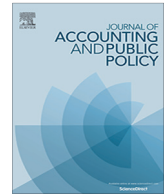




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Business school education, motivation, and young adults' stock market participation[☆]

Ting Dong^a, Florian Eugster^{b,c,*}, Henrik Nilsson^a^a Department of Accounting, Mistra Center for Sustainable Markets, Stockholm School of Economics, P.O. Box 6501, SE-113 83 Stockholm, Sweden^b University of St.Gallen, Institute of Accounting, Control and Auditing, Tigerbergstrasse 9, CH-9000, St.Gallen, Switzerland^c Mistra Center for Sustainable Markets - Stockholm School of Economics

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ABSTRACT

In this paper, we examine whether business school education increases students' stock market participation. We use unique stock ownership data of students from a business school in Sweden. We find a significant increase in stock ownership during and after their studies at the school compared to before entering the school. The marginal effects are 3.8% for the first two years of the core curriculum, 4.4% for the specialisation year, and 4.3% for the three years following graduation. The positive effect of business education on stock market participation is mainly driven by students interested in accounting or finance subjects, and the effect is more pronounced for females than for male students.

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1. Introduction

One of the main stylized facts of household finance is limited participation in the stock market (Campbell, 2006). The cost of not participating in the stock market can be very high because the equity premium may be an important source of long-term return to savings (Almenberg and Dreber, 2015). While basic financial theory prescribes universal stock market participation, the deficient proportion of households (even the most affluent ones) that invest in stocks is viewed as a "participation puzzle" by researchers (Grinblatt et al., 2011). Factors such as the lack of awareness of financial assets (Guiso and Jappelli, 2005), poor numeracy (Christelis et al., 2010), and financial illiteracy (Van Rooij et al., 2011) have been found to explain part of this puzzle, but none have fully resolved the anomalies. On the other end of the knowledge/education spectrum, finance theory, such as the Capital Asset Pricing Model and modern portfolio theory that show how rational investors should combine risky assets, is taught regularly to undergraduate students in business schools. Furthermore, in advanced accounting and finance courses, students learn to value stocks and conduct a fundamental analysis of a firm.

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* Corresponding author at: University of St.Gallen, Institute of Accounting, Control and Auditing, Tigerbergstrasse 9, CH-9000, St.Gallen, Switzerland.

E-mail addresses: ting.dong@hhs.se (T. Dong), Florian.Eugster@unisg.ch (F. Eugster), Henrik.Nilsson@hhs.se (H. Nilsson).

Do business students, equipped with advanced knowledge in accounting, finance, and economics, learn to follow the basic principle of finance and invest in the stock market? Christiansen et al. (2008) have shed some light on this issue by examining the effect of an economics degree on the stock market participation of the general population.¹ In this paper, we complement Christiansen et al. by examining whether and how business school education affects young adults' stock market participation.

We use a large dataset of direct stock ownership of bachelor's degree students in a leading business school in Sweden (hereafter referred to as "the school") from 2006 to 2016. The Swedish setting is advantageous to our study for the following reasons. First, Sweden has a developed financial market that closely follows the EU directives and regulations;² by September 2021, there were 950 firms listed on the Swedish stock market, making it the largest in Europe by number of listed firms.³ Second, the school provides high-quality education, which has gained top global ranking in recent years. The EQUIS (European Quality Improvement System) accreditation of the school also means that its teaching meets the highest international standards and that the implication from this study can be generalizable to other settings. Stringent admission criteria of the school further ensure that our sample students are competent and have high cognitive ability. Third, Sweden has a very high general trust level that is beneficial for stock ownership (Georgarakos and Pasini, 2011, Guiso et al., 2008). Finally, Sweden is also a high gender-egalitarian country where gender differences in education and social capital are among the lowest in the world.⁴ The gender gap in stock market participation is, therefore, less likely to be affected by gender differences in these aspects.

For all students in the three-year bachelor programme at the school, we collected their stock ownership data for up to three years before entering the school, three years during bachelor studies, and up to three years after graduation.⁵ During our sample period, there were two broad programmes offered to bachelor's degree students at the school: (1) Business and Economics (BE) and (2) Retail Management (RM). The BE programme represents the vast majority of bachelor students' choice (85.8%), and students in BE are provided with the same courses in the first two years of their bachelor studies. During this period, BE students are taught basic subjects such as mathematics, statistics, micro/macroeconomics, marketing, management, introductory accounting, law, and finance. In the third year, BE students choose two specialisations from Accounting, Economics, Finance, Management, Marketing, and others.⁶ The third year is the period when they learn more advanced topics in each chosen specialisation. For example, in the Accounting specialisation, students are taught "Financial Reporting and Financial Markets" and "Performance Measurement and Business Control". In the Finance specialisation, courses such as "Derivatives in Investment Management" and "Corporate Finance and Value Creation" are provided. For students who have instead opted for Management or Marketing, their specialisation courses do not cover advanced topics in firm valuation and financial management. The RM programme has a strong focus on retail and is designed for students who aspire to a career in areas such as E-commerce, brand management, supply chain management, and fashion business. In our analyses, we focus more on students in the BE programme because they represent the majority of the sample, and the course design makes it easier for us to identify the effect of advanced accounting and finance courses on students' decisions to participate in the stock market.

In our empirical analyses, we first examine the overall stock ownership, noting that the general stock ownership of students in this school is relatively high upon entry. Roughly 31% of all students owned at least one stock before they enter the school. This is a very high number compared to the estimate of 18% for the full population in Sweden, and about 10% for the 20–30-year-olds in Sweden, according to Euroclear (2018).

We then examine the business education effect, dividing the three-year bachelor programme into two parts: the first two years (when all BE students have the same courses) and the third year (when advanced courses in various subjects are taught). We first find that BE students' stock market participation rate in the first two years at the school is 4.2% higher ($p < 0.001$) than before entering university. Alongside the education effect, two other potential explanations for this phenomenon are higher income (from a part-time job or internship) and social interaction/learning (Brown et al., 2014, Guiso and Jappelli, 2005, Hvide and Östberg, 2015, Van Rooij et al., 2011). While we do not rule out the possibility that these factors have played a role here, we find that students' motivation, proxied by their choice of specialisation courses in the third year of their bachelor studies, is a crucial factor in explaining this effect. Students who opted for Accounting or Finance (AF) specialisations in the third year of their bachelor programme are much more likely to own stock even before entering university (33.2% versus 28.9% of the non-AF students).⁷ Logit estimation further shows that, during the first two years in the school, AF students are 4.18% ($p < 0.001$) more likely to own a stock than before, whereas we do not observe a statistically

¹ Christiansen et al. (2008) covers a broad range of economics education ranging from apprenticeship for bank clerks to a PhD in economics.

² More information can be found at the website of Finansinspektionen (Sweden's financial supervisory authority): <https://www.fi.se/en/bank/regulations/>.

³ More details can be found: <https://www.svd.se/aktiemarknaden-isverige-ar-europas-overlagset-storsta> (accessed 26th October 2021).

⁴ As the world's forerunner of gender equality, Sweden ranks first in the EU gender equality index and fourth in the World Economic Forum's (WEF) Global Gender Gap Report in 2020 (WEF, 2020). Human capital investment in females and males is equal in Sweden: women achieve as good (or even better) educational attainment as men (Guiso et al., 2008, Pekkarinen, 2012). Women are also well represented in the Swedish labor market, thanks to the generous parental leave policy and the day-care system in Sweden (Albrecht et al., 2015).

⁵ Our stock ownership data starts from 2006 and ends in 2016. For the cohort of students who entered the school in 2007, for example, we have only one year of their pre-school stock ownership data, but have the data for three years during school and three years after school.

⁶ There exists a sixth specialisation option, namely, Taxation. Furthermore, there is an additional option that is used mostly by students that choose to go on an exchange semester. We combine these two together as "others", since only 4.8% of the students choose those specialisations.

⁷ In untabulated results (available upon request), however, we do not find a significant positive association between the pre-school stock ownership and the choice of Accounting or Finance specialisation, controlling for gender, GPA, age at entering the school, and year fixed effects. This is true for the full sample but also in additional tests for females. This result alleviates some of the endogeneity concerns.

significant increase for students (1) who opted neither for Finance nor for Accounting and (2) in the RM programme. We also observe that the so-called 'motivated students' exhibit a higher market participation rate in the third year of bachelor studies and in the period after graduating compared to the pre-university period. However, we do not find the same pattern for other students.

Our baseline results thus indicate that personal motivation is an important factor in explaining stock ownership as well as how business education affects stock ownership. Unlike [Mandell and Klein \(2007\)](#), who focus on the importance of motivation for individuals with low financial literacy, our paper highlights the salience of motivation even for those who are highly competent and receive university-level business education. Our finding also resonates with a contemporary study by [Chen et al. \(2021\)](#), who conducted a qualitative inquiry into what facets of financial literacy enhance financial capability. Based on institutional theory, they argue that institutional intervention is necessary in the transition from financial literacy to financial capability. Through interviews with financial advisors in six European financial institutions, they find that individual motivation is important for financial capability, especially for people who are more financially knowledgeable.⁸

In our next set of empirical analyses, we investigate whether business school education reduces the gender gap in stock market participation among students. Extant research has shown that, in the general population, women participate less than men in the stock market ([Alessie et al., 2021](#), [Van Rooij et al., 2011](#)). The studies by [Almenberg and Dreber \(2015\)](#) and [Bannier and Neubert \(2016\)](#) have shown that the gender gap in stock market participation is affected by an individual's numeracy, financial literacy, and risk tolerance. In this paper, we go to the upper end of the education spectrum and focus on the group of young male and female individuals with high cognitive ability and who are exposed to one of the best business educations at the university level in Sweden.

We find that before entering university, females' stock market participation rate is already substantially lower than that of males (28.9% for females versus 34.7% for males in the BE programme, pre-university). This is an interesting finding because Sweden is a high gender egalitarian country ([Albrecht et al., 2003](#)); it reached gender equality in education a long time ago and young boys and girls in Sweden have been found to be equally competitive ([Dreber et al., 2011](#)). Running our main tests separately for female and male students reveals that (1) for both genders, the positive effect of business education is only present among motivated students, namely, those who opted for the Accounting and/or Finance (AF) specialisation, (2) the education effect seems to kick in at an earlier stage for male than for female students, and (3) the third-year advanced AF specialisation courses have a significantly higher impact for female than for male students. Both (2) and (3) are consistent with prior research showing that male investors are more confident and more likely to perceive themselves as competent ([Graham et al., 2009](#), [Lusardi, 2019](#)).

The last part of our empirical analyses focuses on the effect of advanced Accounting and Finance specialisation courses on stock market participation. We are interested in the third-year accounting and finance courses because they convey advanced knowledge in valuation, risk assessment, diversification, and other topics that are closely related to stock trading. Students in the BE programme have to choose two specialisations in the third year. About 22.8% of students opt for both Accounting and Finance specialisations. Arguably, this is the group of students who are most interested in stock trading, but it is hard to tease out the effect of the accounting or finance courses because some of the core concepts are covered by both specialisations. Instead, we examine students who have been "treated" by only one of the three specialisations in Accounting (A), Finance (F), and Economics (E).⁹ In other words, we select the sample of students who elected *one* specialisation from A, F, or E, and the other specialisation from *either* Management *or* Marketing. We designate this group as the focal group. We compare them with the group of students who have elected *both* Management *and* Marketing (the base group). The focal group students have been treated with either accounting, finance, or economics advanced courses, whereas the base group students were not exposed to any of these courses.

Our 'difference-in-differences' analyses show that, compared to the base group, focal group students who have opted for Accounting or Finance exhibit significantly higher stock market participation rate in the third year of bachelor studies (the specialisation year). However, we do not find a significant difference for focal group students specialising in Economics compared to the base group. In this set of tests, we have removed the most motivated students who opted for *both* Accounting and Finance. Hence the remaining students in the sample are arguably more similar on unobservables that may affect stock market participation. We show that the focal group students, although with a relatively higher interest in accounting/finance/economics than the base group, do not exhibit a significant increase in stock ownership during the first two years of business studies compared to the base group. Rather, it is only in the third year (when they learn advanced topics) that the difference starts to emerge. Our results thus highlight the positive effect of advanced accounting and finance courses on stock market participation.

This paper makes at least three contributions to the current literature. First, we show that business school education increases the likelihood of investing in the stock market. However, this effect is present only for motivated students (i.e., those who are interested in topics of accounting or finance). Our paper is closely related to the work by [Christiansen et al. \(2008\)](#), who use Danish registry data covering all age groups of the population and find that economics education sig-

⁸ Specifically, [Chen et al. \(2021, p. 24\)](#) quoted the following two remarks from one financial advisor: "This [inappropriate financial decision] is not because of lack of knowledge. It's lack of interest; it's people who are so disinterested in Finance, so unmotivated to handle their financial affairs." "I think the fundamental thing is apart from educating and creating tools for education, we also need to work on the motivation. The motivational part of it is sometimes underestimated."

⁹ We chose these three specialisations because the course contents are arguably more closely related to knowledge about the financial markets relative to the specialisation courses in Management and Marketing.

nificantly increases people's stock market participation. Although Christiansen et al. (2008) applied individual fixed effects in their model to account for unobservable characteristics that may make economists more likely to hold stocks, they were not able to pin down what the “unobservable” factors are. We extend their work by showing that personal interest/motivation—a characteristic that is inherently difficult to measure—is likely to be an important factor in determining how education affects people's stock market participation. Given that Sweden already enjoys the highest stock market participation in Europe (Kaustia et al., 2019), our findings suggest that high-quality business education may have even higher impacts on individuals in other countries.

Second, we contribute to the literature by studying young adults whose financial decision and behaviour has been less studied. In the United States, many states have administered financial literacy education from the high school level, but the effect of such education in terms of people's financial behaviour is not clear (Amagir et al., 2018; Lusardi et al., 2020; Mandell and Klein, 2009). Our study, although not focusing on basic financial literacy education, indicates that the effectiveness of business-related education on improving people's financial behaviour needs to be carefully designed to enhance motivation. As Mandell and Klein (2007) emphasized regarding the importance of motivation on financial literacy, “it is important for these teachers to set the stage by demonstrating to their students, perhaps repeatedly, that they are responsible for their futures and that the happiness of these futures can vary dramatically based upon their actions.” (p. 114). Our work lends strong support to Mandell and Klein (2007), as our findings suggest that motivation remains important in stock market participation even for the most competent young adults who are already highly financial literate. Thus, our work reminds educators and policymakers of the salience of motivating students.

Third, our study contributes to the literature on the gender gap in stock market participation. Although Sweden is a gender-egalitarian country, our study shows that the gender gap in stock market participation still exists among highly competent young adults who are exposed to university-level business education. We therefore complement previous studies such as Almenberg and Dreber (2015) and Halko et al. (2012) who also use data from gender-equal countries such as Sweden and Finland to examine the gender gap in stock market participation. Different from their work focusing on risk aversion and financial literacy in the general population, we add “motivation” as a potential factor to explain individuals' decisions to participate in the market, and we find that business education can indeed reduce the gender gap among the highly motivated students.

The rest of the paper is organised as follows: Section 2 reviews relevant studies and formulates our hypothesis. Section 3 discusses our research design with our main regression model. Section 4 describes the sample selection and presents descriptive statistics. Section 5 reports empirical results, including robustness tests. Section 6 draws conclusions.

2. Literature review and hypothesis development

2.1. The importance of stock market participation, financial literacy, and education

Sound financial decisions are key to individual well-being (Lusardi, 2019) and non-participation in the stock market can incur sizable welfare loss for individuals (Cocco et al., 2005). The broad literature on stock market participation shows that the overall participation rate is rather low in general (Bucks et al., 2009; Guiso et al., 2008). This phenomenon puzzles researchers because basic financial economics theory prescribes universal participation (Canner et al., 1994; Grinblatt et al., 2011). Van Rooij et al. (2011) show that lack of understanding of the basic concepts in economics and finance prevents people from participating in the stock market. Financial illiteracy also has strong links to high-cost borrowing (Lusardi and Scheresberg, 2013), family financial stress, and difficulties in coping with financial crisis (Lusardi et al., 2021). Lusardi et al. (2017) show that raising people's financial knowledge is key to reducing wealth inequality in the society, and they estimate that “30–40 percent of retirement wealth inequality is accounted for by financial knowledge” (p. 431).

The low level of financial literacy in society has caused concerns for policy makers and global institutions (Suiter and Meszaros, 2005). As one of the top agenda items for national regulators, many initiatives in promoting financial literacy have been undertaken in recent decades (Brown et al., 2014; Miller et al., 2014; Pinto, 2013; Xu and Zia, 2012). For example, OECD's policy brief published in 2006 is titled “The Importance of Financial Education”. It states that “Governments and all concerned stakeholders should promote unbiased, fair and coordinated financial education. Financial education should start at school, for people to be educated as early as possible.” (OECD, 2006, p. 3). Ample studies have found that financial literacy is linked to better financial decisions and behaviour, for example, in terms of retirement planning and saving (Lusardi and Mitchell, 2007), stock market participation and investment diversification (Abreu and Mendes, 2010; Van Rooij et al., 2011), and mortgage performance (Gerardi, 2010), etc. However, with regard to the impact of financial education intervention on financial behaviour, extant evidence is mixed, and the question remains as to whether the faith in financial education “is substantiated by evidence of impact” (Miller et al., 2014, p. 221).¹⁰

¹⁰ Please see more details on the evidence of financial education intervention in the review article by Miller et al. (2014).

2.2. Determinants of stock market participation

The large literature on stock market participation shows that the determinants of people's decisions to participate are multi-faceted.¹¹ Although financial literacy education is believed to be more important for the less educated and those with lower income levels, prior studies have found that even the most affluent households are failing to make optimal financial decisions. Grinblatt et al. (2011) show that cognitive ability (IQ) is monotonically related to stock market participation. High-IQ investors also exhibit better trading skills and hold larger size of investments. Other scholars have attempted to resolve the "participation puzzle" from the perspective of personal values (Kaustia and Torstila, 2011), lack of trust in the financial system (Guiso et al., 2008), personality traits (Conlin et al., 2015), and mental abilities (Vaarmets et al., 2019).

Although not yet studied in-depth, another factor that is potentially crucial to financial behaviour and the effectiveness of financial education is motivation. In his seminal book *"Engaging Minds: Motivation and Learning in America's Schools"*, David Goslin (2003) contends that lack of student engagement is the central obstruction to real learning. Focusing on financial literacy education, Mandell and Klein (2007) assert that, *"based on motivational and goal setting theory, financial literacy programs should be more effective when they are motivated by perceptions and concerns about financial well-being later in life"* (p. 107). Indeed, Mandell and Klein (2007) find that, despite having had a course in personal finance, the low financial literacy scores among young adults in their sample is largely due to lack to motivation to learn or retain the knowledge/skill. To our limited knowledge, Mandell and Klein (2007) is the only work that relates personal motivation to the effectiveness of financial education.

Characteristics such as personal motivation and individual preferences are inherently difficult to measure (Hambrick and Mason, 1984). In a closely related work, Christiansen et al. (2008) address the issue of self-selection by employing individual fixed effects in their probit model to predict economists' stock market participation. Using Danish registry data covering 10% of the overall population, they find that the probability of participating in the stock market increases about two percentage points¹² after completing an economics education programme. They argue that economics education gives investors an "information advantage" in understanding the stock market.

Our study is different from Christiansen et al. (2008) in several ways. First and most importantly, we are able to use students' specialisation choice to proxy for personal motivation, which is potentially an important factor for stock market participation but largely ignored in prior literature. While Christiansen et al. (2008) suggest that economics education has an average positive effect, we extend their work by taking into account the effect of personal motivation. To this end, our work echoes Mandell and Klein (2007) and Chen et al. (2021) who highlight the importance of motivation for individuals' decisions in relation to personal finance.

Second, our study diverges from Christiansen et al. (2008) in that we focus on young adults rather than the general population. Young people confront complicated financial decisions (such as student loans, credit card debt, or first real estate investment) in the modern economy, and they are more likely to make financial mistakes than middle-aged people (Agarwal et al., 2009). The consequences of financial decisions made early in life can also have long-term effects (Lusardi et al., 2017). For the larger society, young adults are an important group of consumers who will have long-term and substantive impacts on the aggregate economy; understanding the effect of education on their financial behaviour is thus especially important. Therefore, we differentiate our work from Christiansen et al. (2008) by examining young adults' decisions to participate in the stock market.

Third, our work differs from Christiansen et al. (2008) because we focus on a group of highly competent individuals engaged in a prestigious business school education, whereas their work examines a broad range of participants in economics education ranging from apprenticeship for bank clerks to a PhD in economics. Since our sample students are already highly competent and generally interested in economics and business (which is why they attend the school), it is not clear how much incremental "information advantage" they can gain from the business school education. Business school education delivers specialised courses such as corporate valuation and investment management, which are often not the focus of an economics degree. By conducting detailed analyses of various specialisation programmes in the school, we open up the "black box" of business education and look into the different effects of these programmes. Therefore, it is *ex ante* not clear whether our study will draw the same conclusions as Christiansen et al. (2008).

2.3. Hypothesis development

As we have discussed in the previous section, prior research suggests that there is no single silver bullet that will solve the "participation puzzle", and there still remains a large part of "unexplained" puzzle after taking into account various individual, social, and institutional factors. Our paper is more related to studies that examine the effect of education, financial literacy, and individual motivation. Although previous research shows that education and cognitive ability are strongly associated with higher participation rate, the magnitude of the effect is rather limited. For example, Christiansen et al. (2008) find that obtaining an economics degree increases the probability of participation by only 2 percentage points.

¹¹ See, for example, Georgarakos and Pasini (2011), Alessie et al. (2021), Guiso and Jappelli (2005) and Barberis et al. (2006).

¹² The overall average participation rate in their sample is 23%.

For our sample, the potential effect of education is not clear. On the positive side, business school education delivers advanced knowledge in business, economics, and finance, which may give students a sizeable information advantage in stock trading. However, there are also some compelling reasons why business school education may not have an observable effect on individuals' decisions to participate. First, Sweden already has a relatively high average participation rate, and previous studies show that traditional factors such as education and wealth have low explanatory power for population segments with higher rates of participation (Kaustia et al., 2019). Second, Grinblatt et al. (2011) show that cognitive ability is positively associated with stock market participation, presumably because smarter people have the ability to process information about the stock market in a better way. This argument is in line with Christiansen et al. (2008) on the effect of obtaining an economics degree. But given that our sample students are already highly capable and interested in business studies, it is not clear whether business education could add further information advantage for them. Based on these arguments, we formulate our null hypothesis as the following:

H1. Business school education does not have significant impact on students' stock market participation.

3. Research design

3.1. Data source, sample, and sample construction

For our empirical analyses, we obtained student registration information from the school. This information contains the personal social security number, gender, the beginning and end of the student's studies, the choice of third-year specialisation subjects, and student GPA.

We obtained information on students' stock holdings from Euroclear Sweden.¹³ This dataset contains complete stock holdings as of March 31, June 30, September 30, and December 31 of each year. For our tests, we utilize only the information at the end of the corresponding school year (June). Prior literature has extensively used this data (Eugster et al., 2021, Kallunki et al., 2018). One advantage of our approach is that, instead of relying on survey data (Grinblatt et al., 2011, Malloy et al., 2009),¹⁴ we can accurately identify stock ownership by matching the Euroclear data and the school information with students' unique personal identity numbers.

In Table 1, we show our sample construction and additional information about the sample. In our data selection process, we started with a list of all students admitted and enrolled in the school for the BE and RM programmes. There are 4,471 students in the period 2006–2016.¹⁵ For our tests, we require students to have completed their Bachelor studies at the school. The standard length of the study is three years. Our final sample contains 2,755 unique students. Starting with those 2,755 unique students, we created a panel on student-year level. This panel also covers up to three years before registration and up to three years after graduation from the bachelor programme. This design allows us to assess the effect of education by comparing stock ownership before students enter the school with ownership during/after the studies.¹⁶

In our main sample, we include students from both BE and RM programmes at the school. Both programmes take three years to complete with 180 ECTS. The BE programme has the longest history at the school. The programme's objective is to attract the most talented students in Sweden and give them a solid foundation in business and economics to prepare them for further studies or the beginning of a career in a complex and global environment. The BSc in Retail Management, created in 2008, was designed to meet an expressed business need: providing undergraduate education focused on future managers for the retail industry, one of Sweden's largest industries. The school has a high reputation in Sweden (and internationally) and the admission process is very competitive. In 2012, for example, the BSc BE admitted 300 students from around 4,000 applicants, and successful applicants had an average grade of 19.60 out of 20 from high school.¹⁷ Therefore, the school can be considered very selective in student intake.

In Table 1, Panel B, we provide more details about the bachelor programmes. For example, 2,364 (85.8%) students graduated from BE and 391 (14.2%) graduated from RM. Notably, the gender distribution is relatively equal: 46% of the students are female, whereas 54% are male.

3.2. Curriculum at the business school

3.2.1. The business and economics programme (BE)

The curriculum in the first two years at the school is relatively broad and contains the necessary elements of a well-rounded education. The BE and RM programmes are independent from each other and offer different courses. For

¹³ Euroclear Sweden is the Swedish Central Securities Depository. Link to the company's website: <https://www.euroclear.com/sweden/en/om-oss.html>.

¹⁴ See Grinblatt et al. (2011) and Malloy et al. (2009) for their notable concerns about the reliability of survey responses to stock market participation questions.

¹⁵ The sample starts in 2006 because this is the first year when the Bachelor of Science in Business and Economics programme at the school was created after the Bologna reform. The sample ends in 2016 because our Euroclear data is available until this year.

¹⁶ In our robustness check section, we come back to this research choice and provide results based on different sample constructions. We thank the referee for bringing this to our attention.

¹⁷ The school also admits some students based on the Swedish Scholastic Aptitude Test ('Högskoleprovet') and on special merits.

Table 1

Sample Selection and Information about the Bachelor Programmes. Panel A reports our sample selection criteria. Panel B provides details about the sample and the bachelor programmes.

Panel A. Sample Selection	<i>Observations Lost</i>	<i>Observations Remaining</i>
Students enrolled in the bachelor programmes		4,471
./ Students not yet finished/dropped out	–1,716	2,755
Number of student-year observations		16,999
Panel B. Information about the Bachelor Programmes		
<i>Choice of bachelor programme</i>	<i>Number of Students</i>	<i>in Percentage</i>
BSc in Business and Economics (BE)	2,364	85.8%
BSc in Retail Management (RM)	391	14.2%
<i>Gender</i>	<i>Number of Students</i>	<i>in Percentage</i>
Female	1,280	46%
Male	1,475	54%
<i>Choice of BE specialisation in the third year (Each student chooses two)</i>	<i>Number of Students</i>	<i>in Percentage</i>
Accounting	1,249	52.8%
Finance	1,129	47.8%
Management	872	36.9%
Marketing	689	29.1%
Economics	675	28.6%
Others	114	4.8%

the BE programme, in the first two years there are three accounting courses and two finance courses. The core curriculum covers one accounting course in the first year ("Accounting 1") and two accounting courses in the second year ("Accounting 2", "Accounting 3"). The course "Accounting 1" aims to give students knowledge of basic accounting issues, from double book entry keeping, to the most basic and important accounting principles and the mechanics of financial reports. This course also stresses the relationship between the three financial reports: (1) income statement, (2) balance sheet, and (3) cashflow statement.

The Accounting 2 course covers cost accounting and capital budgeting in detail. Their importance as decision tools within companies is emphasised. Budgeting and budget deviations are also discussed. The concept of present values and compound interest—knowledge relevant for stock ownership—is introduced in this course. In the Accounting 3 course, students learn to apply their knowledge that encompasses group accounting and performance measures and to conduct a financial statement analysis.

The core curriculum for BE also covers two finance courses, both in the second year of studies. In Finance 1 (Investment Management), the students learn the basic concepts of financial economics including portfolio theory. In Finance 2 (Corporate Finance), students learn corporate finance topics including basic valuation models.

For students in the BE programme, at the end of the second year, they must choose two specialisations out of the following portfolio: (1) Accounting, (2) Economics, (3) Finance, (4) Management, (5) Marketing, and (6) Others. These specialisations have compulsory core courses that all students must take as well as elective courses. In the Accounting and Finance specialisations, at least one of the core courses is related to stock valuation and the stock market. For example, the accounting course Financial Reporting & Financial Markets uses a live case based on a Swedish listed company where the students conduct a valuation of this firm.

In Table 1, Panel B we show that Accounting is the most popular specialisation choice with the students. Among all BE students, 52.8% choose the Accounting specialisation. Finance is the second most popular choice with 47.8%. Overall, 22.8% choose both the Accounting and Finance specialisations. Management ranks third with 36.9% of the students. Marketing and Economics both have about 29% of the students. Finally, only a very minor part (4.8%) of the students choose "Others".

3.2.2. The Retail Management programme (RM)

The RM programme is designed for students who want to have a career in areas such as (1) brand management, (2) e-commerce, (3) fashion business, and (4) supply chain management. Their curriculum focuses mainly on retail management, marketing, supply chain, etc. There is one accounting course and one economics course in the first year of study. In the second year, students have one finance course and one further accounting course. In the third year, they study the following advanced topics in retail: operations strategy, retail management control, brand and category management, innovation strategy, and current issues in retailing. Compared to the BE programme, the RM programme clearly has a different focus, and its curriculum also gives less prominence to accounting, finance, and economics subjects.

3.3. Regression model for stock ownership

We employ the following regression model to test H1:

$$\text{logit} (0 \text{ or } 1 = \text{Ownership}) = \beta_0 + \beta_1 \text{First_2_Years} + \beta_2 \text{In_Specialisation} + \beta_3 \text{After_Specialisation} + \text{Controls} + \text{YearFE} + e \quad (1)$$

Our data consist of individual-year values of the variables of interest (but we omit student and time subscripts in equation (1) for simplicity). The dependent variable, *Ownership*, is an indicator variable that takes the value 1 if the student owns one or more stocks, and 0 otherwise. The main independent variables of interest in equation (1) are *First_2_Years*, *In_Specialisation*, and *After_Specialisation*. These distinct time periods should pick up the effect of the education on stock market participation compared to the period before joining the school. The control variables are factors identified in the prior literature as potential determinants of stock ownership. As a measure for individual capability, we include the overall bachelor GPA score in our estimations (*GPA*). We include an indicator variable *FEMALE* that is equal to 1 if the individual is female, and 0 otherwise. We also include a variable that controls for the age upon entering the school (*Age_at_Registration*). All variable definitions are given in [Appendix 1](#). Furthermore, we estimate equation (1) using a logit model, adding year fixed effects to control for general economic trends.

4. Descriptive statistics

4.1. Descriptive statistics

This section presents summary statistics for the main variables in the empirical analysis. [Table 2](#), Panel A reports summary statistics for the final sample of 16,999 observations. The average stock ownership is 32.2%. In untabulated tests, we find that 1,418 out of 2,755 (=51.5%) students have owned stock at least once in the sample period. Compared to the reported statistics for the overall Swedish population in 2013 ([Euroclear 2018](#)) with around 18% stock market participation rate for the full population and slightly higher than 10% for the 21–30 age group, we find that the students at the school have relatively high stock market participation rate. The average *GPA* (conditional on graduating) is 3.64. The average (median) age at registration (*Age_at_Registration*) is 20.40 (20).

4.2. Univariate results

In Panel B of [Table 2](#), we present more detailed stock ownership (*Stock_Ownership*) information for the BE students. We focus on the BE sample because the majority of the students are enrolled in the BE programme and its curriculum allows a more in-depth analysis of the effects of different specialisation courses. The overall stock ownership among the BE students before entering the school is high with 32.2% owning at least one stock. During the two core years, the average stock ownership increases to 35.7%. At the end of the specialisation year, the average participation rate decreases slightly to 34.8% on average. For the period after graduation, the ownership on average is 32.4%.

We can also observe that BE students who opted for Accounting or Finance in the third year at the school are more likely to invest in the stock market even before joining the school (33.2% compared to the Non-AF-students with 28.9%). The difference is 4.3 percentage points and highly significant with a *t*-statistic of 3.00. The difference between the two groups is 3.5 percentage points during the core courses and settles at 3.9 percentage points in the after specialisation period.

There is also a significant difference in stock ownership between males and females, even before they enter the school. For example, only 28.9% of female students owned stocks before entering university, whereas 34.7% of male students owned stocks. The difference is 5.8 percentage points and statistically significant ($p < 0.001$). The gap between the two genders is the smallest during the specialisation courses, when 33.5% of female students own a stock compared to 35.8% of male students. The difference is 2.3 percentage point and is not statistically significant ($t = 1.14$).

5. Empirical analyses

5.1. Main results

[Table 3](#) reports the results of our empirical model, as described in equation (1). Column (1) presents the results for all bachelor students from the school. In column (2), we only include all the students from the BE programme. In column (3), we report the results from BE students that have taken at least one specialisation in Accounting or Finance. In column (4), we report the results for BE students that did not select the Accounting or Finance specialisations. Finally, in column (5), we include only the students from the RM programme. Sample period in all specifications is 2006 to 2016, including up to three years before entering the school, three years in the school for bachelor studies (*First_2_Years* and *In_Specialisation*), and up to three years after graduation (*After_Specialisation*).

In column (1), we document a statistically significant increase in stock ownership for the three distinct periods: (1) *First_2_Years*, (2) *In_Specialisation*, (3) *After_Specialisation*. The marginal effects are 3.8% for the first two years of the core

Table 2

Descriptive Statistics. In Panel A, we present summary statistics for variables used in the estimation. In Panel B, we present the stock ownership (*Stock_Ownership*) of students in the BE programme, split by gender, choice of specialisation, and time periods. Since the RM programme only accounts for 14.2% of the students, we do not tabulate their *Stock_Ownership* separately. All variables are as defined in [Appendix 1](#) and equation (1). OBS = Observations. STD = Standard Deviation.

Panel A: Summary statistics for variables in the estimation:								
	OBS	Mean	STD	Minimum	First Quartile	Median	Third Quartile	Maximum
<i>Stock_Ownership</i>	16 999	0.32	0.47	0	0	0	1	1
<i>First_2_Years</i>	16 999	0.25	0.43	0	0	0	1	1
<i>In_Specialisation</i>	16 999	0.15	0.36	0	0	0	0	1
<i>After_Specialisation</i>	16 999	0.18	0.38	0	0	0	0	1
<i>GPA</i>	16 999	3.64	0.49	2.21	3.29	3.63	4	5
<i>Female</i>	16 999	0.46	0.5	0	0	0	1	1
<i>Age_at_Registration</i>	16 999	20.4	1.97	15	19	20	21	46

Panel B: Stock ownership for BSc Business and Economics (BE) students, split by gender and the choice of specialisation:			
N=Students	Overall (student N=2,364)	AF students (student N=1,800)	Non-AF students (student N=564)
<i>All BE students:</i>			
Pre-Business School	32.2%	33.2%	28.9%
First 2 Years	35.7%	36.5%	33.0%
During Specialisation	34.8%	35.7%	32.6%
After Specialisation	32.4%	33.3%	29.4%
<i>BE male students:</i> (student N=1,357)		(student N=1,128)	(student N=229)
Pre-Business School	34.7%	35.3%	31.5%
First 2 Years	39.1%	39.2%	38.5%
During Specialisation	35.8%	36.7%	32.2%
After Specialisation	34.2%	34.7%	31.7%
<i>BE female students:</i> (student N=1,007)		(student N=672)	(student N=335)
Pre-Business School	28.9%	29.7%	27.2%
First 2 Years	31.1%	32.0%	29.4%
During Specialisation	33.5%	33.8%	32.9%
After Specialisation	30.2%	31.1%	27.5%

Table 3

Main Results of Education on Stock Ownership. The table shows the main results from estimating the effect of business school education on stock market participation based on model (1), the sample covers the period from 2006 to 2016. All variables are defined in [Appendix 1](#). The standard errors are clustered by year. *, **, and *** denote significance at 10%, 5%, and 1%.

<i>Y = Stock_Ownership</i>	(1)	(2)	(3)	(4)	(5)
Sample	All Students at the school	BSc Business and Economics (BE)			BSc Retail Management (RM)
		All students	AF students	Non-AF students	
<i>First_2_Years</i>	0.181*** (3.80)	0.193*** (4.38)	0.190*** (4.33)	0.158 (1.49)	−0.119 (−0.38)
<i>In_Specialisation</i>	0.205*** (4.15)	0.206*** (4.87)	0.210*** (4.34)	0.106 (1.00)	−0.136 (−0.76)
<i>After_Specialisation</i>	0.200*** (10.17)	0.225*** (8.07)	0.226*** (8.10)	0.087 (1.17)	−0.409*** (−3.22)
<i>GPA</i>	−0.098*** (−6.67)	−0.074*** (−5.49)	−0.011 (−1.07)	−0.521*** (−19.81)	−0.302*** (−4.33)
<i>Female</i>	−0.361*** (−8.46)	−0.265*** (−5.76)	−0.241*** (−6.63)	−0.219*** (−2.72)	−0.697*** (−10.90)
<i>Age_at_Registration</i>	0.010*** (3.68)	0.025*** (7.20)	0.022*** (3.94)	0.034*** (4.78)	−0.092*** (−7.84)
Constant	−0.328*** (−5.84)	−0.700*** (−9.62)	−0.871*** (−7.07)	0.513*** (2.72)	1.911*** (4.35)
Observations	16,999	14,763	11,268	3,495	2,236
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes
Marginal Effects:					
Effect First Two Years	3.84%	4.20%	4.18%	3.23%	−2.05%
Effect Specialisation	4.35%	4.48%	4.62%	2.18%	−2.35%
Effect After Specialisation	4.25%	4.88%	4.97%	1.78%	−7.06%

curriculum, 4.4% for the specialisation year, and 4.3% for after the graduation period. We base this model on 16,999 student-years and include year fixed effects. Results in column (1) suggest that students are more likely to invest in the stock market after they enter the school.¹⁸

We also include control variables such as GPA, gender (*Female*), and the age at which the student entered the bachelor programme (*Age_at_Registration*). As documented in prior research (Van Rooij et al., 2011), the gender variable *Female* is negatively associated with stock ownership. The age at registration is positively associated with stock ownership. This may indicate that older students have more financial knowledge and/or financial resources given their increased age. Interestingly, we find that GPA is negatively correlated with stock ownership. Prior literature suggests that the lack of capacity to process information is a barrier to stock market participation (Christiansen et al., 2008, Grinblatt et al., 2011) and several studies have shown the negative impact of investor distraction on trading activity (Pantazis and Ucar, 2018), response to earnings announcements and firm news (Pantazis and Ucar, 2014) as well as institutions' monitoring efforts (Kempf et al., 2017). We therefore argue that one potential explanation for our finding is that students who have higher GPAs focus more on coursework and spare less effort on investing.

In column (2), we carry out the same estimation but only use students in the BE programme. We find that, in line with results in column (1), all the three period-indicators are highly significant. The marginal effects increase throughout the programme with 4.2% for the first two years, and during and after the specialisation year with 4.5% and 4.9%, respectively. Furthermore, these estimated marginal effects are also larger than the ones found in column (1). This indicates that the results found in column (1) have been driven by the BE students, as we can observe from column (5) that for RM students, there is no significant effect for the *First_2_Years* and the *Specialisation* indicator. More interestingly, we even find a significant adverse effect on *After_Specialisation* in column (5). The marginal effect is estimated at -7.1%, which is relatively large. This result is in line with a prior study showing that the stock market participation rate for people who work in the retail sector is very low (Vaarmets et al., 2019).

In columns (3) and (4), we further examine BE students who are interested in accounting or finance (AF-students, those opted for the Accounting/Finance specialisation) and those who are not. Interestingly, we find that the three period-indicators are significant for the AF-students but *not* for the non-AF-students. The marginal effect for AF (non-AF) students is 4.18% (3.23% but not significant) for *First_2_Years*, 4.62% (2.18% but not significant) for *In_Specialisation*, and 4.97% (1.78% but not significant) for *After_Specialisation*. We would like to emphasize again that all BE students take the same courses in the first two years. Clearly, AF students respond more strongly to business education than those who are not as interested in accounting or finance.¹⁹

We also note that the magnitude of the coefficients in columns (3) and (4) on *First_2_Years* is relatively close (0.19 for AF students and 0.158 for non-AF students), whereas the effect seems to diverge for the third year (*In_Specialisation*) and after graduation (*After_Specialisation*). One potential explanation is that, because all BE students are pooled together in the same courses for the first two years, social interaction (Brown et al., 2008) may have played an important role in increasing non-AF students' stock market participation. As we have shown in the descriptive statistics, AF students are more likely to own stocks even before entering the school. Regardless of business education, non-AF students may have increased their stock market participation simply because of being in the same social circle as AF students in the first two years at the school. This interpretation would be in line with Hvide and Östberg (2015), who found that the stock market investment decisions of co-workers are positively correlated.

However, once the students opt for separate specialisation courses in the third year, AF and non-AF students' levels of participation start to differ more. The coefficient of *In_Specialisation* for column (3) is twice as high as in column (4) (0.21 versus 0.106), and the difference is even larger for the indicator *After_Specialisation* (0.226 versus 0.087). Our results thus indicate that non-AF students, who probably lack the same motivation to learn concepts of accounting and finance, do not respond to business education in the same way as AF students. In contrast, motivated students—those who opted for Accounting or Finance in the third year—are more likely to own stocks before their bachelor studies; they respond immediately to the fundamental courses in the first two years, and the effect seems to persist even after graduation. Our main results in Table 3 thus highlight the importance of motivation for the effect of business education in improving students' financial behaviour.

Taken together, our main results suggest that business school education significantly increases students' stock market participation rate. Therefore, we reject our null hypothesis (H1). However, we also note that the results are mainly driven by *motivated students*, namely, those who are interested in the topics of accounting and finance. To our limited knowledge, our study is the first to demonstrate empirically the importance of personal motivation in how education affects the participation decision. We acknowledge that one potential endogeneity concern for our estimation is that students who have traded stocks in high school may become especially interested in accounting or finance subjects. They may later choose to attend the business school and opt for Accounting/Finance specialisations in the third year. We agree that this may well be the case for some students, but it should not be the main driver of our findings for the following reasons. Our tests

¹⁸ One potential explanation is higher income as students take on more part-time jobs or internships during their bachelor studies. But if income plays a main role here, one would expect the coefficient of *After_Specialisation* to be larger than *In_Specialisation*. Thus, our results indicate that income may not be the main factor that increases participation.

¹⁹ In untabulated tests, we also conducted the same test for Accounting and Finance students separately, and the results are largely the same. For brevity, we do not tabulate them.

examine the “change” in ownership status compared to the high school period, or more specifically, how ownership status changes between “0” and “1” from the high school period to the business school (as well as post-business school) period. If it is stock ownership in high school that drives the choice of AF subjects, then we would, at best, find no increase in stock ownership after entering the business school, because these students already had a status of “1” during high school years.

Another potential concern in our estimation is that the effect we find is merely the consequence of high school education that exposes some students to accounting/finance topics. However, we believe that this is very unlikely. The high school curriculum in Sweden provides rather limited coverage of these topics compared to the workload of the business school in our study. According to the National Agency for Education (*Skolverket*), high school students could opt for various study programmes such as Social Science, Economics, and Natural Science²⁰ (the three most popular), etc.²¹ All programmes have common courses as well as specialisation courses for the specific programme. However, even for the Economics programme, courses dedicated to accounting/finance-related subjects are very limited. For example, there are two mandatory business administration courses that account for 200 out of the 2500 total study points in the Economics programme. Moreover, there are 53 elective courses offered,²² among which five courses are related to business administration and accounting, but students can opt for no more than 300 points out of the 53 courses (each course equals 100 points except two that count 50 points). Given that we do not even find a significant increase in stock ownership for those less motivated students who went through intensive university-level business education, we argue it is unlikely that high school education would be the main driver of our findings.

5.2. The effect of business education for female versus male students

One major issue that concerns regulators and researchers is the low stock market participation rate for women (Van Rooij et al., 2011). Prior research has also shown that women exhibit poorer financial literacy (Lusardi and Mitchell, 2008; OECD, 2013). Almenberg and Dreber (2015) use survey data from Sweden and show that, in the general population, the gender gap in stock market participation diminishes after controlling for financial literacy (numeracy). However, our evidence suggests that a rather large gender gap still exists for highly competent individuals, at least in young adulthood. Descriptive statistics in Section 4 show that before entering university, female students are significantly less likely to own a stock, even though all students in our sample have the highest academic accomplishments in Sweden. In Table 4, we carry out the same logit estimations as in Table 3, but separately for female and male students in Panel A and Panel B. In Panel C, we use *Female* × *Time-indicators* interaction for the three distinct time periods (*First_2_Years*, *In_Specialisation*, *After_Specialisation*). This restrictive design helps to isolate the different effects between males and females during the distinct periods. In column (1), we concentrate on all students, whereas in columns (2) and (3), we examine the effect separately for AF and non-AF students in the BE programme. Given the different design and structure of the retail programme, we use only the subsample of students that have taken the BE programme for tests in columns (2) and (3) in each panel of Table 4.

In Panel A column (1), we observe that there is a positive effect for female students in the school. Interestingly, the marginal effects are 3.1% during the first two years, 6.9% during the specialisation year, and 5.1% after the specialisation. Compared to the results of male students in Panel B column (1), we see that the effect for females is larger, especially during the specialisation period where the marginal effect for females (males) is 6.9% (2.2%). In Panel C column (1), we find that the coefficient on *Female* × *In_Specialisation* is 0.15 with a marginal effect of 3.2% (*t*-statistic is 1.58).

Further, when we focus on students in the BE programme and examine the effects of business school education for AF students and non-AF students separately in column (2) and column (3) of Panel A and B, we find that the effect is more pronounced for AF students than for other students, especially for females. Interestingly, the marginal effect for female students in the AF specialisation is estimated at 8.7% during the specialization, almost twice as high as the effect for non-AF students (4.8%) in the same period. In Panel B, column (2) and (3), we observe that the education effect for male students is only significant in the first two years but not in the specialisation or after the specialisation. By comparing females with males in Panel C, we find that the coefficient on *Female* × *In_Specialisation* in column (2) is positive and statistically significant (0.129, *p* < 5%) for AF students. This suggests that the effect of the AF specialisation is significantly higher for female than for male students. Bannier and Neubert (2016) show that perceived financial knowledge affects men and women's investment decisions differently. Our evidence thus may indicate that advanced finance/accounting courses can enhance the level of perceived financial literacy for women, and, accordingly, they become more likely to participate in the stock market

²⁰ For the 2019/2020 school year, there were around 310,000 high school students in Sweden. About 19.06% elected the Social Science programme, 15.28% elected the Economics programme, and 14.65% elected the Natural Science programme. The business school in our study could not provide us with complete records for the students' high school backgrounds, but from available records for about 3,000 students, we observe that only 17% of them chose the Economics programme in high school.

²¹ All curriculums of Swedish schools can be found at: <https://www.skolverket.se/undervisning/gymnasieskolan/laroplan-program-och-amnen-i-gymnasieskolan/gymnasieprogrammen>.

²² Depending on school capacity, schools may not offer all of the 53 electives. The 53 electives cover the following main areas: English, entrepreneurship, philosophy, business administration, geography, graphic communication, history, humanities, sustainable society, leadership, math, media and communication, modern language, natural science, programming, religion, political science, sociology, and Swedish.

Table 4

Main Results of Education on Females and Males. The table shows the results for estimating the effect of business school education on stock ownership for females and males separately. In Panel A and Panel B, we present the results based on model (1) for female students and male students. In Panel C, we use the full sample and add the interaction terms. In each panel, for column (1), we use students from both BE and RM programmes at the school. For columns (2) and (3), we show the effect of education for AF and non-AF students in the BE programme separately. All variables are defined in [Appendix 1](#). The standard errors are clustered by year. *, **, and *** denote significance at 10%, 5%, and 1%.

Panel A. Female			
	(1)	(2)	(3)
	All Students	BE students	
		AF students	Non-AF students
<i>First_2_Years</i>	0.155* (1.73)	0.205*** (3.31)	0.082 (0.40)
<i>In_Specialisation</i>	0.344*** (5.03)	0.415*** (8.04)	0.239 (1.13)
<i>After_Specialisation</i>	0.254*** (4.42)	0.442*** (5.05)	0.124 (0.83)
<i>GPA</i>	0.039 (1.37)	0.338*** (8.62)	−0.381*** (−8.81)
<i>Age_at_Registration</i>	−0.007* (−1.88)	−0.011** (−2.19)	0.032*** (4.21)
Constant	−0.816*** (−10.49)	−1.663*** (−8.82)	−0.187 (−0.84)
Observations	7,869	4,186	2,089
Year Fixed Effects	Yes	Yes	Yes
Effect First Two Years	3.1%	4.3%	1.6%
Effect Specialisation	6.9%	8.7%	4.8%
Effect After Specialisation	5.1%	9.3%	2.5%
Panel B. Male			
	(1)	(2)	(3)
	All Students	BE Students	
		AF Students	Non-AF students
<i>First_2_Years</i>	0.199*** (5.16)	0.174*** (3.80)	0.257 (1.35)
<i>In_Specialisation</i>	0.097 (1.27)	0.086 (1.14)	−0.070 (−0.61)
<i>After_Specialisation</i>	0.152** (2.39)	0.092 (1.27)	−0.003 (−0.04)
<i>GPA</i>	−0.197*** (−5.03)	−0.181*** (−6.98)	−0.741*** (−6.80)
<i>Age_at_Registration</i>	0.033*** (3.37)	0.047*** (4.76)	0.049*** (2.82)
Constant	−0.431*** (−3.66)	−0.783*** (−4.83)	1.036*** (3.64)
Observations	9,130	7,082	1,406
Year Fixed Effects	Yes	Yes	Yes
Effect First Two Years	4.4%	3.9%	5.4%
Effect Specialisation	2.2%	1.9%	−1.5%
Effect After Specialisation	3.4%	2.1%	−0.1%
Panel C. Interaction effects			
	(1)	(2)	(3)
	All Students	BE Students	
		AF students	Non-AF students
<i>Female</i>	−0.362*** (−6.77)	−0.265*** (−4.67)	−0.193 (−1.31)
<i>First_2_Years</i>	0.218*** (5.65)	0.212*** (4.08)	0.290* (1.65)
<i>Female × First_2_Years</i>	−0.087 (−0.90)	−0.065 (−0.97)	−0.229 (−0.71)
<i>In_Specialisation</i>	0.140** (2.17)	0.164** (2.38)	0.004 (0.04)
<i>Female × In_Specialisation</i>	0.150 (1.58)	0.129** (1.97)	0.181 (0.64)
<i>After_Specialisation</i>	0.198*** (5.50)	0.185*** (3.52)	0.090 (1.11)

Table 4 (continued)

Panel C. Interaction effects			
	(1)	(2)	(3)
	All Students	BE Students	
		AF students	Non-AF students
<i>Female × After_Specialisation</i>	0.004 (0.07)	0.112 (1.44)	−0.006 (−0.03)
<i>GPA</i>	−0.098*** (−6.87)	−0.012 (−1.17)	−0.520*** (−19.42)
<i>Age_at_Registration</i>	0.010*** (3.56)	0.022*** (3.96)	0.034*** (4.53)
Constant	−0.321*** (−6.06)	−0.856*** (−6.32)	0.510*** (2.82)
Observations	16,999	11,268	3,495
Year Fixed Effects	Yes	Yes	Yes
Marginal Effects for Interaction			
Effect First Two Years	−1.86%	−1.44%	−4.68%
Effect Specialisation	3.18%	2.85%	3.70%
Effect After Specialisation	0.09%	2.46%	−0.12%

5.3. Further tests on the effect of advanced accounting and finance specialisation courses

In this section, we attempt to tease out the effect of advanced accounting and finance courses provided in the third year for BE students who opt for these specialisations. To this end, we apply a difference-in-differences framework by comparing two types of students: (1) those who have chosen both Management AND Marketing (M&M) (i.e., students who are not interested in either accounting or finance), and (2) those who have chosen one specialisation from Marketing or Management and the other one from either Accounting (A), Finance (F), or Economics (E). We denote group (1) as the base group and group (2) as the focal group.

For both groups, students took the same courses in the first two years, but for the focal group, students are “treated” by either accounting, finance, or economics courses at an advanced level in the third year. To show the potentially different effects of A, F, or E, we tabulate the results for each type of choice separately in Table 5. Please note that in this set of tests, we exclude the most motivated students (i.e., those who opted for *both* Accounting and Finance) because it is difficult to distinguish the effect of accounting and finance courses. The variable of interest in Table 5 is the interaction term between specialisation choice (*Choice*) and the time indicators (*In_Specialisation*, *First_2_Years*, *After_Specialisation*). Column (1) compares students in the focal group (Accounting specialisation) with students from the control group. Likewise, column (2) ((3)) compares students in the focal group who chose Finance (Economics) with students from the control group. We find that the interaction term between specialisation choice (*Choice*) and *In_Specialisation* is significant for Accounting. Interestingly, the interaction term *Choice × After_Specialisation* is also significant, which indicates that there are long-term effects. In column (2), we can observe that, when comparing students who opted for Finance in the focal group and those in the control group, the estimated coefficient for *Choice × In_Specialisation* is significant and with similar magnitude as in column (1). The post-graduation effect (*Choice × After_Specialisation*) also seems sizable but not statistically significant. Students who opted for Economics, however, do not exhibit a significant increase in stock market participation during (after) business school education compared to the control group students, as we do not observe a significant coefficient for any of the interaction terms. The size of the estimated coefficients is also smaller than in columns (1) and (2). Taken together, our results show that advanced courses in the Accounting and Finance specialisations have a significant positive impact on the stock market participation rate among our sample students.

5.4. Robustness checks

We also conducted further tests to check the robustness of our results. First, we conducted our tests based on alternative sample construction. As discussed in Section 3.1, our sample construction for the main test allows for up to three years pre/post-business school, which captures the variation in stock ownership for a relatively long period. This choice also helps alleviate the limitation in our stock ownership data from Euroclear, which only contains ownership information at each quarter end. We find that when we use a more restricted sample containing one (two) year(s) pre/post-business school and the three years during business school, our results remain largely the same. We note that the magnitude of the estimated effects becomes somewhat smaller, perhaps due to the loss of variation in stock ownership during the pre/post-period. For brevity, we do not tabulate these results.

Second, we attempted to address, at least partly, some of the endogeneity concerns discussed in Section 5.1. We examine whether pre-business school stock ownership predicts the choice of Accounting or Finance specialisations in the third year of

Table 5

Effect of Specialisation Courses. The table shows the results for estimating the effect of third-year specialisation courses on stock ownership. We apply a difference-in-differences framework by comparing two types of students based on model (1): (1) the base group students who have chosen both Management AND Marketing (M&M) and (2) the focal group students who have chosen one specialisation from Marketing or Management and the other one from either Accounting (A), Finance (F), or Economics (E). In column (1), (2), and (3) the sample includes students in the base group and focal group with either Accounting (A), Finance (F), or Economics (E) specialisation, respectively. All variables are defined in [Appendix 1](#). The standard errors are clustered by year. *, **, and *** denote significance at 10%, 5%, and 1%.

Choice =	(1) Accounting	(2) Finance	(3) Economics
<i>Choice</i>	−0.419 (−0.95)	2.491*** (3.18)	1.310** (1.97)
<i>In_Specialisation</i>	0.090 (0.99)	0.045 (0.45)	0.047 (0.56)
Choice × In_Specialisation	0.286*** (2.93)	0.283** (2.26)	0.160 (0.62)
<i>First_2_Years</i>	0.149 (1.18)	0.128 (1.01)	0.132 (1.07)
<i>Choice × First_2_Years</i>	0.134 (0.90)	0.184 (0.98)	0.028 (0.15)
<i>After_Specialisation</i>	0.130* (1.81)	0.060 (0.67)	0.072 (1.05)
<i>Choice × After_Specialisation</i>	0.291*** (3.92)	0.288 (1.40)	0.081 (0.46)
<i>Female</i>	−0.037 (−0.39)	−0.036 (−0.38)	−0.036 (−0.38)
<i>Choice × Female</i>	−0.109 (−1.21)	−0.701*** (−9.30)	−0.427*** (−6.16)
<i>GPA</i>	−0.544*** (−6.75)	−0.574*** (−7.17)	−0.569*** (−6.62)
<i>Choice × GPA</i>	0.654*** (5.78)	0.169 (1.60)	0.083 (0.61)
<i>Age_at_Registration</i>	0.047*** (5.37)	0.047*** (5.45)	0.047*** (5.47)
<i>Choice × Age_at_Registration</i>	−0.082*** (−6.32)	−0.135*** (−4.46)	−0.062*** (−2.67)
<i>Constant</i>	0.311 (0.89)	0.320 (0.89)	0.265 (0.75)
Observations	5,429	3,452	3,430
Year fixed effects	Yes	Yes	Yes

business school. Using a logit regression, we find that pre-business school stock ownership does not predict the specialisation choice, controlling for gender, GPA, the year of registration, etc. When we run the same logit regression separately for female and male students, we arrive at the same conclusion. This alleviates the concern that stock ownership drives students' interest in accounting/finance.

6. Conclusion and discussion

As the financial service industry is becoming increasingly complex, scholars and policymakers have recognised the importance of financial education, which presumably should raise the financial literacy level of society. However, despite substantial efforts made by governments and international organisations, the efficacy of financial education intervention is still not clear. Our study focuses on the effect of education on stock market participation. From a sample of students in a leading business school in Sweden, we find that the effect of business school education on students' participation rate is positive. However, such a positive effect is only present among so-called motivated students, namely, those who are interested in accounting/finance subjects. These motivated students are more likely to own a stock even before entering the business school, and they respond strongly to the business education in the school. In contrast, students who had less interest in accounting/finance do not show significant changes in their stock ownership during or after business school, even though they have studied the same set of courses as the motivated students for at least two years in the school. Our further evidence shows that this pattern is the same for both male and female students. Interestingly, motivated female students respond to advanced third-year specialisation courses in accounting/finance most strongly, whereas males show the largest increase in stock ownership during the first two years in the school.

The importance of motivation in financial education has been raised by [Mandell and Klein \(2007\)](#). However, their study focuses on students with a low level of financial literacy. We show that the effectiveness of business school education on

highly competent students also relies heavily on individual motivation. Echoing [Mandell and Klein \(2007\)](#), our paper highlights the salience of enhancing students' motivation in educational interventions. The implications of our study should therefore be useful to policy makers who are investing extensive resources in education with the aim of improving citizens' financial behaviour.

Finally, we also would like to caution the readers on several limitations of our study. First, due to data availability, we could only observe the relatively short-term effects of business education. Future studies that trace students' long-term behaviour after graduation would be highly valuable to this research area. Second, our sample is based on students from one business school in Sweden. Although the business school that we follow adheres to the highest international education standards, we remind readers that the Swedish evidence may not be easily generalizable to other institutional settings that are substantially different from Sweden. Third, we acknowledge that a limitation in our data is that we could only observe direct stock ownership from the Euroclear data. Our study is thus closer to [Georgarakos and Pasini \(2011\)](#) who focus on direct stock market participation and the implication of trust and sociability on participation across Europe. Although [Georgarakos and Pasini \(2011\)](#) show that European countries' participation rate measured by direct ownership highly correlates with the rate measured by both direct ownership and through mutual funds, prior literature suggests that the determinants of market participation may affect various forms of investment (direct ownership, mutual funds, retirement plans, etc.) differently ([Kaustia et al., 2019](#)). Therefore, we cannot draw a direct conclusion relating to the effect of business school education on other types of market participants through, for example, mutual funds, bonds, or pension plans (e.g., [Calvet et al., 2009](#), [Guiso and Jappelli, 2005](#)).

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Appendix 1. Key variable definitions

Variable	Definition
<i>Stock_Ownership</i>	This variable is equal to 1 if the student is listed in Euroclear's stock register and therefore owns at least one stock, and 0 otherwise.
<i>First_2_Years</i>	This variable is equal to 1 if the student is in the first two years of the school's bachelor programme, and 0 otherwise.
<i>In_Specialisation</i>	This variable is equal to 1 if the student is in the third year of the schools' bachelor programme, and 0 otherwise.
<i>After_Specialisation</i>	This indicator is equal to 1 after the student has graduated from the bachelor programme, and 0 otherwise.
<i>GPA</i>	The grade point average (GPA) is calculated over the full bachelor studies period. The higher the GPA, the better the grade. 5 indicates the highest grade (A).
<i>Female</i>	This is an indicator variable if the student is female, and 0 otherwise.
<i>Age_at_Registration</i>	The age at which the student is enrolled at the school.
<i>Choice</i>	Indicator variable for the specialisation choice made by the students in their third year at the school. The students can choose two specialisations out of the following: Accounting, Economics, Finance, Management, Marketing, and others.

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