⁹ One must recall here that questionnaires could not be paired, for legal reasons, and that our samples are therefore treated as independent. Since differences between students of the same group are sizeable, there is a downward bias on significance. Finding statistically significant differences in those circumstances must, therefore, be interpreted as strong evidence of a learning effect.

¹⁰ The median and the mode are less informative here, as they are more inert. However, we observe an increase in the median answer of law students between their first and final years. We also find that the mode of the answers of economics students increases between the beginning and the end of their studies, unlike their mean and their median. It however appears that answers 1 to 2.5 are almost as frequent as answer 3, while answers greater than 3 are much less frequent.

year fellows. On the other hand, final year psychology students agree less than their first year fellows and the difference in the two means is significant at the one-percent level. Finally, we do not observe significant differences between first year and final year law students.

One may wonder whether the observed amount of learning is sizeable or not. On the one hand, the absolute variation of the mean answer within a group never exceeds 0.6 points, regardless of the time horizon considered, and the median answer rarely changes. Moreover, the largest impact is not observed among students who specialize in the discipline that focuses on voluntary exchange the most, but amongst psychology students. The finding may call into question the impact of studying a topic in general and, in particular, economics. On the other hand, one should keep in mind that the average answer in the first wave of the survey is already rather low, which reduces the scope for large decreases. Moreover, within-group evolutions should be compared with between-group differences. It then appears that within-group evolutions are of the same order of magnitude as between-group initial differences. For instance, the average answer of economics students decreases by approximately 0.2 points and the average answer of psychology students increases by a little more than 0.5 points, between the first and the third wave. At the same time, the initial difference between economics students, who agree the most with the statement, and social sciences students, who agree the least with it, is close to 0.5 points.

To summarize, we observe a clear self-selection effect and some learning effect. An interesting new finding is that learning about the benefit of voluntary exchange is not limited to economics; but it can occur in opposite directions, depending on the discipline studied. As expected, being exposed to economics tends to result in more agreement that voluntary transactions benefit all parties to the transaction. Conversely, studying psychology has a significant opposite effect.

Moreover, we find that the speed of learning differs across disciplines. It is faster in psychology, where the bulk of the observed effect shows up within one year at the university, than in other disciplines, including economics, where we observe no such effect at the end of the first year and it takes a whole degree to affect beliefs.

3.2. Dispersion of answers

The mean answer to the question may be not the only effect of specializing in a given field and being exposed to its line of reasoning. As students self-select in a discipline according to their prior beliefs or preferences, they may form homogeneous groups. Moreover, they may provide more stereotypical answers on questions that are more directly

related to the field in which they have decided to specialize. The point here is that the variance of answers may be as informative on the existence of a selection bias as their mean. We again compare differences across groups and then turn to within group evolutions.

a. Differences across groups

Let us first focus on the first week of students' first year at the university, which is described in the first column of table 2. This column does not seem to display any specific pattern. Furthermore, the variances of answers of economics students are not even statistically distinguishable from those of other fields.¹¹ Students who have chosen economics are therefore neither more heterogeneous nor homogeneous than other first week students.

One may also expect that, as students learn more about the method and way of thinking of a given discipline and interact with each other, their opinions converge. In other words, the impact of learning may not only affect the mean of answers but also their variance. Therefore, we compared the variances of answers across fields at the other stages of the bachelor. A surprising finding is that at the end of the first year, the answers of economics students are more dispersed than those of the students of any other field. Moreover, the difference is always statistically significant, as table A6 reveals. We have no ready explanation for this finding, but it is reminiscent of Klein and Stern (2006), who report that the variance of answers of members of the American Economic Association, to questions pertaining to state intervention, tend to be larger than those of any other discipline. However, in the last year of their bachelor, economics students appear to be the most homogeneous group, as table A7 shows. Although the difference between economics students and psychology students is not statistically significant, the difference between economics and law students is significant at the one-percent level. It, therefore, seems that studying economics for long enough does homogenize students' answers.

b. Within group evolutions

To probe deeper into the impact of each discipline on the heterogeneity of the students who have chosen it, we compared the variances of answers of students of the same field at the beginning and the end of their bachelors. The striking result, revealed by table A8, is that economics stands out as the only discipline whose study resulted in a significant reduction of the variance of students' answers. The variance of answers of economics students at the end of the final year of the bachelor is significantly lower than the variance of their first-week fellows. This result suggests that studying economics reduces the heterogeneity of opinions

¹¹ The relevant t-test matrix is provided in the appendix in table A5.

regarding the impact of voluntary exchange, even though it takes more than a single year to achieve.

To summarize this section, we find clear evidence that, although, on average, they do not reject the idea, students who have selected different fields of specialization exhibit different degrees of agreement, with the proposition that voluntary transactions benefit everyone. First week economics and business students typically tend to agree more with the proposition than psychology, law, sciences, and social sciences students.¹² Secondly, studying given disciplines tends to accentuate those differences. Namely, the agreement of economics students tends to increase, whereas the agreement of psychology students tends to decrease. It also seems that the speed of the evolution differs across disciplines. To be precise, no significant impact is observable after the first year among economics students, but there is evidence of a change among psychology students. Finally, economics is the only topic that results in a significantly lower heterogeneity among students at the end of their bachelor than at the beginning of it.

4. Individual responses

Previous results were obtained by comparing aggregate results on the means and variances of answers. We now complement these aggregate findings by results obtained by studying individual responses. The point here is to take advantage of individual characteristics that respondents were asked to document. Namely, they were asked to specify their gender, their age, and whether the current year was their first year at the university. Controlling for individual characteristics helps interpret aggregate results, because it may decompose the overall effect.

As answers to question 1 are ordinal variables, we used an ordered logit model to study individual answers.¹³ The main explanatory variable was the respondent's discipline. We, therefore, defined a dummy variable for each section; economics being the reference category. Control variables were a dummy variable for female students, the respondent's age, and a dummy variable equal to one if the current year was not the respondent's first year at the university.

¹² Strikingly, this ranking of students is similar to the ranking of academics reported by Berggren et al. (2009).

¹³ We also estimated ordered probit models and obtained the same results.

4.1. Differences across disciplines

We ran a separate regression for each wave of the survey, allowing comparison of students across disciplines at different points in time. To maximize the number of disciplines, we first ran the regressions for the first two waves of the survey: the beginning and the end of the first year. This allowed us to compare economics, law, psychology, social sciences, and business school students. We then added the final year, which obliged us to restrict our sample to students of economics, law, and psychology.

The results of the first estimation are reported in table 3 below. In all regressions, Wald Chi squares are significantly different from zero, at least at the ten-percent level of significance, which means that the hypothesis that all coefficients which are jointly zero can always be rejected. The left panel of the table reports the results of the regression pertaining to the beginning of the first year. Its first column confirms the previous section's results. Namely, we observe that the coefficients of the law, psychology, and social sciences dummies are all positive and statistically significant, at least at the ten-percent level; while the coefficient of the business school dummy is insignificant. In other words, students enrolled in law, psychology, and social sciences tended to answer more negatively than economics students, while business school students did not differ from economics students.

The following columns provide new insights, as they control for individual characteristics of survey respondents. When gender is controlled for, the female dummy exhibits a positive sign, which may signal that female students are less confident in the market mechanism, but this is not significant. The dummy variable for law students, however, loses its significance. This suggests that the observed difference between law and economics students is mainly due to a composition effect, the former section being more female than economics.¹⁴ This finding is reminiscent of previous survey evidence showing that men's answers to questions dealing with economic issues tend to be closer to those of economists than those of women. Such finding was reported by Walstad (1997), Caplan (2001) and Roos (2007).

¹⁴ To wit, 63.3 percent of first year law students but only 38.6 percent of economics students are female. The proportion of female students in each section remains stable across waves of the survey.

Table 3: Ordered logit estimates, beginning and end of the first year, five disciplines

	Beginning of the first year				End of the first year			
	(3.1)	(3.2)	(3.3)	(3.4)	(3.5)	(3.6)	(3.7)	(3.8)
Law	0.287* (1.821)	0.252 (1.573)	0.180 (1.098)	0.156 (0.921)	0.179 (0.755)	0.141 (0.589)	0.079 (0.314)	0.162 (0.608)
Psychology	0.364** (2.148)	0.291* (1.670)	0.26 (1.433)	0.215 (1.155)	0.806*** (3.146)	0.736*** (2.795)	0.728*** (2.627)	0.845*** (2.917)
Social Sciences	0.5*** (3.022)	0.479*** (2.863)	0.5*** (2.888)	0.481*** (2.724)	0.527** (2.049)	0.475* (1.812)	0.354 (1.295)	0.468* (1.652)
Business	0.117 (0.732)	0.126 (0.79)	0.036 (0.216)	-0.008 (0.049)	0.107 (0.434)	0.122 (0.494)	0.065 (0.25)	0.188 (0.696)
Female		0.148 (1.541)	0.144 (1.456)	0.127 (1.274)		0.144 (0.987)	0.15 (0.971)	0.119 (0.733)
Age			-0.022 (1.559)	-0.016 (1.149)			-0.005 (0.280)	-0.004 (0.251)
Not the first year				-0.141 (1.191)				-0.164 (1.068)
Observations	1549	1544	1472	1445	655	652	609	571
Wald Chi ²	13.19**	15.62***	19.46***	20.43***	17.43***	17.61***	17.05***	18.15**
Pseudo R ²	0.00226	0.00268	0.00344	0.00362	0.0066	0.0067	0.00671	0.00831

The reference category in each year is economics. Absolute robust z-statistics in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table 4: Ordered logit estimates, from the beginning of the first year to the end of the final year, three disciplines

	Beginning of the first year				End of the first year				Final year			
	(4.1)	(4.2)	(4.3)	(4.4)	(4.5)	(4.6)	(4.7)	(4.8)	(4.9)	(4.10)	(4.11)	(4.12)
Law	0.295* (1.789)	0.213 (1.248)	0.131 (0.752)	0.119 (0.668)	0.173 (0.75)	0.0877 (0.369)	0.131 (0.752)	0.112 (0.421)	0.681** (2.030)	0.616* (1.819)	0.675* (1.876)	0.672* (1.822)
Psychology	0.379** (2.139)	0.23 (1.223)	0.181 (0.93)	0.155 (0.777)	0.778*** (3.091)	0.634** (2.407)	0.181 (0.93)	0.704** (2.423)	1.225*** (4.607)	1.105*** (4.025)	1.259*** (4.240)	1.226*** (4.067)
Female		0.33** (2.343)	0.351** (2.419)	0.348** (2.361)		0.326* (1.724)	0.351** (2.419)	0.406* (1.956)		0.373 (1.534)	0.313 (1.254)	0.355 (1.376)
Age			-0.017 (0.723)	-0.0176 (0.736)			-0.017 (0.723)	0.009 (0.261)			-0.045 (0.941)	-0.054 (1.367)
Not the first year				-0.004 (0.026)				-0.047 (0.230)				-1.249 (0.975)
Observations	782	780	743	733	396	395	743	348	248	248	234	231
Wald Chi ²	4.857*	10.22**	9.808**	9.093**	12.88***	15.33***	9.808**	18.66***	22.21***	23.44***	24.96***	24.87***
Pseudo R ²	0.00169	0.00349	0.00355	0.00335	0.00806	0.00967	0.00355	0.0133	0.0209	0.0235	0.0272	0.0278

The reference category in each year is economics. Absolute robust z-statistics in parentheses. *** p<0.01, ** p<0.05, * p<0.1

The other dummies remain significant at conventional levels and keep the same sign in regression (3.1). When age and previous enrolment at the university are controlled, they are not significant and the effect of psychology loses its significance; but the coefficient of the social sciences remains positively significant at the one-percent level. This suggests that the selection effect of first year students in economics versus other social sciences is irreducible to gender, age or having already studied at the university.

The right panel of table 3 studies the differences between students at the end of their first year in higher education. The results are predominantly similar to those obtained for the beginning of the year. Namely, we observe that business students do not significantly differ from economics students and that social science students disagree significantly more than economics students with the statement that transactions can make everyone better off. However, two new findings appear. Firstly, law students at the end of the first year are no longer significantly different from economics students. Secondly, psychology students are always different from economics students, regardless of individual characteristics. The findings suggest some form of learning during the first year; whilst law students move closer to economics students, psychology students drift away from them.

Table 4 tests the long run effect of studying a topic. The method remains the same. We estimate an ordered logit model for each wave of the survey. The only difference is that we restrict the sample to the three disciplines for which we have data over the three waves of the survey: economics, law and psychology.

The left panel of table 4 confirms that law and psychology students differ from economics students when they start their studies, insofar as economics students tend to agree more with the statement that voluntary transactions make everyone better off. Moreover, these differences still seem to be driven by a gender bias across the three sections, with economics being the most masculine and psychology the most feminine.¹⁵ An interesting difference here, with respect to table 3, is that the gender dummy is now significantly positive, indicating that female respondents tend to put less confidence in voluntary transaction. This finding complements previous survey evidence that women voice more skepticism about the working of free markets than men. For instance, Mayda and Rodrik (2005) report a protectionist bias of women. Austin and Wilcox (2007) find that women believe less than men in the law of supply and demand. Cipriani et al. (2009) observe that women are more likely than men to believe that the management of a firm facing a trade-off between lay-offs and profit

¹⁵ The proportion of female students in psychology caps 80.3 percent in the first year.

maximization will just maximize profit. More generally, gender differences have been observed in many empirical and experimental set-ups. In their survey, Croson and Gneezy (2009) classify those differences across three dimensions: differences in risk preferences, other-regarding preferences and competitive preferences. Each of these dimensions may result in a gender difference in the reliance on voluntary transactions. The central panel of table 4 is also consistent with the results of the previous section. It reports a statistically insignificant coefficient for law students and, in general, a positive coefficient for psychology students. Again, this suggests a convergence between law and economics students and a divergence between psychology and economics students.

A novel result of table 4 appears in the right panel, which studies students at the end of their course at the university. The coefficients of the law and psychology dummies are now always positive, at least at the ten-percent level and regardless of the number of control variables. Table 4, therefore, confirms the result of previous section that the impact of studying different topics led students, who specialized in law and psychology, to diverge from economics students; even though law students first converged at the end of their first year.

An interesting complementary result is that the coefficient of the gender dummy now fails to be significant. A possible interpretation is that studying a topic for three to four years or more has an impact on students' opinions that compensates initial gender biases.

To gauge the economic significance of the effect of studying a given discipline tables A9 to A11 report the estimated marginal effects implied by regressions (4.2) (4.6) and (4.10). These regressions allow for tracking the impact of three disciplines from the first to the final undergraduate year and control for the impact of gender, which is the only control variable that is statistically significant. Since the reference category is a male student specializing in economics, the reported coefficients measure the impact on the probability of selecting each answer, being female instead of male, or of respectively choosing law or psychology, instead of economics.

As the estimated model is non-linear, the marginal impact is different for each value of the dependent variable. To be succinct, let us focus on answers 2 and 6, corresponding respectively to a strong agreement and a strong disagreement with the statement that voluntary exchange benefits those involved. The marginal impact of studying law and psychology on the probability to choose answer 2 is negative, while its effect on the probability of choosing answer 6 is positive in all tables. In other words, economics students are more likely to strongly agree and less likely to strongly disagree than law and psychology students. At the beginning of the first year, the marginal effects of studying psychology or

law, instead of economics, on the probability of ticking 2 or 6 are statistically insignificant. At the end of the first year, both the coefficient of studying psychology and the coefficient of being female are significant. A first quantitative impression of the impact of studying economics can then be obtained by comparing the marginal impact of studying law or psychology with the marginal impact of being female rather than male. It then appears that the marginal impact of studying psychology on the probability of both answers is twice as large as the impact of gender. In the final year of study, the impacts of both law and psychology on the probability to choose answer 2 are significant, whereas the gender dummy is no longer significant; its size is, however, again smaller than the other two. One may also notice that the coefficient of the psychology dummy is larger than the coefficient of the law dummy, suggesting that economics students are closer to law students than to psychology students.

Another way to gauge the marginal impact of studying one of the three disciplines is to compare their marginal effect to the estimated probability of choosing a given answer. One can infer from regression (4.2) that the estimated probability for a male economics student to choose answer 2 at the end of the first year is 21.4 percent. The marginal impact of studying psychology at the end of the first year is -0.087 and, therefore, implies that choosing psychology instead of economics would result in a probability of 12.7 percent when ticking answer 2. By the same token, a male economics student has an estimated probability of 4.3 percent of choosing answer 6. Given the coefficient of the psychology dummy, a similar student would have a probability of 7.7 percent of choosing that answer. In the final year, the psychology dummy is still statistically significant for both answers, while the law dummy is significant for answer 2 but not for answer 6. In that year, the implied probability for a male economics student to choose answer 2 is 25.8 percent. Given both coefficients, it is 19.6 percent for a male law student and only 14.4 percent for a male psychology student. The impact of studying a given topic is, therefore, not only statistically, but also quantitatively, significant.

These results point to a learning effect of higher education on students' perceptions of voluntary exchange. Moreover, the effect is in line with expectations, as the gap between economics and other students widens over time.

4.2. Within group evolutions

The previous section documented increasing differences between economics students and other students over time. We now focus on within group evolutions. The aim here is to determine the groups who are responsible for the increase in the gaps between groups. Consequently, we focus on each group of students and compare their individual answers over the three waves of the survey, so as to determine whether a student completing his/her bachelor answers differently from a first year student only starting to study the same discipline. A separate regression is, therefore, run for each discipline. The key explanatory variables are dummy variables capturing the waves, the reference category being the first wave students at the beginning of their first year.

Table 5 below displays the results of the regressions run for the three groups of students for which three waves are available, each panel being devoted to another group.¹⁶ The right-panel is devoted to economics students. The results that it displays qualify the results of the previous section. Namely, both dummy variables capturing years of study are statistically insignificant. In other words, the individual answers of economics students at the beginning of their first year cannot be distinguished from either individual answers at the end of the first year or from individual answers at the end of the bachelor. The only variable that appears significantly in the regression is the age of the respondent, which exhibits a negative coefficient, significant at the ten-percent level; implying that older students tend to agree more with the proposition that voluntary transactions benefit those involved.

The findings for law students are similar to those for economics students. Their individual answers do not seem to evolve over time. However, one may remark that the gender variable is now robustly positive and significant at the one-percent level. Female law students are accordingly more reluctant than their male fellows to agree with the proposition.

¹⁶ We also ran regressions for the five groups for which only two waves are available, but the results for economics, law and psychology students are qualitatively the same, while we could observe no significant effect for social sciences and business students at the end of the first year, which is in line with the results of section 3.1.b. We do not report those regressions to save on space, but they are available upon request.

Table 5: Evolution of beliefs among economics students

	Economics				Law				Psychology			
	(5.1)	(5.2)	(5.3)	(5.4)	(5.1)	(5.2)	(5.3)	(5.4)	(5.1)	(5.2)	(5.3)	(5.4)
End of 1 st year	0.0654 (0.289)	0.0662 (0.292)	0.163 (0.678)	-0.0278 (0.113)	-0.0219 (0.133)	-0.00962 (0.0583)	0.0451 (0.267)	0.0441 (0.253)	0.574 (2.772) ***	0.593 (2.863) ***	0.638 (3.003) ***	0.620 (2.815) ***
Final year	-0.0950 (0.551)	-0.0981 (0.562)	0.158 (0.561)	0.00241 (0.00806)	0.232 (0.782)	0.226 (0.749)	0.424 (1.150)	0.549 (1.368)	0.666 (2.760) ***	0.683 (2.781) ***	0.732 (2.638) ***	0.684 (1.949) *
Female		0.0333 (0.202)	0.0201 (0.117)	0.0512 (0.291)		0.557 (3.461) ***	0.554 (3.356) ***	0.540 (3.163) ***		0.493 (2.252) **	0.496 (2.211) **	0.504 (2.130) **
Age			-0.0885 (1.542)	-0.0999 (1.693) *			-0.0356 (0.734)	-0.0271 (0.517)			0.00284 (0.131)	0.00427 (0.198)
Not the first year				0.283 (1.243)				-0.225 (1.033)				0.0451 (0.182)
Observations	475	475	446	430	549	548	523	507	402	400	381	375
Wald Chi ²	0.613	0.625	4.008	5.236	0.692	13.00	13.36	14.72	11.74	16.64	18.15	17.94
Pseudo R ²	0.000316	0.000337	0.00256	0.00320	0.000373	0.00612	0.00672	0.00759	0.00711	0.0104	0.0117	0.0117

Absolute robust z-statistics in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Psychology students again contrast to the other two groups, because they show evidence of a learning effect that appears at the end of the first year and remains visible until the end of the final year. The coefficients of both year dummies are indeed positive and statistically significant at least at the ten-percent level. They are robust to including control variables. Moreover, the magnitude of the coefficient of the end of first year dummy is similar to the magnitude of the coefficient of the final year dummy; implying that the bulk of the learning effect is obtained after the first year and persists until the final year. This finding confirms the previous section's finding that learning is faster among psychology students than among other students. Finally, the female bias observed so far is also present among psychology students.

5. Concluding comments

The belief that voluntary transactions are mutually beneficial is central to economics. This paper documents the extent to which students adhere to that belief and how specializing in different disciplines affects it. The first finding is that students specializing in different disciplines already differ with respect to that belief at the very start of their studies; namely, in the first week of their first year at the university. Typically, economics and management science students agree more than students of psychology, law, sciences or other social sciences with the idea that voluntary transactions make those involved better off. Our survey, therefore, provides confirming evidence of a self-selection bias in higher education.

Moreover, the survey provides some evidence of a learning effect of studying different topics. This learning effect takes two guises. Firstly, the answers of students from different disciplines tend to drift apart over the course of their studies. More precisely, the difference between economics students and other students in general tends to grow over time. A novel finding of the study is that the observed drift is not only caused by economics students. We admittedly find some evidence that final year students are more confident in the mutual benefits of voluntary transactions than their first year fellows. However, the strongest and most robust evidence is obtained for psychology students, whose confidence diminishes after one year of study and remains lower until their final year. We also find some evidence that final year law students tend to disagree more than students who have just started the same studies. Therefore, learning takes place everywhere and also in opposite directions.

The speed of the effect may differ across disciplines. The effect is observable after only one year in psychology; whereas it takes at least three years in economics and law to

appear. The finding that learning can be slow may explain the difficulty of previous studies to find evidence of learning. They may simply have considered too short a time frame for learning to appear in students' answers.

Secondly, we observe that the answers of economics students tend to become more homogeneous over time. This effect is only observed in economics; pointing to some specificity of economics teaching. One may easily argue that, since the presumption that voluntary transactions make everyone involved better off is so central to economics, the exposure of students to that presumption is massive; whereas other disciplines only incidentally tackle it. It may, therefore, not be surprising and to some extent reassuring on the impact of teaching economics, that the views of economics students over so central a belief tend to converge.

The question is now to determine how that specificity of future economists relates to their political preferences and behaviors. We have briefly touched upon the issue by showing that a stronger agreement with the notion that voluntary transactions make everyone better off correlates with a preference for the market mechanism in a variant of Khaneman et al.'s (1986) fairness question, while more disagreement results in a higher probability of preferring other mechanisms. These questions are still abstract, and could be complemented by questions on more topical policy issues. Moreover, if the present paper has unveiled differences in beliefs, differences in values may also affect behaviors and policy preferences. Distinguishing how they interact is food for future research.

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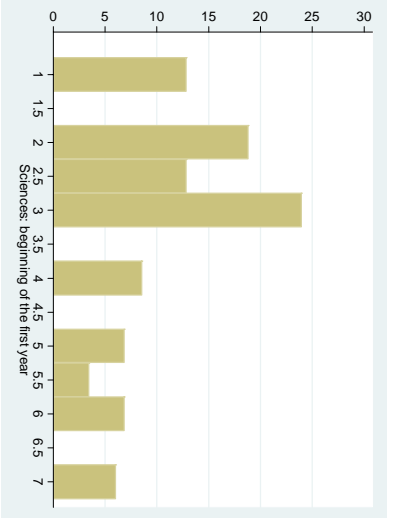
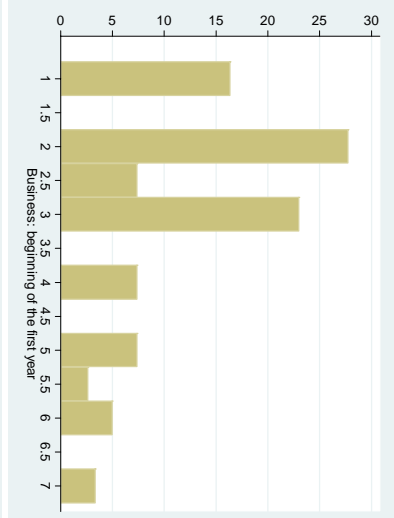
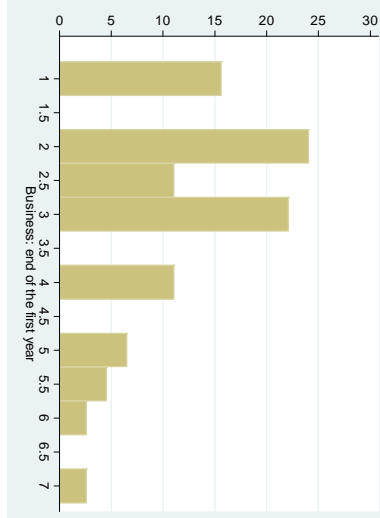
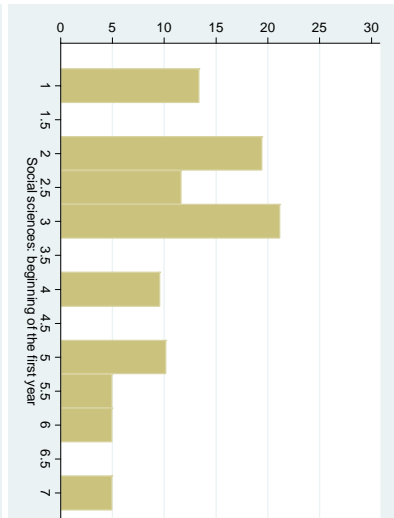
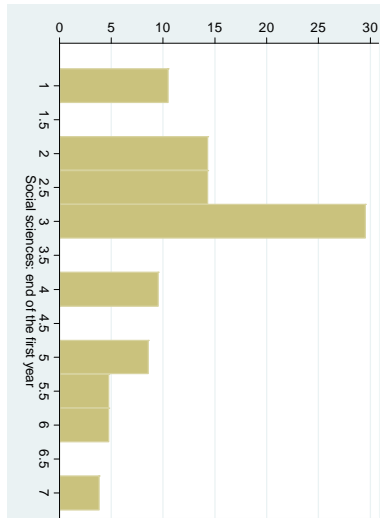
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6. Appendix

Appendix 1: Distribution of answers (percentage points)





Appendix 2: Differences in average answers

Table A1: t-tests for differences in average answers, beginning of the first year

	Economics	Law	Psychology	Social sciences	Business	Sciences
Economics	1	1.5702*	1.6731**	3.0215***	0.8105	2.2269**
Law	-	1	0.2565	1.7950**	-0.9567	1.2041
Psychology	-	-	1	1.3819*	-1.1156	0.9709
Social sciences	-	-	-	1	-2.7368***	-0.0236
Business	-	-	-	-	1	1.8266**
Sciences	-	-	-	-	-	1

*** p<0.01, ** p<0.05, * p<0.1. One-tailed p-values. T-tests are computed for the difference between the mean of the group in column and the mean of the group reported in line. A positive (negative) sign signals that the average answer of the group in column is larger (smaller) than the average answer of the group in line.

Table A2: t-tests for differences in average answers, end of the first year

	Economics	Law	Psychology	Social sciences	Business
Economics	1	-0.1186	2.4591***	1.3566*	-0.2178
Law	-	1	2.9054***	1.6409*	-0.1163
Psychology	-	-	1	-1.0644	-2.9689***
Social sciences	-	-	-	1	-1.7203**
Business	-	-	-	-	1

*** p<0.01, ** p<0.05, * p<0.1. One-tailed p-values. T-tests are computed for the difference between the mean of the group in column and the mean of the group reported in line. A positive (negative) sign signals that the average answer of the group in column is larger (smaller) than the average answer of the group in line.

Table A3: t-tests for differences in average answers, final year

	Economics	Law	Psychology
Economics	1	2.4608***	4.5498***
Law	-	1	1.1356
Psychology	-	-	1

*** p<0.01, ** p<0.05, * p<0.1. One-tailed p-values. T-tests are computed for the difference between the mean of the group in column and the mean of the group reported in line. A positive (negative) sign signals that the average answer of the group in column is larger (smaller) than the average answer of the group in line.

Table A4: t-tests for differences in average answers across waves of the survey

	End of the first year (vs. beginning of the first year)	Final year (vs. beginning of the first year)
Economics	0.8199	-1.3324*
Law	-0.6012	0.8835
Psychology	2.4024***	2.5043***
Social sciences	0.0537	-
Business	0.0143	-

*** p<0.01, ** p<0.05, * p<0.1. One-tailed p-values. T-tests are computed for the difference between the mean of the group in column and the mean of the group reported in line. A positive (negative) sign signals that the average answer of the group in column is larger (smaller) than the average answer of the group in line.

Appendix 3: Differences in the variance of answers

Table A5: t-tests for differences in the variance of answers, beginning of the first year

	Economics	Law	Psychology	Social sciences	Business	Sciences
Economics	1	0.9365	0.9078	1.1278	1.0106	1.1685
Law	-	1	0.9693	1.2044**	1.0791	1.2044**
Psychology	-	-	1	1.2425**	1.1133	1.2872*
Social sciences	-	-	-	1	0.8960	1.0360
Business	-	-	-	-	1	1.1562
Sciences	-	-	-	-	-	1

*** p<0.01, ** p<0.05, * p<0.1. One-tailed p-values. T-tests are computed for the ratio of the variance of the group in column divided by the variance of the group in line. Ratios smaller (larger) than one signal that the variance of the group in column is smaller (larger) than the variance of the group in line.

Table A6: t-tests for differences in the variance of answers, end of the first year

	Economics	Law	Psychology	Social sciences	Business
Economics	1	0.6322***	0.7498*	0.7656*	0.7250**
Law	-	1	1.1860	1.2109	1.1467
Psychology	-	-	1	1.0210	0.9669
Social sciences	-	-	-	1	0.9470
Business	-	-	-	-	1

*** p<0.01, ** p<0.05, * p<0.1. One-tailed p-values. T-tests are computed for the ratio of the variance of the group in column divided by the variance of the group in line. Ratios smaller (larger) than one signal that the variance of the group in column is smaller (larger) than the variance of the group in line.

Table A7: t-tests for differences in the variance of answers, final year

	Economics	Law	Psychology
Economics	1	1.9147***	1.2963
Law	-	1	1.4771*
Psychology	-	-	1

*** p<0.01, ** p<0.05, * p<0.1. One-tailed p-values. T-tests are computed for the ratio of the variance of the group in column divided by the variance of the group in line. Ratios smaller (larger) than one signal that the variance of the group in column is smaller (larger) than the variance of the group in line.

Table A8: t-tests for differences in the variance of answers across waves of the survey

	End of the first year (vs. beginning of the first year)	Final year (vs. beginning of the first year)
Economics	1.2494*	0.6232***
Law	0.8435	1.2743
Psychology	1.0320	0.8900
Social sciences	0.8481	-
Business	0.8963	-

*** p<0.01, ** p<0.05, * p<0.1. One-tailed p-values. T-tests are computed for the ratio of the variance of the group in column divided by the variance of the group in line. Ratios smaller (larger) than one signal that the variance of the group in column is smaller (larger) than the variance of the group in line.

Appendix 4: Marginal effects

Table A9: Marginal effects, beginning of the first year, three disciplines

Answer	1	2	3	4	5	6	7
Law	-0.032 (1.22)	-0.019 (1.26)	0.015 (1.23)	0.01 (1.25)	0.01 (1.25)	0.005 (1.22)	0.005 (1.23)
Psychology	-0.034 (1.22)	-0.021 (1.21)	0.017 (0.014)	0.011 (1.21)	0.011 (1.21)	0.006 (1.16)	0.006 (1.23)
Female	-0.048** (2.34)	-0.031** (2.26)	0.023** (2.30)	0.015** (2.23)	0.016** (2.19)	0.008** (2.09)	0.008** (2.02)

Marginal effects computed from estimation (4.2). The reference category is a male economics students. Absolute robust z-statistics in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table A10: Marginal effects, end of the first year, three disciplines

Answer	1	2	3	4	5	6	7
Law	-0.014 (0.37)	-0.007 (0.37)	0.005 (0.36)	0.005 (0.37)	0.004 (0.37)	0.004 (0.37)	0.001 (0.37)
Psychology	-0.087** (2.34)	-0.056** (2.36)	0.025* (1.76)	0.035** (2.28)	0.031** (2.28)	0.034** (2.15)	0.010** (1.81)
Female	-0.049* (1.76)	-0.028 (1.62)	0.017 (1.60)	0.019* (1.68)	0.015 (1.61)	0.015 (1.53)	0.004 (1.32)

Marginal effects computed from estimation (4.2). The reference category is a male economics students. Absolute robust z-statistics in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table A11: Marginal effects, final year, three disciplines

Answer	1	2	3	4	5	6	7
Law	-0.083** (2.01)	-0.062* (1.68)	0.054** (2.07)	0.033* (1.67)	0.027 (1.50)	0.007 (1.22)	0.012 (1.20)
Psychology	-0.127*** (3.94)	-0.114*** (3.74)	0.070*** (2.97)	0.060*** (3.17)	0.055*** (2.64)	0.015* (1.75)	0.027** (2.02)
Female	-0.055 (1.46)	-0.036 (1.57)	0.036 (1.48)	0.019 (1.54)	0.015 (1.51)	0.004 (1.17)	0.006 (1.33)

Marginal effects computed from estimation (4.2). The reference category is a male economics students. Absolute robust z-statistics in parentheses. *** p<0.01, ** p<0.05, * p<0.1