Three Essays on Some Unsettled Questions of Political Economy
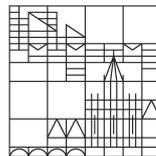
Dissertation

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Dedicated to my PhD supervisor and the best father figure one could have,

Henry W. Ursprung

Words of gratitude

When you pause to think about it, life is in a way nothing but a collection of mesmerizing moments that make every prior struggle, and effort invested, fully worth it. I was blessed to experience many moments like those during my time in Konstanz. Gathering my thoughts, though, seemed the most appropriate at the Silvaplana Political Economy Workshop, a place that had quite of an impact on my studies, and that marked the career of my PhD supervisor, Henry Ursprung. He started it more than 30 years ago with a single aim - to help students, such as myself, to evolve and become good academics, those who ask the right questions and don't hide away from the challenge.

Writing this thesis was by far one the most exciting periods of my life, and it definitely shaped me into the person I will be in the years to come. I was incredibly privileged to be supervised by Henry Ursprung, the sharpest mind I will ever meet, and the best father figure one could ever have. Years that I spent in Konstanz were special and unique, and once I leave, I will carry a lot of special memories in my heart.

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Contents

Summary

This dissertation includes three chapters that use state of the art empirical methods to examine research questions in political economy and labour market:

In the first chapter, I focus on left-wing ideology and politics. Using German data, I investigate whether students self-select into the teacher-training program (Lehramtsstudium), by comparing their socio-political attitudes to those of the students from other fields of study. I also investigate whether teacher training influences students' socio-political attitudes. I find that incoming teacher trainees' ideology and political preferences are more left-wing compared to an average incoming university student. Additionally, I provide evidence of the socialization effect exerted by a teacher-training program. Their socio-political attitudes are reinforced and become even more left-wing as teacher trainees progress in their studies. In order to infer whether graduated teacher trainees who started working as teachers demonstrate similar behavior, I use the German Socio-Economic Panel to compare the political attitudes expressed by tenured teachers with the average of reference groups. Finally, I provide possible mechanisms behind the explicit left-wing orientation of German teachers, and I also discuss implications in terms of indoctrination.

The second chapter is joint work with Heinrich Ursprung. In this chapter, we contribute to the research on glass ceiling effect and fertility in Germany. We focus on women with high-profile careers and analyze whether having children provides an impediment in reaching the top, in terms of professional success. We first provide evidence of a gender wage gap and glass ceiling effect in Germany using the German Socio-Economic Panel. Women who have children indeed earn less in each quantile, but the motherhood effect is smallest at the highest income decile. We further look into the probability of being employed full-time, for women and men separately, and whether having children has a negative effect on that probability. Our results suggest that having children is correlated with the lower probability of working for women, while the opposite holds for men. Instrumenting the number of children by the occurrence of twins at the first birth, we find that having a second child has no effect on the probability of working for neither women, nor men. Finally, we investigate the probability of reaching the top. Our results show that it is the first child that makes the largest difference and creates a sort of a glass

ceiling for women in pursue of high-profile careers, but the effect of the second child does not turn out to be statistically significant. We discuss possible explanations.

A self-collected dataset is used in the third chapter (also joint with Heinrich Ursprung). In this chapter, we revisit the self-selection and socialization effects, but we focus on economics students and on rationality in decision-making. Students taking a third-semester course in the Bachelor's Economic program at the University of Konstanz have been surveyed each year during their first lecture from 2012 to 2018. In 2018, we extended the survey to the first-semester students, and additionally to the law and political science students. Students participated in the survey by making decisions in hypothetical situations that were presented to them in the survey. The survey questions were designed to analyze a few concepts from decision theory and the deviation from expected utility theory. Our aim was to infer whether economics students deviate less from rationality when compared to the law and political science students, and whether they become even more rational as they progress in their studies. We found no evidence of self-selection into studying economics based on rationality expressed in decision-making among first-semester students. We also provide evidence of economics training effect as students in higher semesters make decisions that are more rational compared to those at the beginning of their economics studies. This chapter contributes to the research on self-selection and socialization effects, but also on research related to differences between economists and non-economists.

Zusammenfassung

Diese Dissertation umfasst drei Kapitel, die mit modernsten empirischen Methoden Forschungsfragen der politischen Ökonomie und des Arbeitsmarktes untersuchen:

Im ersten Kapitel konzentriere ich mich auf linke Ideologie und Politik. Anhand deutscher Daten untersuche ich den Selbstselektionseffekt von Studierenden im in einem bestimmten Studienfach, nämlich das Lehramtsstudium, indem ich ihre gesellschaftspolitischen Einstellungen mit denen von Studierenden anderer Studienrichtungen vergleiche. Ich untersuche auch, ob die Lehrerausbildung die gesellschaftspolitischen Einstellungen der Studierenden beeinflusst. Meine Ergebnisse zeigen, dass die Ideologie und die politischen Präferenzen von angehenden Lehramtsstudierenden im Vergleich zu einem durchschnittlichen angehenden Universitätsstudenten weiter links ausgerichtet sind. Darüber hinaus weise ich den Sozialisationseffekt einer Lehrerausbildung nach. Die gesellschaftspolitischen Einstellungen von angehenden Studierenden werden verstärkt und bewegen sich mit dem Fortschreiten des Studiums noch weiter nach links. Um abzuleiten, ob Lehramtsanwärterinnen und Lehramtsanwärter ein ähnliches Verhalten zeigen, vergleiche ich anhand des Deutschen Sozioökonomischen Panels die politischen Einstellungen der Lehramtsstudierenden mit dem Durchschnitt der Referenzgruppen. Abschließend zeige ich mögliche Mechanismen der expliziten Linksorientierung von deutschen Lehrern auf und diskutiere auch Implikationen im Sinne der Indoktrination.

Das zweite Kapitel ist eine gemeinsame Arbeit mit Heinrich Ursprung. In diesem Kapitel leisten wir einen Beitrag zur Erforschung des Glass Ceiling Effekts und der Fertilität in Deutschland. Wir konzentrieren uns auf Frauen mit hochkarätigen Karrieren und analysieren, ob die Geburt von Kindern ein Hindernis für den beruflichen Aufstieg an die Spitze darstellt. Wir belegen erstmals einen Gender Pay Gap und Glass Ceiling Effekt in Deutschland anhand des Deutschen Sozioökonomischen Panels. Frauen mit Kindern verdienen zwar in jedem Quantil weniger als Männer, aber der Mutterschaftseffekt ist im höchsten Einkommensdezil am geringsten. Darüber hinaus untersuchen wir die Wahrscheinlichkeit einer Vollzeitbeschäftigung getrennt für Frauen und Männer und ob sich die Geburt von Kindern negativ auf diese Wahrscheinlichkeit auswirkt. Unsere Ergebnisse legen nahe, dass die Geburt von Kindern für Frauen mit einer geringeren

Wahrscheinlichkeit einer Erwerbstätigkeit korreliert, während für Männer das Gegenteil gilt. Instrumentiert man die Zahl der Kinder durch das Auftreten von Zwillingen bei der ersten Geburt, so stellt sich heraus, dass ein zweites Kind weder für Frauen noch für Männer einen Einfluss auf die Wahrscheinlichkeit hat, zu arbeiten. Schließlich untersuchen wir die Wahrscheinlichkeit, die Spitze zu erreichen. Unsere Ergebnisse zeigen, dass das erste Kind den größten Unterschied macht und eine Art von Glass Ceiling für Frauen in hochkarätigen Karrieren bildet, aber der Effekt des zweiten Kindes erweist sich als statistisch nicht signifikant. Wir diskutieren mögliche Erklärungen.

Im dritten Kapitel wird ein selbsterstellter Datensatz verwendet (ebenfalls gemeinsam mit Heinrich Ursprung). In diesem Kapitel gehen wir noch einmal auf die Selbstselektions- und Sozialisationseffekte ein, konzentrieren uns jedoch auf Studierende der Wirtschaftswissenschaften und auf Rationalität bei der Entscheidungsfindung. Studierende des dritten Semesters des Bachelorstudiengangs Wirtschaftswissenschaften der Universität Konstanz wurden von 2012 bis 2018 jährlich in ihrer ersten Vorlesung befragt. 2018 haben wir die Befragung auf die Erstsemester und zusätzlich auf die Studierenden der Rechts- und Politikwissenschaften ausgeweitet. Die Studierenden nahmen an der Umfrage teil, indem sie Entscheidungen in hypothetischen Situationen trafen, die ihnen in der Umfrage präsentiert wurden. Die Fragestellungen der Umfrage wurden entwickelt, um einige Konzepte aus der Entscheidungstheorie und die Abweichung von der Erwartungsnutzentheorie zu analysieren. Unser Ziel war es herauszufinden, ob die Entscheidungen von Studierenden der Wirtschaftswissenschaften im Vergleich zu Studierenden der Rechts- und Politikwissenschaften weniger von der Rationalität abweichen und ob die Rationalität ihrer Entscheidungen im Laufe ihres Studiums zunimmt. Wir fanden keine Hinweise auf eine Selbstselektion für das Studium der Wirtschaftswissenschaften aufgrund von rationalen Entscheidungen bei Erstsemestern. Wir weisen auch einen wirtschaftswissenschaftlichen Ausbildungseffekt nach, da Studierende in höheren Semestern rationaler entscheiden als zu Beginn ihres wirtschaftswissenschaftlichen Studiums. Dieses Kapitel leistet einen Beitrag zur Erforschung von Selbstselektions- und Sozialisationseffekten, aber auch zur Erforschung der Unterschiede zwischen Ökonomen und Nicht-Ökonomen.

Chapter 1

Teachers and politics

ABSTRACT

Ideology and political preferences are transferable to impressionable young minds. I inquire into teachers' ideological and political attitudes in Germany and find ideological uniformity. An extensive survey of students shows that high-school graduates'self-selection into teacher training programs is likely to be co-determined by their political attitudes: incoming teacher trainees are more left-wing in ideology and political preferences than the average incoming university student. I find that teacher training programs exert a socialization effect: as compared to the average student, teacher trainees become more left-wing as they progress in their studies.In a third step, I use the German Socio-Economic Panel to compare tenured teachers' political attitudes with other employees with a university degree and with other civil servants, and find that tenured teachers are more left-wing than the average person in the respective reference groups. I consider possible explanations for the left-wing orientation of teachers in the German educational system and implications of indoctrination and imbalance of views.

1.1 Introduction

For many young Germans, becoming a teacher is an attractive option. The compression of earnings in the teaching profession attracts relatively risk-averse students (Lang and Palacios, 2018) and, since performance assessments of teachers are not a high-stake matter in Germany, peer competition is limited. After graduating from a university program called Lehramtsstudium, a teacher training position (Referendariat) is readily obtained through a state-wide centralized employment system. Teachers have the status of civil servants, which grants them tenure and various other employment benefit.

I consider the following questions. Do incoming teacher-training students differ significantly from students in other fields of studies; do their attitudes change while studying; are these changes, if they occur, specific to teacher trainees or do they reflect a common trend among students; and finally do the attitudes that set graduates of teacher-training programs apart from other university graduates also set apart tenured teachers from people with a similar training or profession?

My focus is on ideology and politics. Are teacher trainees more supportive of a particular ideology than their fellow students; and, if so, is this reflected in a sustained ideological position of tenured teachers that differs from that of similar professionals who followed different career paths?

Answers can reflect self-selection and socialization (Hastie, 2007). Self-selection refers to initial choice of a field of study according to ideological or political attitudes. Socialization is the effect on political attitudes in the course of progress in a chosen field of study (Plant, 1966; Guimond and Palmer, 1990, 1996). With respect to socialization, Eagly and Chaiken (1993) distinguished two main mechanisms: informational influence, whereby attitudes change based on information received when studying; and normative influence, whereby students' attitudes change by exposure to attitudes of their professors (indoctrination) and fellow students (peer pressure).

I find prominence of left-wing ideology and political views among German-trainer teachers, ostensibly through self-selection. There is reinforcement through socialization as studies progress. The results are consistent with ideology and political attitudes of tenured teachers, who the students eventually become.

Ideological and political attitudes of teacher trainees have not been previously studied. Investigating the political attitudes of teacher-trainees is interesting because these students will become teachers who influence their pupils' ideological and political attitudes.

Knowing more about future teachers can determine whether tenured teachers embrace ideologies and have political attitudes because of their family background, peer pressure while studying, or financial dependence on the state. Teacher training, as compared to most other university programs, is targeted to a clearly defined career path and is thus ideally suited for an investigation that links the ideological and political attitudes of university students to the ideological and political attitudes that may be prominent in the profession they will be joining[1].

Most closely related to my study are the studies by Goossens and Méon (2015) and Fischer et al. (2017). Both of these studies are concerned with university education and differentiate carefully between self-selection and socialization effects. Goossens and Méon (2015) use a survey of students of different disciplines in their first and final year of university studies to investigate whether economics and business students hold different beliefs about the existence of mutual benefit from market transactions than students studying different disciplines. The results show evidence of both socialization and self-selection effects of studying economics or business. Fischer et al. (2017) also investigated self-selection and socialization effects of university students. They found evidence of self-selection according to political attitudes in all fields of study, and socialization effects only for economics students, who become, in the course of their studies, more market oriented[2].

1.2 Relevance

Why do the findings of left-wing monopoly of thought among teacher-trainers and teachers matter? There are issues of indoctrination and bias. Teachers are ex officio in a position to influence their students' ideological and political views. Their influence can be deliberate or unwitting but indoctrination can take place. Views imparted to students can be part of a social consensus or can be contested within a population. When views are contested and only one view is put forward, one can speak of indoctrination. Whereas education should expand students' horizons, indoctrination does the opposite in narrowing students' horizons. Students are not equipped with broad knowledge for the diverse needs for understanding phenomena they may confront in life. Levy and Peart (2006) observe 'the fragility of a discipline when a model has monopoly status. A model with monopoly status among teachers is imparted to students, who only in the later course of life may come to realize that there is an alternative to the view of the world that teachers

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[1] Bonica et al. (2016) provide a similar analysis for the legal profession.

[2] Fischer et al. (2017) did not include teacher trainees as a field of study. Their study focused on university training in general and was not motivated by a preconceived hypothesis, whereas my study focuses on a training program and a profession.

portrayed and that the alternative has merit.

Economists and political scientists have focused on the positive research question of modelling and measuring the effect of schooling on socio-political attitudes[3]. The following studies are examples.

Fuchs-Schündeln and Masella (2016) found in an empirical study that excessive uniformity of a particular type in education, or indeed indoctrination, was detrimental for students. Their study used the natural experiment of the German re-unification to show that socialist education had an adverse effect on the likelihood of obtaining a college degree in the unified market economy and on several other labor market outcomes, especially for men. Cantoni et al. (2017) studied the causal effect of a new high-school political-science curriculum that was introduced by the Chinese Communist Party between 2004 and 2010. They found that the Chinese government's desired objectives of the textbook reform in shaping the students' political attitudes were achieved, while evidence on changing the students' social behavior was mixed.

In observations on schooling in China, Liu (2020) has described schooling within strictly defined uniform boundaries as 'producing bricks': 'School students are kept busy with heavy work, both in school and at home. No time to think. After 9–12 years' training in this system, students do not know how to think but follow orders from the superior. Such an educational system kills creativeness. They are making bricks instead of human beings.' Indoctrination during the 3rd Reich has been studied by Voigtlaeander and Voth (2015), who showed that Germans who grew up under the Nazi regime have been significantly more anti-Semitic than those born before or after that period. They show, in particular, that Nazi schooling was more effective in indoctrination than radio or cinema propaganda.

Gradstein and Justman (2002) formulated a model with benefits from educational uniformity. In their model of endogenous growth, education has a dual role, in building human capital and ensuring increased social cohesion through common norms. They viewed centralized uniform schooling as generating economic growth by reducing cultural polarization that inhibits the ability of economic agents to interact with one other and thus undermines the efficiency of production and exchange. Material advantages in this view outweigh the cost to ethnic groups of alienating their children from their traditional

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[3] The educational psychology and philosophy literature on indoctrination has mainly focused on definition, differentiation and the normative aspect of legality (Flew, 1966; Wilson, 1966, Snook, 1972/2010, Hare, 2007; Bialystok, 2014), and empirical social and educational research is usually limited to small sample case studies and interviews (Hadley and Young, 2018; Myers, 2009).

culture and values.

In another case of benefit from educational uniformity, Dhar et al. (2018) describe school-based intervention in India aimed at changing restrictive gender norms. Using a randomized controlled trial, they found that this educational intervention significantly increased adolescents' support for gender equality against the background of other determinants such as the students' family characteristics.

The content of education clearly matters when students are exposed to a uniform view or a single ideology. Hillman (1998) proposes that teaching students exclusively that government decisions are necessarily socially beneficial disadvantages students when, after their studies, they confront in life political self-interest and rent seeking, which they try to interpret through the mindset of the concepts of necessarily beneficial governments that they have been taught.

When a view from the left monopolizes education, students can be exposed uncritically to the claim that a socialist system can be result in a virtuous efficient society, while teachers downplay the evidence that indicates otherwise. Levy and Peart (2011) provide such evidence from American textbooks.

I proceed now to the institutional setting for my study and to the empirical results.

1.3 Institutional setting

The procedure for becoming a teacher in Germany is strictly determined. I describe the general procedure and disregard all state-specific characteristics. The first step on the career ladder is to enroll in a Lehramt study program. The term "Lehramt" is telling because "Amt" translates into "public office". Future teachers are required to pass two state examinations: the first one is tantamount to obtaining the university degree, the second one is taken at the end of the practical teacher training phase. After passing the second state exam, teacher trainees are ready to become appointed teachers, i.e. public servants. Finding a position is through an allocation procedure at the state level.

Teacher trainee students choose two subjects that they will teach. Different state-specific rules apply to the choice of these two fields of study, but this does not affect my investigation as I investigate teacher trainees as one group. Differentiating between subgroups of teachers specializing in specific subject combinations yields insufficient numbers of observations. In any event, I am interested in who decides to pursue a teacher career. Students who enroll in a teacher-training program have, independent of their choice of

subjects, already a clear vision of the profession that they want to pursue, while other students usually do not have clear career plans. Most high school graduates make the decision to become a teacher already at the age of 18, which sets them clearly apart from most other students (not including medical students).

German teachers enjoy job-market related benefits that other professionals whose jobs also require a university education do not have. Most importantly, the civil servant status provides job and income security, but civil servants also benefit from other especially generous regulations: they do not pay social security contributions, they receive subsidies for private health insurance, and part-time employment is granted as a rule.

Mothers and female teachers who contemplate motherhood benefit, moreover, from especially generous maternity leave regulations, working time flexibility, and long school vacations that make the job even more compatible with motherhood. That these gender-specific benefits play an important role when a high school graduate contemplates becoming a teacher can be seen from the gender composition of the German teacher body. Using SOEP (German Socio-Economic Panel) data shows that about two thirds of German teachers are women.
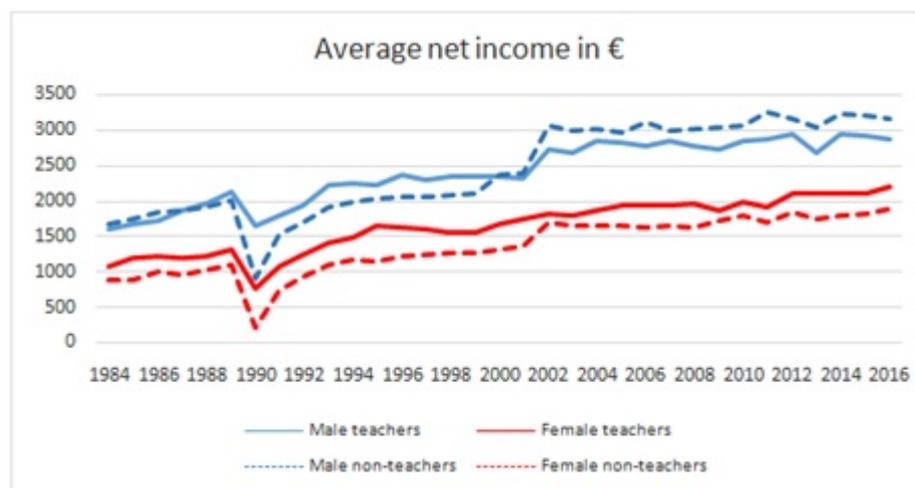
Figure 1.1: Average net income of teachers and non-teachers - SOEP data

Figure 1.1, which is also based on SOEP data, reveals a second reason for the gender imbalance in the German teacher body. The figure shows the average net incomes of teachers and other professionals with university degrees by gender. Both full-time and part-time employment are considered. Besides documenting the well-known gender wage gap, the graphs also show that female teachers earn more than their peers in other pro-

fessions. For males, the "teacher wage gap" has, in the last 16 years, been negative, i.e. male non-teachers earned more than teachers [4] .

1.4   Data and empirical strategy

My study uses survey data. Use of survey data raises the question whether respondents are not expressive in terms of answering to signal a preferred identity (Hillman, 2010) or to provide a socially desirable response (Kauder et al., 2018). In my case, the survey responses are reliable indicators because expressive or socially adjusted designations of identity is exactly what I am looking for.

I follow Fischer et al. (2017) and use a longitudinal micro survey on German students administered by the Research Group on Higher Education, a long-term project of the sociology department at the University of Konstanz. The survey covers 13 years from the academic year 1982/83 until 2015/2016. Altogether 105,000 students were surveyed. The students were chosen randomly but were not tracked over time, i.e. the dataset has the characteristics of a pseudo panel. The sample is representative for German students. Questions relating to political attitudes or implicitly ideology were included from the second wave onward.

My sample is restricted to students who were enrolled as undergraduates for less than 10 semesters (regular undergraduate studies in Germany lasted until recently 8-9 semesters). I also exclude students who were younger than 18 and older than 23 at the beginning of their study. Lehramt programs are only offered at universities; I therefore exclude students studying at universities of applied sciences. About 10% of all German university students are teacher trainees. Descriptive statistics of the control variables are reported in the appendix.

Two questions elicit the students' political attitudes. The first one asks: *"Characterizing your overall political attitude, to what extent do you agree with the positions of the following basic political orientations, and to what extent do you disapprove of them?"* The students could express their positions using a Likert scale ranging from *strongly disagree* (1) to *strongly agree* (7). I focus only on those political ideologies advocated by one of the political parties that played a major role in the observation period; i.e. the Christian-conservative party (CDU/CSU), the green party (Bündnis 90/Die Grünen), the liberal-democratic party (FDP), and social democratic party (SPD). The term "liberal-democratic" signifies in Europe a strong belief in personal freedom and market allocation.

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[4] This result is in line with Ammermüller and Weber (2005) who found that, for women, financial returns to a teaching degree are larger than the returns to all other 25 considered university degrees.

Together with the CDU/CSU, the FDP is thus positioned on the right of the political spectrum. The SPD and the green party are on the left. The second question that elicits the students' political attitudes is less finely grained by referring explicitly to the left-right spectrum. The exact wording is the following: *"As compared to most people in this country I am, politically speaking, rather to the left (1), ..., right (7)."*

Apart from the attitudes toward political ideologies, I also use survey questions that elicit the students' attitudes towards different types of policies: support of free markets, traditional family policies, production of nuclear energy, and environmental policies. The students could express their positions towards these policies again on a Likert scale ranging from 1 to 7.

To analyze the political attitudes of tenured teachers, I use the German Socio-Economic Panel (SOEP) dataset. The SOEP is an annual representative longitudinal survey of private households that began in 1984. Three questions related to political preferences are asked: whether the respondent has any political preferences, and, if so, which political party he/she supports (only one party can be chosen), and finally the intensity of the support on the scale from 1 to 5. Descriptive statistics of the SOEP dataset are presented in the appendix. My data for tenured teachers does not allow me to test their attitudes toward specific policy areas.

I estimate the teacher-trainees' political attitudes by using a linear probability model that controls for student characteristics and wave fixed effects. The outcome variables are defined as binary values; 0 if a student does not agree with a political ideology (ticked 1, 2, 3, or 4), and 1 if a student agrees (ticked 5, 6 and 7). The linear probability model has the advantage that the interpretation of the estimated coefficients is straight-forward. But I also used ordered probit and OLS models for robustness tests. The linear probability model has the following form:

$$Y_{i,j,t} = \sum_k \lambda_j Z_{i,t} + \sum_l \rho_{j,l} X_{i,l,t} + \theta_t + \varepsilon_{i,j} \tag{1.1}$$

The outcome variable $Y_{i,j,t} \in \{0,1\}$ denotes the attitude of individual i regarding political attitude j in wave t. The field of study is captured by the variable $Z_{i,t}$. I control for various student characteristics in the vector $X_{i,l,t}$ and include a wave fixed effect θ_t. The objective of this regression is to test whether incoming teacher-training students differ significantly from incoming students in other fields of study in terms of political attitudes, which, if so, would indicate that they self-select themselves to some extent into this field of study based on their political attitudes. In order to investigate whether teacher-training students change their political attitudes while training to become a teacher, the following

linear probability model is used (again, I also used ordered probit and OLS models for robustness tests):

$$Y_{i,j,t} = \beta_j S_{i,t} + \sum_l \rho_{j,l} X_{i,l,t} + \theta_t + \varepsilon_{i,j} \tag{1.2}$$

where the variable $S_{i,t}$ denotes the semester in which student i is enrolled.

In regressions (1.1) and (1.2), the vector $X_{i,l,t}$ contains indicators of the following student characteristics: gender, average grade in the high school leaving exam (Abitur), whether the father is a blue collar worker or entrepreneur, whether students can envision themselves to be self-employed in the future, and whether they are under financial stress. I control for gender because the literature suggests that women are more left-wing oriented than men (Dassonneville, 2019). The Abitur grade is used as a proxy for a perceived career success (Schwerdt and Woessmann, 2015). Data on fathers' employment is a proxy for the students' socio-economic family background, while students who can envision themselves to be self-employed may be indicating that they favor free markets over political allocation. Finally, financially stressed students may be more likely to support political parties on the left (Fischer et al., 2017).

To estimate the political attitudes of tenured teachers, I use as the comparison group other German employees who hold a university degree. Rockey (2014) found that certain demographic characteristics can be used to predict ideological positions, in particular age, gender, income and education. He also found that increasing income may lead to increased political polarization. I therefore control for the following variables: age, gender, income, years of education, and marriage status. In this way teachers and workers with similar characteristics are matched.

In the SOEP questionnaire, respondents express their support for a certain political party only if they previously stated that this party is their favored choice (the student survey, in contrast, elicits attitudes toward all four parties). Since only one party can be the favored choice, the respondents have "partisan" characteristics. I did not transform the outcome variable into a categorical variable because the respondents had only five options for expressing their intensity of support (the student survey offered seven options) and therefore use the following OLS fixed effects model:

$$Y_{i,j,t} = \beta_0 + \beta_1 X_{i,t} + \beta_2 Z_{i,t} + \theta_t + \varepsilon_{i,j} \tag{1.3}$$

The outcome variable $Y_{i,j,t}$ denotes the political attitude of the respondent i towards party j. The value $Y_{i,j,t} = 0$ reflects no support for the policy, value 1 is the lowest support, and value 5 the highest. The variable $X_{i,t}$ is a teacher dummy. If the respondent

is a teacher the value is 1, otherwise 0. $Z_{i,t}$ are the respondent's characteristics, θ_t is the wave fixed effect, and $\varepsilon_{i,j}$ the error term.

1.5 Results

1.5.1 Teacher trainees: ideology based self-selection

Figure 2 illustrates the incoming students' responses to questions about political attitudes. Based on the similarity of their political preferences, students can be bracketed together as: i) law and economics, ii) engineering, medicine, Lehramt, and natural sciences, and iii) humanities and social science students.

To test whether this bracketing survives if one controls for demographic, social background, and other characteristics of the incoming students and takes, moreover, into account that political attitudes and also the ideological orientation of the political parties may have changed, I applied regression model (1.1). The results are reported in Table 1.1. Notice that the incoming engineering students serve here as the reference group because they represent best the "average" student. The left-wing humanities and social science group and the right-wing law and economics group survive. The group containing the remaining fields of study now splits up: incoming medical students are more conservative than incoming engineering students, and incoming natural science students are less conservative and greener. The only group whose party preference profile is still indistinguishable from the incoming engineering students are our incoming teacher trainees. Using, however, the left-right political orientation as dependent variable (column 5) reveals that even this similarity rests on rather shaky foundations: incoming teacher trainee students have beliefs more to the left of the general public than incoming engineering students. Taken together, these results clearly show that the political attitudes of incoming teacher trainees differ from other students; political attitudes are therefore likely to have had an influence in the choice of their field of study.

The results presented in Table 1.1 are robust to OLS fixed effect and ordered probit estimates and also to a sub-sample analysis that excludes the medical students who are special because studying medicine is restricted to students with very good Abitur grades. All of these robustness checks are documented in the appendix.

To capture differences in party support across fields of study in more detail, I also present results of a subsample analysis of partisan students. Partisan students are students who assign values 6 or 7 to only one political ideology and 5 or less to all other ideologies. Partisan students thus have very clear preferences towards one particular ideology. The results reported in Table 1.2 support the picture obtained from the estimates based on all students. Overall, it can be concluded that the empirical evidence supports the conjecture of ideology-based self-selection in teacher trainee programs. The ideological profile of incoming teacher trainees differs from other incoming university students. Their preferences towards political parties are somewhat similar to the preferences of engineering students, but they report themselves to be more to the left than engineering students.
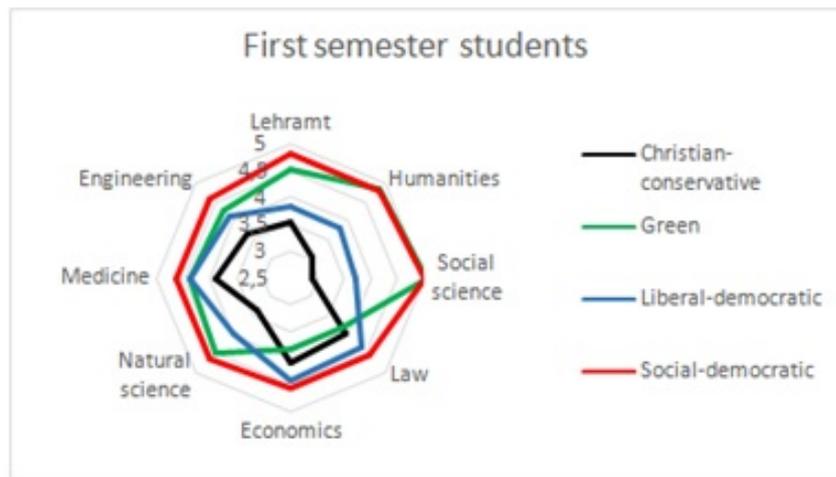
Figure 1.2: Descriptive statistics: Attitudes towards political ideologies of incoming students

Table 1.1: Self-selection, all students

	Green	Social-Democratic	Christian-Conservative	Liberal-Democratic	Left/Compatriots
Lehramt	0.0296	0.00180	-0.0109	-0.0336	0.0884***
	(1.35)	(0.08)	(-0.53)	(-1.62)	(3.61)
Medicine	0.0154	0.0105	0.0502**	0.0979***	0.0125
	(0.68)	(0.47)	(2.30)	(4.39)	(0.49)
Natural	0.0562***	-0.00504	-0.0769***	-0.00159	0.0927***
Sciences	(3.44)	(-0.31)	(-5.05)	(-0.10)	(5.09)
Humanities	0.144***	0.0515***	-0.125***	-0.0325*	0.198***
	(7.82)	(2.71)	(-7.47)	(-1.77)	(9.78)
Social	0.183***	0.107***	-0.130***	-0.0403*	0.252***
Sciences	(8.06)	(4.65)	(-6.30)	(-1.71)	(10.24)
Law	-0.102***	-0.0202	0.0925***	0.0902***	-0.0798***
	(-4.38)	(-0.86)	(4.06)	(3.88)	(-3.10)
Economics	-0.100***	-0.0207	0.104***	0.114***	-0.0995***
	(-5.51)	(-1.13)	(5.75)	(6.27)	(-4.94)
Controls[#]	Yes	Yes	Yes	Yes	Yes
Wave FE	Yes	Yes	Yes	Yes	Yes
Observations	8552	8524	8557	8526	6767
R-squared	0.0524	0.0267	0.0617	0.0392	0.0689

t statistics in parentheses, * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$
[#]A table reporting the estimates of the controls can be found in the appendix

Table 1.2: Self-selection, partisan students

	Green	Social-Democratic	Christian-Conservative	Liberal-Democratic	Left/Compatriots
Lehramt	0.0117	-0.0150	-0.0298	-0.0638**	0.0905**
	(0.35)	(-0.46)	(-0.91)	(-2.03)	(2.40)
Medicine	-0.0298	-0.0459	0.0450	0.102***	0.0265
	(-0.88)	(-1.36)	(1.33)	(2.99)	(0.69)
Natural	0.0903***	-0.0197	-0.100***	0.0135	0.112***
Sciences	(3.69)	(-0.80)	(-4.26)	(0.55)	(4.15)
Humanities	0.128***	-0.00752	-0.154***	-0.0581**	0.222***
	(4.60)	(-0.25)	(-5.81)	(-2.08)	(7.35)
Social	0.140***	0.100***	-0.163***	-0.0504	0.257***
Sciences	(4.12)	(2.96)	(-5.14)	(-1.42)	(7.05)
Law	-0.122***	-0.0547	0.0854**	0.0757**	-0.110***
	(-3.48)	(-1.53)	(2.47)	(2.15)	(-2.92)
Economics	-0.108***	-0.0154	0.0689**	0.0965***	-0.0547*
	(-3.96)	(-0.57)	(2.49)	(3.55)	(-1.82)
Controls	Yes	Yes	Yes	Yes	Yes
Wave FE	Yes	Yes	Yes	Yes	Yes
Observations	3665	3665	3665	3665	3022
R-squared	0.0753	0.0398	0.0625	0.0513	0.0805

t statistics in parentheses, * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

1.5.2   Teacher trainees: socialization effects on political attitudes

Figure 1.3 shows the teacher trainees' party support as measured by their responses at the beginning and at the end of their training (1st and 9th semester). Their support for the green and social-democratic ideologies increases and their support for the Christian-conservative ideology decreases. To test whether this shift to the left survives controlling for demographic, social background, and other characteristics, I apply regression model (1.2). The results reported in Table 1.3 show that the impression gained from inspecting the raw data is robust. The semester variable has statistically significant positive coefficients for the support of the left-wing parties – the greens (column 1) and the social democrats (column 2) – and negative coefficients, albeit not statistically significant, for the right-wing parties (columns 3 and 4). The teacher trainees also report themselves to become more leftist as compared to the German voters at large (column 5).

There is thus clear evidence that teacher trainees are subjected to socialization effects while studying. This result is substantively significant considering that so far only two studies have been able to detect statistically significant socialization effects on political attitudes: Fischer et al. (2017) for economics students, and Laméris et al. (2019) for business students.
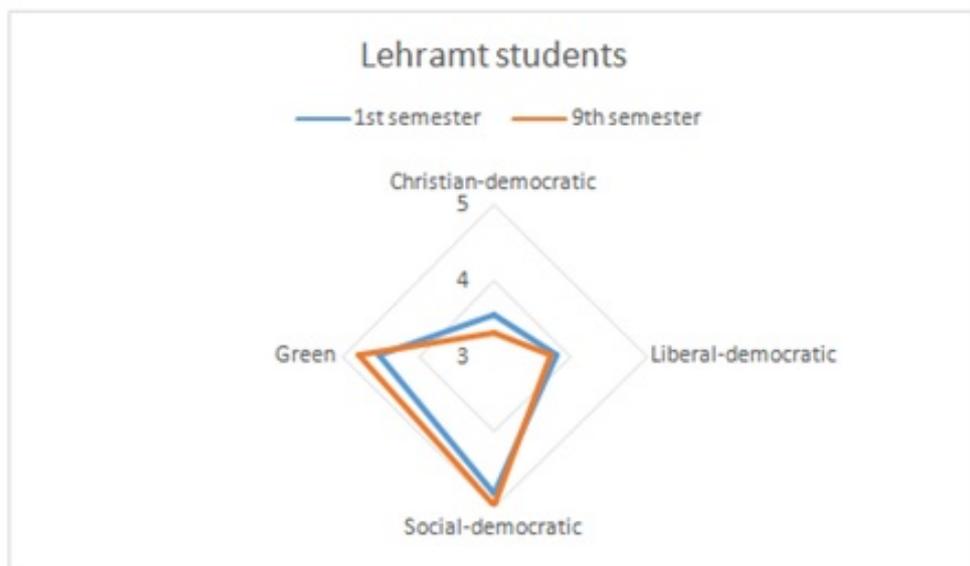
Figure 1.3: Descriptive statistics: Training effect based on political parties

Table 1.3: Socialization effect based on political ideology

	Green	Social-Democratic	Christian-Conservative	Liberal-Democratic	Left to compatriots
Semester	0.00969***	0.00691**	-0.00198	-0.000111	0.00713**
	(3.09)	(2.24)	(-0.66)	(-0.04)	(2.04)
Controls#	Yes	Yes	Yes	Yes	Yes
Wave FE	Yes	Yes	Yes	Yes	Yes
Observations	3458	3448	3460	3438	2754
R-squared	0.0248	0.0145	0.0360	0.0154	0.0165

t statistics in parentheses, * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

#A table reporting the estimates of the controls can be found in the appendix

1.5.3 Teacher trainees: a special robustness test

Our longitudinal micro survey of German students allows us to test for self-selection and socialization effects based on various specific policies rather than party programs or political ideologies. The survey asks many questions regarding specific policies in the same manner as the questions about political attitudes. I chose four of these questions: two questions about policies which are, among most students, hardly ever discussed controversially (production of nuclear energy and environmental protection) to see whether teacher trainees are, as a group, independent enough to form an own opinion, and two questions addressing issues that may be important for future teachers and civil servants (policies supporting the traditional family and free market policies).The results from by regression model (1) are reported in Table 1.4.

Table 1.4: Self-selection based on specific policies, linear probability model, all incoming students. Dependent variable: Support for specific policies

	Production of nuclear energy	Environmental protection	Traditional family	Free market
Lehramt	-0.0866***	0.00863	-0.0506**	-0.0944***
	(-3.50)	(0.51)	(-2.25)	(-4.40)
Medicine	-0.0264	0.0131	0.0110	-0.0157
	(-0.83)	(0.73)	(0.49)	(-0.78)
Natural Sciences	-0.0510**	0.0428***	-0.0847***	-0.0930***
	(-2.45)	(3.44)	(-5.04)	(-6.03)
Humanities	-0.140***	0.0527***	-0.178***	-0.175***
	(-7.43)	(3.79)	(-8.80)	(-9.04)
Social Sciences	-0.140***	0.0594***	-0.198***	-0.183***
	(-5.22)	(3.19)	(-7.56)	(-7.12)
Law	0.00306	-0.1000***	-0.0343	-0.0132
	(0.10)	(-4.79)	(-1.44)	(-0.64)
Economics	-0.0113	-0.0834***	-0.00290	0.0640***
	(-0.44)	(-4.96)	(-0.16)	(4.47)
Controls[#]	Yes	Yes	Yes	Yes
Wave FE	Yes	Yes	Yes	Yes
Observations	3105	7800	7793	7784
R-squared	0.0792	0.0641	0.0359	0.0601

t statistics in parentheses, * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$
[#]A table reporting the estimates of the controls can be found in the appendix

Table 1.5: Socialization effects based on specific policies, linear probability model, all teacher trainees. Dependent variable: Support for specific policies

	Production of nuclear energy	Environmental protection	Traditional family	Free market
Semester	-0.00121	-0.00249	-0.00566*	-0.00774**
	(-0.34)	(-1.00)	(-1.71)	(-2.36)
Controls [#]	Yes	Yes	Yes	Yes
Wave FE	Yes	Yes	Yes	Yes
Observations	797	3251	3239	3236
R-squared	0.0449	0.0582	0.0252	0.0178

t statistics in parentheses, * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$
[#]A table reporting the estimates of the controls can be found in the appendix

Most students are against nuclear plants[5]. It is therefore not surprising that teacher trainees agree with their peers on this question (column 1). Environmental protection policies are also rather uncontroversial[6], but law and economics students are clearly less eco-friendly than engineering and medical students and even less so than the vast majority of students. Interestingly, teacher trainees do not follow the crowd and form with the engineering and medical students a group of less committed students (column 2). The

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[5] In 2002, nuclear plants were outlawed in Germany. The phase-out is well underway.
[6] Kauder et al. (2018) found, for example, that the environmental policy stance of German partisan students does not follow the left-right ideology cleavage.

incoming teacher trainees' responses to the questions relating to policies supporting the traditional family (column 3) and market friendly policies (column 4) do not deviate from the majority responses. The responses are nevertheless telling because they are very much in line with the interests of teachers. Teachers perceive themselves as educators whose expertise is much superior to the education efforts of parents that are, in their view, often ill-conceived. All teachers of publicly financed schools, but especially teachers who are civil servants, benefit from a strong state sector and thus view decentralized market allocation with suspicion.

With one exception (environmental protection), the attitudes of incoming teacher trainees towards specific policy fields thus turn out to conform quite well with the attitudes of the majority of students. The responses nevertheless indicate that these policy views are already well attuned to the personal interest of appointed teachers.

As compared to the robustness test of self-selection, the results of the corresponding robustness test of socialization effects are much stronger. The results of this test are reported in Table 1.5. In the two policy fields that are directly related to the professional and financial interests of teachers, we observe statistically significant negative coefficient estimates of the semester variable, implying that the students take an increasingly dismissive attitude towards policies supporting the traditional family and free market polices. In both cases the students are reinforced in their attitudes they already had when entering university.

1.5.4 Political attitudes of tenured teachers

I now turn to estimating the political attitudes of appointed teachers using the SOEP data. My sample comprises all German employees who hold a university degree. The *Teacher* variable thus estimates the party preferences of secondary school teachers as compared to the reference group of all other German employees who hold a university degree. The reference group is thus similar to that used in the regressions estimating the party preferences of the teacher trainees (engineering students are very similar to the average student). The controls were also chosen to mirror as best as possible the controls used in the regressions estimating the attitudes of teacher trainees.

The regression results reported in Table 1.6 indicate that the average teacher more strongly supports left-wing parties than comparable German employees with a university degree and, correspondingly, is less in favor of right-wing parties. This partiality is even more pronounced for younger teachers. Whether this is a cohort or an age effect is an open question. I ran two robustness tests, one including the respondents' state of residence and

one including in the sample also primary school teachers. The results reported in Table 1.6 turn out to be perfectly robust to these changes[7].

Since SOEP respondents can choose only one political party and then assign to this favored party the strength of their support, the teacher sample is best compared with the results reported in Table 1.2 for partisan students. Considering that the questions were not identical and the reference groups are not identical, there is an impediment to comparing the coefficients. Still, the statistical significance and the signs are informative enough - teacher trainees keep their strong preference for left-wing ideologies after they have entered the job market.

Teachers' possible motives for strongly supporting left-wing ideologies are numerous. Teachers in Germany are not unionized (since they are civil servants) but nevertheless have a strong lobby that is likely to have a homogenizing effect. If a teacher is not on the same track as the majority of his peers, she or he might face substantial difficulties at the work place. Another motive may be that teachers support the parties that promise them professional and financial benefits.

To check whether the teacher effect estimated in the previous regression can in part be attributed to the teachers' civil servant status, I re-estimated the regression with the subsample of civil servants. Comparing teachers with other civil servants reveals that teachers support the green party even more strongly than the average German civil servant and the Christian-conservative party less.

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[7] These robustness tests are documented in the appendix.

Table 1.6: Political attitudes of tenured teachers, German employees with a university degree, OLS. Dependent variable: strength of support for favored party

	Green	SPD	CDU/CSU	FDP
Teacher	0.144***	0.173***	-0.187***	-0.126***
	(6.12)	(6.60)	(-6.82)	(-8.53)
Female	0.267***	-0.0265	-0.179***	-0.0969***
	(16.01)	(-1.42)	(-9.17)	(-9.27)
Age	-0.00642***	-0.00120	0.00697***	0.00287***
	(-8.71)	(-1.46)	(8.10)	(6.21)
Married	-0.0943***	-0.000565	0.198***	-0.0309**
	(-5.57)	(-0.03)	(10.00)	(-2.92)
Log net income	-0.105***	0.0254*	0.190***	0.0373***
	(-9.53)	(2.06)	(14.72)	(5.40)
Years of	0.0686***	-0.0230***	-0.0557***	0.0186***
Education	(15.73)	(-4.72)	(-10.93)	(6.80)
Degree from East	-0.411***	-0.192***	-0.142***	-0.0823***
Germany	(-16.26)	(-6.79)	(-4.81)	(-5.20)
Constant	-0.0126	1.543***	0.547***	-0.212*
	(-0.09)	(10.19)	(3.45)	(-2.49)
Wave FE	Yes	Yes	Yes	Yes
Observations	37532	37532	37532	37532
R-squared	0.061	0.016	0.035	0.019

t statistics in parentheses, * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 1.7: Political attitudes of teachers, civil servants, OLS regression. Dependent variable: strength of support for favored party

	Green	SPD	CDU	FDP
Teacher	0.0615*	-0.0330	-0.105**	0.0246
	(2.07)	(-0.99)	(-3.21)	(1.80)
Controls#	Yes	Yes	Yes	Yes
Wave FE	Yes	Yes	Yes	Yes
Observations	14028	14028	14028	14028
R-squared	0.059	0.020	0.034	0.009

t statistics in parentheses, * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$
#A table reporting the estimates of the controls
can be found in the appendix

1.6 Conclusions

I have provided new evidence on how the political attitudes of German teachers begin and develop. I first investigate, using a representative survey of German students, whether teacher trainees' ideological and political attitudes differ from other students studying at German universities. I find that students who self-select themselves into teacher training programs are characterized by support for left-wing political ideologies. The evidence is of ideological uniformity in self-selection. Other evidence of ideology-induced self-selection into different fields of studies does not make self-selection surprising. The implicit question is why do individuals with leftwing ideologies or political preferences select themselves in particular into teaching?

Perhaps surprisingly, I find systematic socialization effects on teacher trainees' political attitudes. As teacher trainees progress in their studies, they become even more supportive of left-wing ideology. The results concerning socialization are robust when self-reported political ideologies are replaced by responses to questions about preferences for specific policies. The inference is that increased conformity takes place. My data does not allow me to identify the mechanism whereby the socialization shift in ideology occurs. This is why I use the rather neutral term "socialization effect" that is intended to capture all possible mechanisms driving the observed regularity. Possible mechanisms are peer pressure, indoctrination by left-wing oriented professors, pocket-book (self-interested financial) considerations when the teacher trainees anticipate future income or approach their career goal, or a combination of these mechanisms.

Using the German Socio Economic Panel, I explored the political attitudes of tenured teachers and find that teachers support left-wing parties more so than other German university degree holders do, and also more so than other civil servants. Even though the Socio Economic Panel and the data from the employed student survey are not perfectly comparable, some general conclusions with respect to the formation of teachers' political preferences can be drawn. Teachers already express support for left-wing parties and ideologies when starting their university training programs. These preferences become more pronounced as they progress in their studies, and remain when they are working as tenured civil servants.

An interpretation of the likely motive of tenured teachers to express and support left-wing policy is financial self-interest because teachers are civil servants whose incomes are financed by the state. This motive is reinforced by peer effects at the work place; 'mobbing' of teacher colleagues who deviate ideologically from the mainstream is not

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anecdotally unheard of.

To be sure, my interpretation that the political attitudes of teacher trainees and tenured teachers reflect financial self-interest motives and are reinforced by peer effects, is only an inference that is consistent with my results. The mechanisms that underlie the formation of political attitudes are difficult to identify with econometric methods because of lack of data. The objective of my study has been to use the standard econometric tool kit to describe and trace the formation of these attitudes.

Finally, I return to the issue of indoctrination of students whose thinking can be 'captured' and placed in a confined world view articulated by teachers. Moreover, my study shows that it is not only being exposed to one ideologically committed teacher, but, rather when students change teachers, they tend to be exposed exclusively to the same world view.

A policy conclusion of my study is that the ideological monoculture of German teachers should be replaced by greater diversification in teacher ideology and political attitudes. The policy would place the quest to understand the mechanisms determining the composition of the teacher body at center stage.

Chapter 2

Does having children create a glass ceiling for women with high-profile career positions?

with Heinrich W. Ursprung*

ABSTRACT

Pursuing a high-profile career while having children is believed to be unfeasible for many women as maternity leaves and childcare slow down their career progress. We investigate whether children are indeed an impediment for women when reaching the top in terms of their careers. We use the German Socio-Economic Panel and confirm empirically the existence of a gender wage gap in Germany, as well as of the glass ceiling effect. The motherhood effect is present in each decile of wage distribution, but surprisingly it is the smallest at the top decile. We find no effect of the second child on women's probability for reaching the top, but the negative correlation between having children and reaching the top suggests that it is the first child that creates the largest impediment, and therefore a glass ceiling, for women pursuing high-profile careers.

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2.1 Introduction

"But the biggest obstacle (at least in most rich countries) is children. However organized you are, it is hard to combine family responsibilities with the ultra-long working hours and 'anytime, anywhere' culture of senior corporate jobs." (The Economist, 27th Oct, 2012)

Being a mother and pursuing a high-profile career is an impossible mission. At least this is the deep-rooted belief of the general public. Supporting that belief are all these famous women who do not have any children, presumably because it is not possible to have it all. Non-believers would surely mention Elinor Ostrom, the first female Nobel Prize winner in economics, or former US state secretary Condoleezza Rice as examples that support their beliefs. But is this glass ceiling in high-profile careers really an empirically proven fact? In our study, we show that the conclusion is not so straight-forward as generally assumed. Gender wage gap and gender inequality on labor market induced by motherhood are unfortunately very much present, but in contrast to the general opinion, women who are highly successful professionally turn out to be less impaired by having children than other working mothers.

The most restricting factor for women's professional success is often believed to be the biological difference between women and men in terms of child bearing. Maternity leaves and childcare slow down women in their careers and the gap only widens over time. Gender inequality is unfortunately still deeply rooted even in the most developed countries and policies directed towards establishing more gender equality do not seem to be especially efficient (Albrecht et al., 2003; Glass, 2004; Arulampalam et al., 2007; Huffman et al., 2017; Kleven et al., 2020).

Research on the gender wage gap, the most prominent measure of gender inequality, has only relatively recently demonstrated that the gender wage gap is not equally distributed along the wage distribution, implying the sticky floor and glass ceiling effects (Huffman et al., 2017). Sticky floor effect implies larger wage gap at the bottom of the wage distribution, while glass ceiling effect implies a larger gap on the top. Consequently, the policies aimed at reducing the mean gender wage gap are not optimal and potentially also have adverse effects on the women at the top of the earning ladder. A glass ceiling is simply an invisible obstacle close to the top that prevents women from progressing to the very top of an occupational hierarchy. Economists have defined it mostly as substantial increase of the gender wage gap at the top of the wage distribution. Numerous economic studies document the existence of a glass ceiling in Germany and other developed countries (Huffman et al., 2017; Collischon, 2018 etc.). When decomposing the gender wage gap at the highest quantile, researchers mostly use industry and firm characteristics, as

well as the education and professional experience in explaining the gap.

In each study, there is always a significant share of the gap unexplained. Even though various economic studies documented a negative relationship between fertility rates and labor market variables, such as income, hours worked and education(Lundborg et al., 2017; Alesina et al., 2011; Cygan-Rehm and Maeder, 2013 etc.), only few studies have used the number of children or access to child care to explain the gender wage gap at the top, such as Bertrand et al. (2010) who documented the existence of gender gap for MBAs who graduated from top US universities, and Azmat and Ferrer (2017) who provided similar evidence for the legal profession in the US. In addition, it is not clear why women at the opposite tails of the wage distribution differ in terms of wage gap factors, which is probably one of the causes of only partially sufficient policies against gender inequality at the labor market (Glass, 2004; Huffman et al., 2017).

The existing literature on the topic has various drawbacks. Only few control variables are used and most of the studies have also completely neglected the occupational heterogeneity or the timing of the first pregnancy. Much of the gender gap remains unexplained and no plausible explanations for the unexplained part are offered. A proper differentiation between women at the different tails of wage distribution or occupational prestige has not been done. Finally, conclusions are mostly based only on correlations without causal inference.

In this study, we contribute to the research on glass ceiling effect and fertility using German data. Our aim is to analyze whether children are an impediment for the women at the top and to which extent, compared to men and other working women. We first document the existence of a glass ceiling using different data than Huffman et al. (2017) and Collischon (2018) by looking into the gender effect along the wage distribution. We further decompose the gender wage gap using a dummy for having children and its interaction with gender. In the second part, we investigate whether having children decreases the probability of working full-time separately for men and women. Finally we identify the gender effect and children effect on the probability of being in the group of highly successful individuals. An interaction between gender and having children directly answers the main research question of this study - do children create a glass-celling for women with high-profile careers? We control for variables that we expect to be compelling as well, such as partner's characteristics, health, occupational prestige, and political attitudes.

Our findings confirm the existence of glass ceiling effect in Germany and, interestingly enough, the motherhood effect is lower at the highest decile. The empirical analysis is augmented by IV estimation so that some conclusions on causal effect can be made as

well. The results show that there is no causal effect of additional children on making it to the top, for women nor men. Still, a negative correlation between having any children and making it to the top suggests that the first child is indeed the most detrimental to women's high-profile careers. A caveat of our study is that the causal effect of the first child cannot be found considering that no exogenous variation in having a first child can be found in the dataset at hand. The roots to the existing gender inequality at the top are much deeper and much more difficult to diagnose and eliminate. We define the women at the top not simply by using income quantiles, but also by their profession belonging to the first class of occupational prestige, which is an additional contribution to the literature.

2.2 Background and previous studies

The gender wage gap has been thoroughly analyzed in the field of labor economics, shifting from the analysis of the mean wage gap to the heterogeneous one in the last two decades. The latter has set the stage for the empirical analysis of the glass ceiling effect, which is the starting point of our study as well. The following scholars focused their research on glass ceiling and the effect of family-related policies. Albrecht et al. (2003) provided evidence of the increasing trend in the gender wage gap across the wage distribution in Sweden using the quantile regression, and attributed it to the generous parental leave policies. De la Rica et al. (2005), del Rio et al. (2011) and Felgueroso et al. (2008) provided the similar results using Spanish data, and Arulampalam et al. (2007) using EU data.

De la Rica et al. (2005) also concluded that only the group of highly educated individuals is subject to the glass ceiling effect, and Arulampalam et al. (2007) found that countries with more generous work-family reconciliation policy have a wider gap at the top of the wage distribution. Albrecht et al. (2015) updated their study on the glass ceiling effect in Sweden for an additional 10 years and found that it is a phenomenon that hits only white-collar workers. Finally, Geiler and Renneboog (2015) analyzed the impact of marital status and parenthood on the wage gap among executive directors using data on all listed UK firms in the period from 1996 - 2007. They found that married female executive directors with children earn much less than male executives with children, controlling for various characteristics of the firm, sector, position and individual performance. All of these studies provide evidence for a glass ceiling effect, and additionally the adverse effects of family-oriented policies and parenthood (Goldin, 2015; Goldin and Katz, 2016) .

Studies that analyze the glass ceiling effect in Germany are more relevant for our study. The first that took into account the heterogeneity along the wage distribution when estimating the wage gap and the efficiency of organizational policies and practices on the

gender wage gap in Germany is the study by Huffman et al. (2017) who applied quantile regressions to German data and estimated the wage gap, and the effects of different policies. They found that they benefit only the lower tail of the distribution, and potentially even harming the upper one in the case of childcare assistance. Their results confirmed findings from Glass (2004) stating that the popular work-family reconciliation policies are generally more harmful for the women in high-income occupations. Taking the option to work more hours from home and better schedule flexibility were highly penalized in high-profile careers.

Collischon (2019) applied the similar intuition but an improved method to German data and found evidence of a glass ceiling effect. He used the Structure of Earnings Survey data set for 2010. Obviously, a decade of data since then is missing. Understanding the heterogeneity across the wage distribution is important because different types of policies aim at different tails of the distribution. For example, increasing the minimum wage is aimed at the lower part of the distribution, while female quotas aim at decreasing the gap at the top of the distribution (Collischon, 2019). According to Glass (2004), most policies have a small and positive effect on the lower tail, but negative effect on the upper tail of wage distribution. Clearly, a one-size-fits-all approach is counterproductive for many women. This has been further confirmed by Kleven et al. (2020), who investigated whether family policies, namely parental leave and child care, reduce gender inequality in the Austrian labor market, and found that the enormous expansion of those policies had no casual effect on gender convergence.

The other strand of literature relevant for our research question explores the relationship between women's career and fertility. Some of those studies take the fertility as the main outcome (Alesina et al., 2011; Cygan-Rehm and Maeder, 2013; Baudin et al., 2015). A more interesting case for our purposes is estimating the effect of fertility on labor market outcomes such as income, hours worked, and education. Robert J. Willis stated back in 1987 that finding enough well-measured exogenous variables that will allow identifying the causal effect of variables such as delay of marriage, decline of childbearing, and growth of divorce on female labor participation, is quite difficult (Willis, 1987). Since then, many econometric studies have tried to explain fertility. Angrist and Evans (1998) were one of the first who pointed out that estimating the labor-supply consequences of childbearing is complicated by the endogeneity of fertility. In order to solve this problem, they used the IV approach by using parental preferences for a mixed sibling-sex composition to construct IV estimates of the effect of childbearing on labor supply and found that the presence of third child reduces the probability of working for mothers, while there is almost no effect for the fathers.

The theoretical arguments for this study date back to 1973. Becker and Lewis (1973) and Becker and Lewis (1976) presented a theoretical impact of a siblings sex mix on fertility using a standard quantity/quality model of fertility. Parents derive utility from the number of children they have, and the sex-mix of the children determines the "child quality" that enters the utility function. In a recent study, Lundborg et al. (2017) used the instrumental variable approach, having in vitro fertility treatment success in Denmark as an IV for childbearing, to estimate the causal effect of having children on women's career. Their analysis showed that fertility has a negative effect on earnings. This is, so far, the only study that has managed the estimate the causal effect of a first child on woman's career. Ursprung et al. (2017) analyzed the effect of motherhood on the research productivity of academic economists, and found that motherhood is not associated with low research productivity in the long-run.

Few recent studies managed to identify exogenous variation in the number of children and estimate the causal effect of having an additional child. So far, there is no study that investigates other determinants of fertility, especially correlated with outstanding careers. The quest for such results is indeed complicated due to endogeneity issues.

2.3   Children and glass ceiling

The glass ceiling effect was defined in late 1980s by the US and the US Department of Labor defined as *"those artificial barriers based on attitudinal or organizational bias that prevent qualified individuals from advancing upward in their organizations into management-level positions"*. This definition implies that those barriers reflect discrimination (Grout et al., 2009). Economists define the glass ceiling mostly as a gender wage gap bunched near the top of the wage distribution so it concerns basically the group of women with high-profile career positions. Our study asks the following: does having children create a glass ceiling for women at the top of the income ladder?

The glass-ceiling can either be the result of gender differences or gender discrimination. Grout et al. (2009) provide an economic interpretation using a theoretical model that defines the glass ceiling as a natural equilibrium of Bertrand competition, and conclude that these two interpretations are not in conflict with each other. The puzzle thus remains: What are the possible mechanisms through which having children could create a glass ceiling effect for women?

Albrecht et al. (2015) updated the previous study of theirs by adding the data for 1998 – 2008 and found evidence for women signaling their commitment to careers by taking shorter parental leave and that this signal becomes more important the higher the wage

quantile is. They also found that glass ceiling along the top of the wage distribution exists also few years prior the birth of the first child, but increases even more afterwards. These studies are one of the few that consider children when decomposing the gender wage gap at the top and quite informative in terms of the potential effect of having children on career.

Preferences for flexibility at the workplace may be another explanation for a gender pay gap. Bertrand (2018) identified it as an influential factor, especially at the top of the earning ladder, and found that women seem to be unable to match the achievements of men in occupations where rewards for long working hours are especially important, mostly in the high paying occupations. Wiswall and Zafar (2018) found that the preferences for job attributes explain staggering 25 percent of the gender wage gap at the start of the career. The preference for flexibility is tightly correlated with the predominantly important role of women in raising children. When analyzing number of working hours between men and women who completed highly-ranked MBAs in the US, Bertrand et al. (2010) found that the main reason why women work less or have less work experience is children. Child penalties seem to exist even in developed countries with low levels of gender inequality, such as in Scandinavia. This finding was highlighted by Kleven et al. (2019) who presented evidence on child penalties in earnings in a cross-country analysis (English-speaking, German-speaking, and Scandinavian countries). The similarity in terms of qualitative effects were tenacious but with significant differences in the effect magnitude. Angelov et al. (2016) found that wife's earnings start to decrease immediately after the birth of the first child, and 15 years after, the gender wage gap within couples increased by 28 percentage points in the case of Sweden. It seems that those women who marry men with high earning potential suffer even more earning loss in the future. Similar results have been found for Denmark by Kleven and Landais (2017) and Kleven et al. (2019). In the latter, the authors presented evidence for a dramatic increase of the gender inequality on the labour market, that was caused by child penalty in the past four decades. Additionally, they claimed that the effect is transmitted from parents to daughters, suggesting the influence of upbringing on gender inequality.

Bursztyn et al. (2017) claim that women who give the impression of being too ambitious or too smart might be less attractive on the marriage market, or at least they believe so. They used the sample of MBA students, i.e. people who aspire to high paying professions. Finally, Bertrand (2018) discussed several years of research on glass ceiling effect and drew conclusions that psychological traits, such as aversion towards risk and competition, as well as attitudes towards negotiation seem to explain a small portion of the gender wage gap. The main mechanism in this case would be that women tend to stay away from occupations that pay more because of their risk aversion, considering that

these occupations carry a certain risk added. Niederle and Vesterlund (2007) conducted an experiment in order to analyze the compensation choices in a mixed-sex environment and concluded that women show less taste for competition than men. Still, based on the analysis of various studies that contributed to this research, Bertrand (2018) concluded that psychological traits are not that important when it comes to the glass ceiling effect. A more systematic review by Blau and Kahn (2017) has confirmed this finding by concluding that not more 10% of the gender wage gap is explained by psychological traits.

Considering that child penalties in labour markets explain most of the remaining gender inequality, even in developed countries (Kleven et al., 2019a; 2019b), and that family policies related to parental leave and child care seem to have no effect overall (Kleven et al., 2020), it is important to better understand whether this holds for women at the top of the income ladder as well, in order to have more efficient policies in the future. If having children is not a main factor that explains the glass ceiling for women, then policies aiming at that issue are simply detrimental, and this is why this research question is important. It implies that better and calibrated policies are needed. Additionally, it provides evidence against the deep-rooted belief of the general public that having children prevents women from achieving their full professional potential.

2.4 Data and key variables

The labor market in Germany is highly regulated and trade unions traditionally play an important role in wage negotiations via collective bargaining. Still, trade union influence has decreased in recent years (Dustmann et al., 2009) but there is no evidence that it had a substantial effect on gender inequality in Germany (Antonczyk et al., 2010). Even though Germany's welfare regime offers generous maternity leave programs, the child care access was often inadequate and unaffordable until two decades ago, which caused many women with young children to take a break in their career or take on only part-time jobs (Drobnic et al., 1999). Germany's anti-discrimination policies started in 1980 with the Equal Treatment Act (Allgemeines Gleichbehandlungsgesetz), with additional guidelines for the public sector made in 1994 (Huffman et al., 2017). Still, the private sector remained unregulated until 2001, when the main labor union in Germany came to a nonbinding agreement with the federal government promising implementation of female-friendly policies, better educational and training possibilities for women, as well as family and work reconciliation policies (Kohaut and Möller, 2009). The analysis of the efficiency of those policies showed that larger establishments are more likely to adopt formal gender-friendly policies, while smaller ones incur higher costs of doing so and are more probable to rely on informal agreements. Kohaut and Möller (2019) also found that policies are implemented disproportionately in industries that are more female skewed. Finally, Finke (2010) and

Hirsch and Schnabel (2013) found a difference in gender wage gaps between East and West Germany, with the gap being smaller in East Germany, most probably due to more publicly sponsored child care available in the East. All of these information make Germany quite an interesting case for this type of analysis.

We use the most recent version of the Socio Economic Panel on German Households (SOEP). This is the representative survey that has been running since 1984, and the current version ends with 2018. It is conducted by the DIW Berlin and every year around 25,000 people from around 16,000 households are surveyed. The data on numerous topics, such as income, employment, education, occupation and many others is provided. Every year the same individuals are interviewed making the dataset fit for panel analysis. The dataset includes every woman who took part in SOEP questionnaire and data on children she might have had. These women can be traced over time as they took part in the survey more than once. Additionally, they were chosen randomly. One part of our empirical analysis is focused on the entire sample of employed and unemployed women and men, while the other part is further restricted to working individuals only. In this way, retired women are excluded from the dataset, and it is clear whether a woman is currently taking the maternity leave.

An important factor for identifying women with high-profile career positions in our study is the class of occupational prestige. As a standardized measure, we use the EGP index [1], which defines 7 classes of occupational prestige. Our focus is on class I that describes higher managerial and professional workers. The other 6 classes refer to the following: class II - lower managerial and professional workers, class III - routine clerical, service and sales work, class IV - small self-employed workers, class V - manual supervisors[2], class VI - skilled manual workers, and class VII - semi- and unskilled labor, as well as agricultural workers. EGP values have been constructed using the type of occupation, income and education. The distribution of women and men across EGP classes of occupational prestige in Germany is presented in Figure 2.1. The largest share of working women is engaged in clerical, service and sale activities, while the largest share of men work as skilled manual workers. Overall, the least represented category for both genders is small self-employed businesses. An even more important observation is that there are significantly more men than women engaged in one of the class I occupations.

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[1] There are three internationally standardized measures of occupational status/prestige: Goldthorpe's class categories (EGP), Treiman's international prestige scale (SIOPS) and Treiman's International Socio-Economic Index (ISEI). We use EGP index in our study as it is the one with the least missing observations, as well as the one that separates clearly the first class from the rest.

[2] Even though class 5 exists in theory, it is not used for coding in SOEP dataset.

Figure 2.1: Occupational prestige distribution among women and men

These women also delay the first birth the most, compared to women whose professions are in lower prestige classes, as presented in Figure 2.2. The average age of welcoming the first child for a woman with a high-profile career is almost 29. The difference in the age at first birth between the first and the second class is quite large, more than one entire year. On average, men have their first child much later than women in all occupational prestige classes. As they do not experience a biological time pressure as women, this result is not surprising. On the other hand, even for them the delay is the largest for those engaged in class I occupations, but with a much smaller difference compared to class II. Reaching a high-profile career entails a significant time investment.
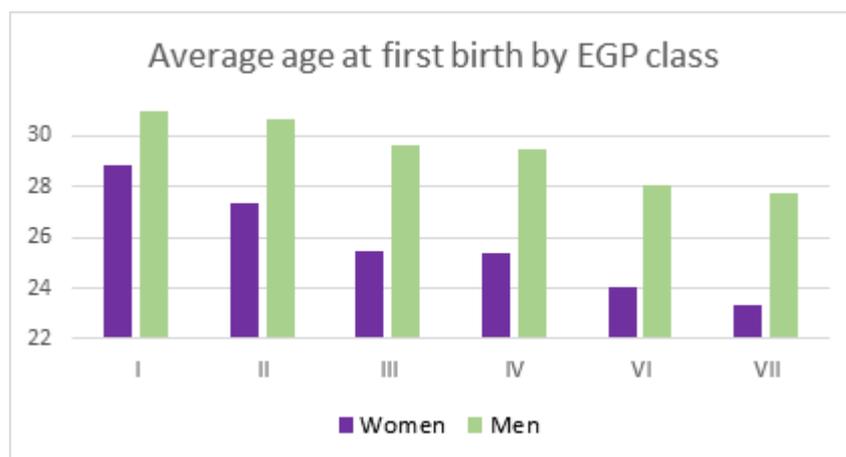
Figure 2.2: Delay of the first birth by EGP class

Comparing the average number of children by income quintiles in Figure 2.3 shows that women have more children than men at the bottom of income ladder, but the situation changes already from the 30th quantile. As they progress up on the income ladder, the difference in the average number of children between men and women increases. At the very top, the difference is the largest and men have more children than women. Does this imply that having children creates a certain obstacle for women when aiming for the top? In our study we provide evidence that sheds some light on this issue.
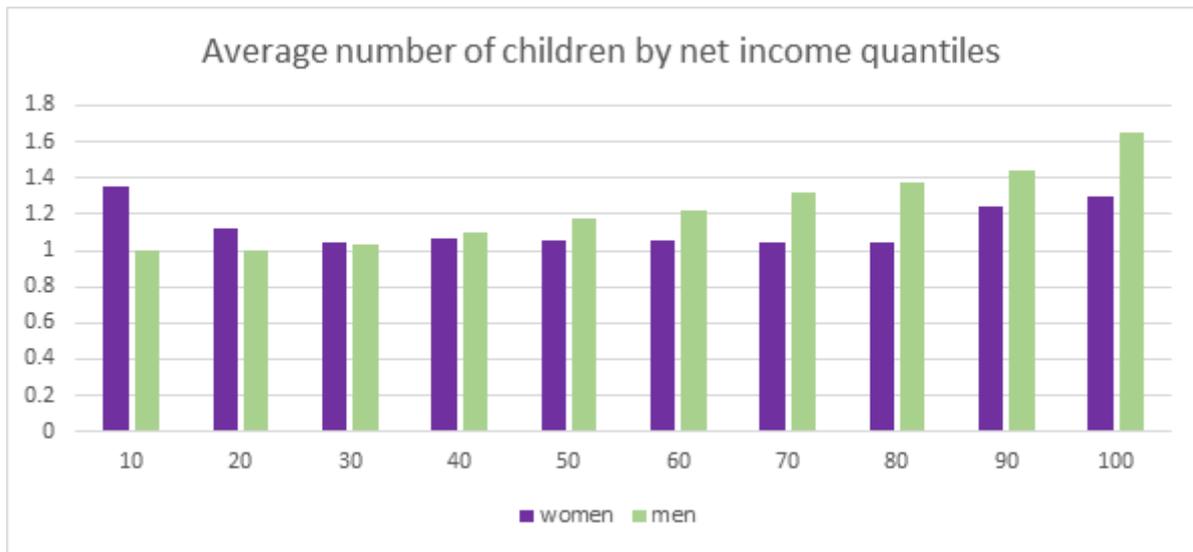
Figure 2.3: Average number of children

2.5 Specification and the results

2.5.1 Glass ceiling

This study investigates whether having a child creates a glass ceiling for women with high-profile career positions in Germany. Following the results by Huffman et al. (2017) and Collischon (2019), we first document the existence of glass ceiling effect in Germany using SOEP data.

$$log(net\ income)_{i,t} = \beta_0 + \beta_1 female_{i,t} + \beta_2 children\ dummy_{i,t} +$$
$$+\beta_3(female\ X\ childrendummy)_{i,t} + \beta_4 X_{i,t} + \theta_t + \varepsilon_{i,t}$$

(2.1)

We apply a quantile regression using the dataset on working women and men in Germany, in the period from 1984 − 2018. Our dependent variable is the log net income, and we use gender as the main independent variable to identify the gender wage gap, and then a dummy that has a value of 1 if an individual i is a mother or father, and 0

otherwise, to investigate the effect that having children might have on wage distribution. Additionally, we interact gender with having children to identify how the effect of having children differs for females compared to men along wage distribution. $X_{i,t}$ is a vector of individual controls for a woman/man i: age, married/single status, years of education, high education degree, and the class of occupational prestige (EGP). θ_t is a time dummy and $\varepsilon_{i,t}$ is the error term. In order to account for possible serial correlation per individual, standard errors are clustered at the individual level.

The results are shown for the bottom, median and top of the earning ladder in Table 2.1. The negative coefficients for females increase in size along the quantiles, providing support for the glass ceiling effect, and no evidence of sticky floor effect, considering that the effect is smaller for the 10th quantile than for the median. When interacted with having children, mothers earn less in each quantile, but the magnitude is the smallest at the top of the wage distribution, which might provide a first hint that having children is at least not as limiting for women with high-profile careers as generally believed. Having children has a positive coefficient for men, but negative for women. Furthermore, fathers overall earn more than non-fathers, but the opposite holds for mothers[3]. Females earn less than males, and the impediment for mothers is very much existent. However, the impediment is at the lowest level for the top of the wage distribution, which hints that women at the top might be a bit different. Still, a further analysis is required to obtain more details about women with high-profile careers.

Table 2.1: Quantile regressions, dependant variable: log net income

	Q10	Q50	Q90
Female	-0.167***	-0.208***	-0.290***
(=1)	(-15.72)	(-32.49)	(-27.77)
Having children	0.0765***	0.106***	0.0962***
(=1 yes)	(7.45)	(16.45)	(10.48)
Having children=1 x	-0.277***	-0.212***	-0.130***
female = 1	(-18.59)	(-23.89)	(-9.76)
Constant	5.350***	5.962***	6.381***
	(92.86)	(196.22)	(144.13)
Controls	yes	yes	yes
Year FE	yes	yes	yes
Observations	244474	244474	244474
r2	0.448	0.470	0.461

t statistics in parentheses, SE clustered at individual level

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

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[3] Complete table available in the appendix.

2.5.2   IV estimations

In order to better understand the effect that having children has on professional careers, we investigate the existence of a motherhood gap[4] further by comparing mothers to non-mothers, and separately fathers to non-fathers, while controlling for various factors. We identify highly successful individuals as those whose earnings are in the top 10 % of the income ladder and whose professions are characterized with the first class of occupational prestige. Our aim is to infer whether having children makes it less probable for women to be employed full-time to start with, and then, later, whether having children makes it less probable to be in the group of highly successful individuals.

In order to analyze whether mothers are less probable to be working than non-mothers, we apply a linear probability model with the following regression equation. We do the same for men and compare the results.

$$working_{i,t} = \beta_0 + \beta_1 having\ children_{i,t} + \beta_2 X_{i,t} + \beta_3 Z_{i,t} + \theta_t + \varepsilon_{i,t} \qquad (2.2)$$

Our dependent variable is a dummy with the value of 1 if the individual i is employed full-time, and 0 otherwise. The main independent variable is a dummy with value of 1 if an individual i has any children, regardless of the number, and 0 otherwise. The literature shows that it is the first child that creates the most effect on professional career compared to no children at all, and non-linearity in number of children is also avoided in this case. $X_{i,t}$ is a vector of individual controls for a woman/man i, $Z_{i,t}$ is a vector of partner's controls, θ_t is a time dummy, and $\varepsilon_{i,t}$ is the error term. As support of the partner can contribute to professional success, it seems only intuitive to control for partner's characteristics as well.

The results in Table 2.2 (columns 1 and 2)[5] show that mothers are correlated with lower probability to be employed full-time, while the opposite holds for fathers. Being married makes women less probable to be working, while it is the opposite for men, supporting the evidence from the previous regression. The more educated the individuals are, the more probable it is that they work, but having a partner with a university degree is negatively correlated with probability of working for both men and women. This regression is though only the baseline and here all women who work are equally treated.

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[4] Felfe (2012)
[5] Complete table in the appendix

Table 2.2: Linear probability model, dependant variable: employed full-time vs not working

	Women OLS	Men OLS	Women OLS	Men OLS	Women IV	Men IV
Having children	-0.296*** (-32.54)	0.0682*** (13.65)				
Number of children			-0.0360*** (-15.24)	-0.0349*** (-9.71)	-0.000696 (-0.02)	-0.257 (-1.45)
Married	-0.135*** (-17.94)	0.0571*** (9.13)	-0.0956*** (-9.19)	0.0669*** (5.69)	-0.0961*** (-9.14)	0.0722*** (5.11)
Years of education	0.0154*** (10.22)	0.0338*** (27.49)	0.00608*** (3.39)	0.0400*** (23.34)	0.00942** (2.03)	0.0282*** (2.95)
High education	0.0934*** (9.10)	-0.0942*** (-12.30)	0.123*** (9.83)	-0.129*** (-11.86)	0.114*** (6.47)	-0.0798* (-1.94)
High edu partner	-0.0567*** (-8.49)	-0.0248*** (-4.35)	-0.0523*** (-6.58)	-0.0270*** (-3.41)	-0.0530*** (-6.55)	-0.0319*** (-3.16)
Constant	0.491*** (12.57)	-0.562*** (-10.36)	0.00211 (0.04)	-0.720*** (-9.46)	-0.0293 (-0.19)	0.367 (0.18)
Other controls	yes	yes	yes	yes	yes	Yes
Year FE	yes	yes	yes	yes	yes	Yes
Obv	198517	194221	128336	93248	128336	93248
r2	0.162	0.432	0.0932	0.413	0.0850	0.241

t statistics in parentheses, SE clustered at individual level

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

Even though results so far show some support for impediment that females with children are facing at the job market in terms of earnings and probability of being employed full-time, they do not show causal relations, rather correlations with fixed effect using panel data. The number of children is a fully endogenous decision which makes research in this field challenging as it is rather difficult to find a source of exogenous variation in fertility, especially for the first child. The only study that has managed to do so until now is Lundborg et al. (2017) that used in vitro fertility treatment success in Denmark as an instrumental variable for childbearing to estimate the causal effect of having children on women's career. Such data is not available for Germany. Still, it is possible to do so for the second child, using data on twins. This method dates back to Rosenzweig and Wolpin (1980), Angrist and Evans (1998), and Bronars and Grogger (1994). The basic idea is that the occurrence of twins in the first birth is an exogenous and unplanned event. It is also randomly distributed across the population with respect to other characteristics potentially related to labor market, and as such allows to identify the marginal effect of having a second child, given the presence of one child. The method does not allow to measure the marginal effect of going from zero to one child, but considering that many women in the sample already have one child, it still provides useful information.

In order to provide additional empirical support to the previous regressions, we use the occurrence of twins at the first birth as an instrument for the number of children[6]. Our aim is to estimate the causal effect of second child on probability that individual is employed full-time. The exclusion restriction is likely to hold considering that the occurrence of twins is intuitively uncorrelated with other labor market variables, and should not affect the outcome other than through affecting the number of children. The model for the IV estimation is expressed with the following equations:

First stage:

$$number \ of \ children_{i,t} = \beta_0 + \beta_1 twins_{i,t} + \beta_2 X_{i,t} + \beta_3 Z_{i,t} + \theta_t + \varepsilon_{i,t} \qquad (2.3)$$

Second stage:

$$working_{i,t} = \beta_0 + \beta_1 number \ of \ children_{i,t} + \beta_2 X_{i,t} + \beta_3 Z_{i,t} + \theta_t + \varepsilon_{i,t} \qquad (2.4)$$

The variable $twins_(i, t)$ is a dummy with the value of 1 if an individual i had two children at the first birth, and zero otherwise, $X_{i,t}$ and $Z_{i,t}$ are vectors of the same individual and partner's controls as in previous sections, and θ_t is the time fixed effect. First stage in Table 2.3[7] shows that the instrument is strong.

Table 2.3: Two-stage least squared regression

	Women First stage	Men First stage
Twins	0.484***	0.145**
	(3.33)	(2.29)
Number of children		
Constant	3.120***	2.070***
	(27.81)	(18.46)
Controls	yes	yes
Year FE	yes	yes
Observations	128336	93248
r2	0.0529	0.0568

t statistics in parentheses, SE clustered at individual level
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

The results of an IV estimation using occurrence of twins at first birth for the number of children are presented in columns 5-6, in the Table 2.2. The OLS results for this restricted sample confirm the negative correlation for females from columns 1 and 2, and an opposite result for males. Males are less probable to be working as the number of children increases, conditioned on having at least one child already. Still, when instrumenting for number of

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[6] As the variable twins is correlated only to the sample of individuals who have children, those without are excluded. They constitute only a small part of the subsample.

[7] Complete table in the appendix.

children, the effect is no longer statistically significant. Having a second child does not have a causal effect on probability of working full-time for either females or males.

2.5.3 Reaching the top

Applying the linear probability model again with the following regression equation, we investigate the gender effect on the probability of reaching the top. Additionally, we also analyze the children effect and specifically how it changes for females by interacting these two variables.

$$top_{i,t} = \beta_0 + \beta_1 female_{i,t} + \beta_2 having\ children_{i,t} + $$
$$+\beta_3 (female\ x\ having\ children)_{i,t} + \beta_4 X_{i,t} + \beta_5 Z_{i,t} + \theta_t + \varepsilon_{i,t} \tag{2.5}$$

Our dependent variable is a dummy with the value of 1 if an individual i is in the group of those, whose earnings are at the top 10% of the income ladder, and at the same time, in the group of those whose occupations are characterized with the first class of occupational prestige, and 0 otherwise. We also control for more partner characteristics, including the occupational prestige of the partner's profession.

The first column in Table 2.4 reports results of an OLS regression using a dummy for having children as dependent variable, while the dependent variable in the second column is the number of children. Results in column 1 show that females are less likely to reach the top, especially when having children. The opposite holds for men, who are more likely to reach the top. Results in column 2 confirm this finding and interaction effect shows that mothers are less probable to be in the group of highly successful individuals with each additional child.

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Table 2.4: Regression Results, DV: Being on the top (Top 10 & first class)

	OLS	OLS	OLS	IV	IV
	(1)	(2)	(3)	(4)	(5)
Female	-0.0216***	-0.0292***	-0.0866***	-0.0894***	-0.284
	(-4.60)	(-6.74)	(-5.42)	(-13.18)	(-0.38)
Having children	0.0465***				
	(11.36)				
Having children=1 x Female=1	-0.0552***				
	(-9.46)				
Number of children		0.0232***	0.0136***	0.0154	-0.0346
		(11.67)	(2.96)	(0.12)	(-0.12)
Female=1 x Number of children		-0.0239***	-0.00122		0.0834
		(-9.38)	(-0.20)		(0.26)
Constant	-0.228***	-0.201***	-0.360***	-0.362**	-0.300
	(-9.14)	(-8.14)	(-7.11)	(-2.57)	(-0.88)
Controls	yes	yes	yes	yes	yes
Year FE	yes	yes	yes	yes	yes
Observations	145321	145321	71046	71046	71046
r2	0.162	0.165	0.197	0.197	0.186

t statistics in parentheses, SE clustered at individual level

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

(1) Having children; (2) No of children - entire sample; (3) No of children - IV sample

(4) No of children ; (5)No of children + interaction

Remaining columns 4-5 portray the results of an IV estimation using occurrence of twins at the first birth as an instrument for number of children again[8]. Column 3 shows the linear correlation of having the second child with the probability on being at the top. As in previous results, the coefficient for the number of children is overall positive for fathers, but the interaction between females and an additional child is not statistically significant anymore. It seems that the crucial difference for women is the first child, based on the results from columns 1 and 2. Results in column 3 indicate that, conditional on having at least one child already, having more does not seem to be problematic for women career-wise. IV estimations in columns 4 and 5 reinforce this finding. Both the number of children and the interaction effect with gender are not statistically significant, implying that there is no causal effect of having a second child on the probability of reaching the top for either mothers or fathers. Partner's characteristics are not statistically significant either.

It seems that it is only the first child that makes the difference, especially for females considering the negative correlation. The fact that having children is positively correlated with the probability of being at the top for men only displays a reverse causality. These

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[8] Two stage least square estimation in the appendix.

men are not at the top because they have children, but most likely have children because they already reached a certain career success.

2.5.4 Women at the top

The timing of reaching the top in terms of income and occupational prestige and the birth of the first child can also be relevant. Do women have their first child after they have reached the top positions in their careers? If that is the case, the results presented can be misleading, as I am primarily interested in whether having a child before reaching the top positions makes a difference, not after. A simple descriptive statistics of a subsample comprised of women and men who have reached top positions during their professional careers shows that both have their first child at least 12 years before.
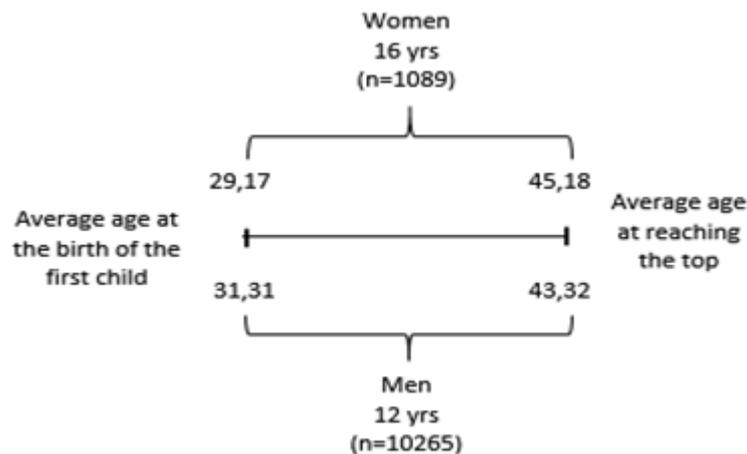
Figure 2.4: Average age at first birth and at reaching the top

On average[9], men take 12 years after the birth of their first child to reach the top, and women take 16 years, as presented by Figure 2.4. Women, on average, have their first child 2 years earlier than men at the age of 29, and reach the top about 2 years later than men, at the age of 45. Looking at the period[10] from 1998 – 2018 presented in the Figure 2.5, women have always needed more years after the birth of the first child to reach the top positions, but this difference has started to decrease since 2000s, as well as the overall average for both men and women. Still, the female average has not declined substantially more than the male average, implying that the overall effect can simply be a result of needing a shorter time to reach the top, perhaps because of the lower education require-ments for example. Another possible reason is having both the public and the private sector more regulated in terms of family-work reconciliation policies in Germany since

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[9] Subsample of individuals whose earnings are within top 10% of income ladder, whose occupations classify as first-class, and who have at least one child.

[10] The dataset starts in 1984 but a sizeable sample of women with high-profile careers starts at the end of 1990s.

2000s. It seems that having a first child delays women for few years from reaching the top careers and, as results from the previous section showed, the birth of the second child has no effect on their further career. Unfortunately, having the first child is negatively correlated with the probability of reaching the top for women. A causal effect cannot be estimated for the first child due to the nature of the dataset and endogeneity issues.
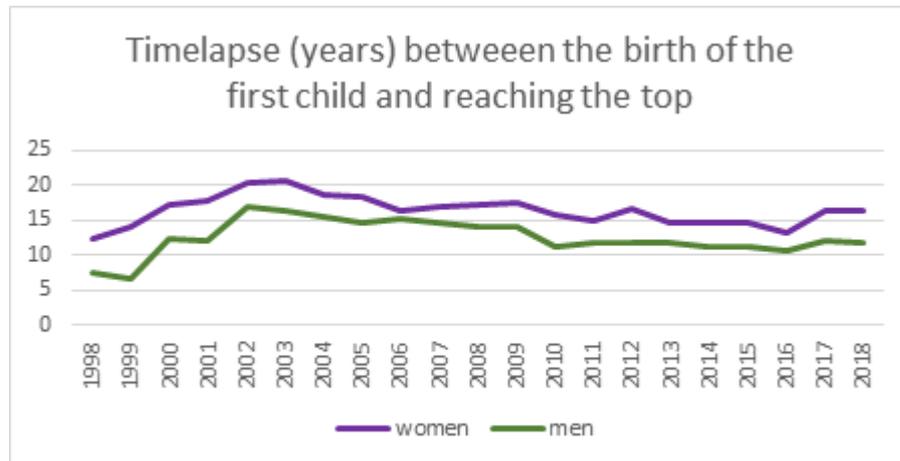
Figure 2.5: Timelapse between the birth of the first child and reaching the top positions

Lastly, the difference in number of observations for women and men should be noted – there are significantly fewer women in the top category, implying strong presence of gender inequality, that is definitely partly also characterized by having children, but surely not fully, and more research in this field is required.

2.5.5 Robustness check: partner's characteristics not included

Even though partner's characteristics are important and can be crucial for women with children and their careers, not controlling for those variables gives us the possibility to consider also single mothers and single fathers. The results remain mostly robust. The only difference is that the causal effect of having children on probability of working is now statistically significant for fathers. Conditioned on already being a father, having more children causes the probability of working for men to decrease. This is not the case for women with children. It seems that partner's support, when it comes to having more children, is more important for men than for women. Causal effect on probability of making it to the top remains statistically not significant for both women and men.

Table 2.5: Robustness check I: partner's characteristics not included

	Women OLS	Men OLS	Women OLS	Men OLS	Women IV	Men IV
DV: working vs not working						
Having children	-0.215*** (-37.33)	0.0974*** (21.43)				
Number of children			-0.0323*** (-18.06)	-0.0413*** (-12.62)	-0.0222 (-0.95)	-0.166** (-2.01)
Constant	-0.299*** (-18.41)	-0.715*** (-36.42)	-0.305*** (-12.62)	-0.183*** (-4.01)	-0.338*** (-4.14)	0.109 (0.55)
Controls	yes	yes	yes	yes	yes	yes
Year FE	yes	yes	yes	yes	yes	yes
Observations	349139	274019	193520	106291	193520	106291
r2	0.161	0.375	0.0983	0.408	0.0976	0.352

t statistics in parentheses, SE clustered at individual level

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

Table 2.6: Robustness check II: partner's characteristics not included

	OLS	IV
DV: being on the top		
Number of children	0.0103*** (3.07)	-0.564 (-0.33)
Female	-0.0961*** (-8.78)	-1.504 (-0.35)
Female=1 x No of children	0.00288 (0.72)	0.580 (0.33)
Constant	-0.278*** (-7.17)	0.599 (0.23)
Controls	yes	yes
Year FE	yes	yes
Observations	103543	103543
r2	0.177	0.091

t statistics in parentheses

SE clustered at individual level

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

Further robustness check for Table 2.2 and Table 2.4 can be found in the appendix. Additional individual characteristics related to physical and mental health, as well as political attitudes are taken into account. Lastly, the variable related to the probability of being at the top is redefined as earning the top 10% of the wage distribution only. The results remain robust.

2.6 Conclusion

In this study, we have provided some evidence against the supposition that children are a significant obstacle for women at the top of the wage hierarchy in the same way they are for all other working women, even though it is generally believed that the effect is the same for all. We first document, using the Socio Economic Panel for Germany, the existence of a glass ceiling and the negative correlation of having children with earnings. Then, we investigate whether having children is correlated with a lower probability of being employed full-time. Our results show that this is indeed the case for women on average, while the opposite, in a significantly lower magnitude, holds for men.

As these results present correlations rather than causal effects, we provide further econometric support by using the occurrence of twins at the first birth as an instrument for the number of children. Even though this only estimates the marginal causal effect of the second child, given the existence of the first one, it still provides useful information. Applying the IV estimation, we find that having the second child does not cause any change in the probability of working for either men or women. This is consistent with the first child being the most consequential for females' careers, confirming the results of the previous literature.

Finally we investigate the gender effect on the probability of being in the group of highly successful individuals, as well as the children effect. Women are less probable to reach the top overall, and especially if they are mothers. Exactly the opposite holds for men, likely due to reverse causality. When looking into the causal effect of having a second child, the children effect is no longer statistically significant, as in the previous analysis. This could suggest that it is the first child that slows women down in their career progress and eventually leads to lower earnings. When looking at the timing of having the first child and reaching the top positions, we find that women have their first child about two years earlier than men and reach the top position about two years later. Both have their first child before reaching high-profile career positions. We conclude that having children delays the process for few years and makes women less probable to reach the top. The number of women who reach the top of the wage-hierarchy is significantly smaller than the number of men.

Overall, our findings highlight that women still face disadvantages in the labor market, and women with children do so particularly. The motherhood penalty is smallest for women at the top, and is likely driven by the first child, as we find a zero causal effect of subsequent children. Certainly there are various possible mechanisms that explain that result. One of them is that women with highly successful careers are simply very

efficient in each life segment and they manage the child penalty better than women with less successful careers. An additional point could be that women at these positions also have a better support system through better access to child care. It should still be noted that most women have their first child before they reach the top, not after. Finally, it could also be the product of power couples (Costa and Kahn, 2010), i.e. matching on the marriage market based on similar education and career success factors. Each of these mechanisms is plausible, as well as their combination. Clearly, more research in this field is needed in order to identify what precisely is causing the inequality. The roots to the existing gender inequality at the top seem much deeper than generally assumed, and much more difficult to identify.

Our study contributes to research on gender inequality at the labor market and the effect of fertility. Clearly, highly successful women can have it all, and can manage a career and a family life very well, but overall it is not that easy to achieve it. The mechanism behind this efficiency is surely not possible to show using econometric methods, but we can intuitively assume that part of it lies in psychological traits, general efficiency and the support system. The main takeaway from our study is that the belief that children cause gender inequality on the labor market is an empirically proven fact, but the limitation that they create is smallest for women with high-profile careers. Children do create a glass-ceiling for these women, even when not in the expected magnitude. Solving gender inequality problems should certainly be given even more effort, especially since the policy-making has not been so successful so far, and the inequality is still deeply rooted in the labor market.

Chapter 3

Are rational economists born or made?

Deviation from expected utility theory across different academic subjects

with Heinrich W. Ursprung*

ABSTRACT

We use a self-collected and novel dataset to investigate whether economics students select this field of study based on their deviation from expected utility theory in decision-making, and whether economics teaching makes them more rational. We first compare first-semester economics-students to first-semester law and political science students. Our results show no evidence for the self-selection effect, as we find no significant differences between them when it comes to rationality in decision-making, even after interacting studying economics with the academic achievement. In the second part, we focus only on economics students and investigate whether there is evidence of learning effect from studying economics. We compare third-semester to first-semester students and find that those in the third semester deviate less from the expected utility theory compared to those students who are in their first-semester. Contingent on surveyed concepts and hypothetical situations presented to them, we conclude that rational economists are rather made than born.

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3.1 Introduction and relevance

Economists are often considered to be somewhat different compared to other scientists. They are considered to free-ride more than others (Marwell and Ames, 1981; Carter and Irons, 1991), but also to be more honest and cooperative than other social scientists (Laband and Beil, 1999). They are also labeled as more selfish (Cipriani et al., 2009) and motivated primarily by self-interest (Frank et al., 1993), and profit-maximization (Rubinstein, 2006), but also as more efficient decision-makers in terms of business decisions (Kahneman, 1986 a,b). There is a vast literature that investigates these differences, and all explanations offered, as well as methods used, are equally intriguing. Do economists excel in deductive logic required to recognize and determine opportunities for some sort of economic gain (Carter and Irons, 1991) and intuitively select themselves into studying economics, or do they acquire certain skills during their economics studies as part of the economics trainings?

Different characteristics, skills, and behavior are analyzed to determine differences between economists and non-economists, but the underlying concepts[1] in almost every study are self-selection into studying economics, and the socialization effect during the economics studies (Plant, 1966; Guimond and Palmer, 1990; 1996; Hastie, 2007; Frey et al., 1993; Haucap and Just, 2010; Wang et al., 2019). Self-selection implies choosing a studying discipline in which the general views match most closely to individual's views or attitudes. It can be based on prior ideology, socio-political attitudes, or other individual skills and characteristics.

On the other hand, the core of the socialization effect states that individual's belief system changes to match those of the chosen studying discipline during the study itself. This is a broader concept that operates through two different mechanisms (Hastie, 2007): normative, related to the change of attitudes to match those of the group, and informational influence, in which acquisition of new knowledge leads to change in attitudes and skills. Put differently, in the process of socialization, students acquire relevant skills and knowledge, which is why it consists of adapting to the peers, and of the pure learning effect related to the respective academic discipline. Our analysis is mainly focused on the latter, and we will address it as the learning effect in the remainder of our study. Deviation from expected utility theory in decision-making is a skill that can be learned, which is why we focus only on the learning effect. Addressing the entire socialization effect would assume that attitudes towards certain topics or some specific beliefs are at play as well, which is certainly not the case when it comes to deviation from rationality

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[1] Many studies contributed to the better understanding of these effects, especially Rosengart et al., (2009), Lüthje (2008), Katz (2004) and Schein (2003).

in decision making.

We focus on students' decision-making process and the rationality within that process. Using a self-collected and novel dataset based on a sample of students from the University of Konstanz, we analyze whether economics and non-economics students differ in their decision-making. Based on several questions that depict behavioral concepts from the expected utility theory, we create a simplified index of rationality by aggregating different concepts. We then compare how much students from economics, law, and political science deviate from expected utility theory. We find no evidence for self-selection into studying economics based on deviation from expected utility theory, even after interacting studying economics with academic achievement. Nonetheless, our results provide evidence for the learning effect of studying economics. It seems that, conditioned on surveyed behavioral concepts and our data limitations, rational economists are rather made than born.

Even though a substantial literature has investigated differences between economists and non-economists from different angles, ours is, to the best of our knowledge, the first study that analyzes deviations from expected utility theory. We mention only the most relevant studies starting from one of the most cited studies in this field of research, Marwell and Ames (1981). They analyzed whether economists free-ride more than other individuals using a sample of economics graduate students and students from other fields of study. They found that this is indeed the case and proposed a twofold mechanisms: those students who are particularly concerned with economic incentives might self-select into this study program, or they might adapt their behavior over time. These two mechanisms denote the selection and learning hypothesis in a nutshell, or put differently, self-selection effect and socialization effect.

Carter and Irons (1991) tested the robustness of these conjectures by using a simple ultimatum bargaining experiment and also found that the difference does exist. Their experiment involved a decision-making process and the participants were economists and non-economists in different stages of their careers. Their findings showed that economists are different, but already from the beginning of their economics studies. They did not find strong evidence related to economics trainings. In their opinion, economists are different because they excel in self-interest calculation, and are in a way more successful in deductive logic required to recognize and determine opportunities for some sort of economic gain. This skill was not acquired as a result of economics teaching, but existed already prior to the start of university studies. Later on, Laband and Beil (1999) investigated whether economists exhibit more selfish behavior than other social scientists who have not been taught about homo oeconomicus fully. Their results reported that professional economists are substantially more honest and cooperative than professional political and

social scientists.

Kahneman et al. (1986a, b) found that economic decisions of business students become more efficient during their studies, providing the first evidence for the socialization effect. Rubinstein (2006) found that economics students are substantively more oriented towards profit-maximization compared to mathematics and philosophy students. The caveat of this study was that he couldn't disentangle whether the result is a consequence of self-selection or some sort of indoctrination during university studies, as he didn't survey the students at the very beginning or very end of their studies. Cipriani et al. (2009) combined the survey questions of the previous two studies and provided evidence in favor of the socialization effect, and intuitively also of the learning effect as part of the concept. Interestingly enough, when analyzing the self-selection and socialization effect in conjecture to the change in moral attitudes, Hummel et al. (2018) concluded that the university education in general does not influence the moral aspect of decision-making among students, so neither does the economics teaching. On the other hand, Frank and Schulze (2000) conducted an experiment and provided evidence of economics students being more corrupted than other students as a consequence of self-selection, and not of economics training.

Goossens and Méon (2015) found that economics and business students hold different beliefs about the existence of certain benefits from the market transactions, compared to other students, and that this phenomen is the result of economics training. Economics students are also different from other students in the study by Fischer et al. (2017), when socio-political attitudes are analyzed. They provided evidence for the self-selection for all fields of studies, and for the socialization effect only in case of economics student who become more market-oriented as they progress in their studies. Rosengart et al. (2020) provided evidence for the self-selection and socialization effect among business and law students by using a survey with three decision cases. Their results indicated that business students make decisions that are more in line with economic theory compared to law students, as a consequence of being exposed to economics teaching, and that studying business leads to students basing their decision more on efficiency concerns, and studying law leads to basing decisions more on social concerns.

Finally, our paper also relates to a larger and certainly more general literature on how students select into studying different academic disciplines and on different ways it possibly changes their beliefs, attitudes, and preferences, such as Lindov (2020), Fuchs-Schündeln and Masella (2016), Cantoni et al. (2017), Fischer et al. (2017), and Rosengart et al. (2020).

3.2 Research question

In order to infer whether there is any evidence in support of self-selection into study-ing economics, and whether first-semester economics students are substantially different when it comes to rationality in decision-making, we compare their decisions to those of the first-semester law and political science students, while controlling for age and gender. If studying economics is correlated with less deviation from irrationality and statistically significant already in the first semester, it would provide evidence for the self-selection effect because, at that point, the learning effect was quite small or even non-existent.

Still, even if there is such evidence at hand, academic achievement is an important factor because it could be that only those students with better academic achievements make more rational decisions. We therefore interact studying economics with student's grade obtained after examinations took place in the first semester in order to infer whether economics students with better grades are those who are different, not the entire group of economics students, compared to law and political science students.

Finally, we also investigate for the learning effect from studying economics by com-paring third semester economics students to those who were in their first semester at the time when survey took place. If the coefficient of correlation between the semester variable and the irrationality index is negative and statistically significant, it would imply that students learn how to make more rational decisions as they progress in their economics studies, and it would provide evidence for the learning effect. We proceed with describing our data in more details.

3.3 Data

We use a self-collected and novel dataset for our empirical analysis. The majority of the data was collected over years, starting from 2012 and ending in 2018, as part of the course "Introduction to decision theory", taught by Prof. Ursprung in the Economics Bachelor program at the University of Konstanz. The course takes place in the third semester, but students are also allowed to take it in a later semester. Nevertheless, most of them were indeed in their third study semester when they took the course. During the first lecture, students were given a survey to fill in and were duly informed that it has no effect on their grade and that they should just give their opinions on given topics and make deci-sions for the given hypothetical situations. In the year 2018, we expanded our dataset by surveying a sample of first-semester economics students, as well as first-semester political science and law students. In order to gather data from the first-semester students, we asked professors who were teaching the mandatory courses in these three disciplines if

they would allow us to survey their students, which they did.

After collecting the survey data and after the first semester examinations took place, we matched students' matriculation numbers with their individual characteristics: age, gender, student semester, and the grade obtained from a mandatory first-semester course of their study program. For the first semester students, these were actually the courses during which the students were surveyed: Einführung in die Volkswirtschaftslehre, Strafrecht, and Personal and organization. In the case of the third-semester economics students, more data was available regarding their grades, considering that most mandatory courses take place in the first two or three semesters. For that reason either two or three grades[2] were available for each student and we used the average in our econometric analysis. We only used grades from the mandatory courses as it ensured that most of the students have one, and also because these courses have to be taken by all economics students, no matter which specialization they might choose later, so in a way they provide general teaching in the respective academic field.

About 56% of our survey participants are economics students, 28% are law students, and 16% are political science students. The total number of participants is 627. Out of those, 244 students are third-semester economics students, and the remaining 383 students are the first-semester students coming from three different study fields. Figure 3.1 reports the percentage of first-semester participants by their study field.

First-semester students
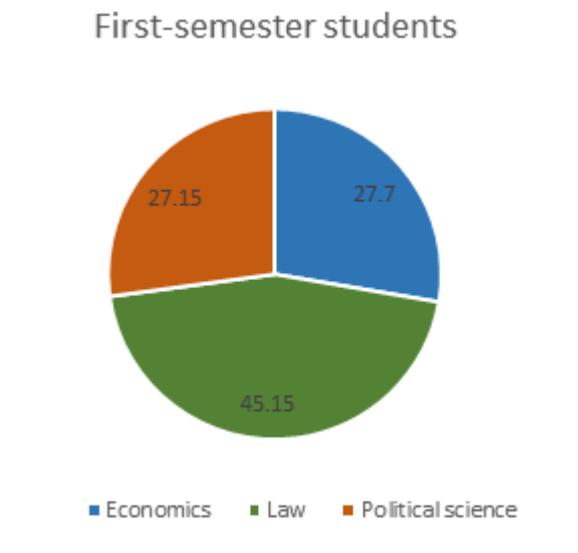
Figure 3.1: Percentage of first-semester students by the field of study

We could only use replies of the participants that provided their matriculation numbers or their names. Finally, all personal information has been anonymized. Our dataset

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[2] Besides Einführung in die Volkswirtschaftslehre, also Mikroökonomik I and Mathematik I.

is balanced in terms of gender with a bit of higher share of females in the subsample of law students, about 65%. It matches well the statistics on gender composition in respective fields of studies at the University of Konstanz in 2020[3]. The share of female students in the law study program was 60%, for example.

The average age of the student-participant is 20. The average grade of the mandatory course for all students is about 2.9. The law grades have been converted using the general German grading system for comparison and econometric purposes.

Descriptive statistics of the entire dataset are presented in Table 3.1, and separate tables for the subsamples can be found in the appendix.

Table 3.1: Descriptive statistics. Entire dataset: 2012-2018

	N	mean	SD	min	max
Economics student	627	.5582137	.4969961	0	1
Political science student	627	.1658692	.3722602	0	1
Law student	627	.2759171	.4473321	0	1
Age	627	20.40829	1.829592	18	29
Female	626	.5271565	.4996612	0	1
Grade	624	2.849306	1.03371	1	5
VWL grade	349	2.544126	.8549727	1	5
Mathematik I grade	342	2.830702	.9402496	1	5
Mikroökonomie I grade	335	2.785075	.9262722	1	5
Personal & organization grade	104	2.388462	.8168502	1	5
Strafrecht grade	173	3.600578	1.186234	1	5
Student semester	622	2.048232	1.611429	1	11
True semester	627	.8548644	.3525187	0	1
Third semester course	627	.3891547	.4879478	0	1
Gambler's fallacy	619	1.248788	.4326605	1	2
Independence axiom I	624	1.362179	.6633582	1	3
Independence axiom II	624	1.350962	.5286942	1	3
Independence axiom II	623	1.529695	.6818745	1	3
Independence axiom IV	624	1.80609	.6793643	1	3
Subjective probability I	622	1.14791	.3552964	1	2
Subjective probability II	622	1.691318	.4657913	0	2
Ellsberg's paradox I	590	1.29322	0.4556249	1	2
Ellsberg's paradox II	587	1.332198	.4714032	1	2
Ellsberg's paradox III	590	1.39661	.4896089	1	2
Ellsberg's paradox IV	582	1.402062	.4907361	1	2
Irrationality index	619	.5215401	.2253349	0	1
N	627				

[3] Based on the official reports of the University of Konstanz.

3.4 Survey questions and main concepts

The initial survey that we used had a significantly larger number of questions, but we reduced the survey to the few most relevant questions in 2018 because of time constraints in surveying the first-semester students. All questions were created by Gilboa (2011), whose main aim was to acquaint the general public with some ideas from decision theory and to investigate how these ideas can help in making better decisions. Every question is presented as a hypothetical situation in which the survey participant has to make a certain decision or judgment. These questions exemplify some decision theory principles, as well as their violations. A short overview of the questions used, and the analyzed principles behind them follows.

3.4.1 Gambler's fallacy

The students were asked the following question: „ *You are going to play the roulette. You first sit there and observe, and you notice that the last five times it came up "black." Would you bet on "red" or on "black"?".*

This question portrays the gambler's fallacy and the majority of surveyed individuals usually choose red, arguing their decision based on the occurrence of the "black" last five times. What they usually do not realize is that each event is independent of the previous one in terms of the probability. If that was not the case, and we estimate the outcome based on Bayesian updating, a more probable event would be rather "black" than "red". The percentage of students who chose red is presented in Figure 3.2. Among first-semester students, the most rational ones in this specific case seem to be the economics students, and the least rational on average are political science students. Interestingly enough, third-semester economics students are less rational than those in the first semester.
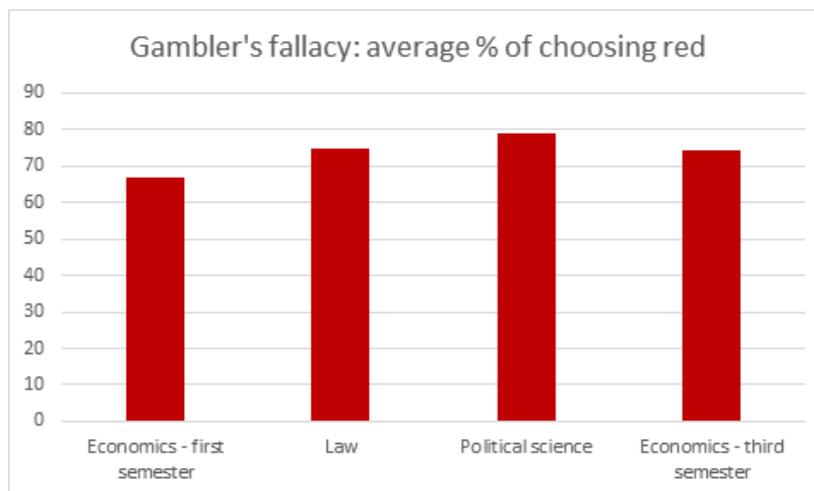
Figure 3.2: Gambler's fallacy

3.4.2 Subjective probability

Subjective probability and inconsistency are analyzed by combining the following two questions:

"Do you prefer to get 100 EUR if it will snow on February 14th (A), or if a roulette wheel yields the outcome 3 on February 14th (B) ?"

"Do you prefer to get 100 EUR if it will not snow on February 14^{th}(A), or if a roulette wheel yields a different outcome than 24 on February 14th (B)?"

A survey participant is clearly forming a subjective probabilities regarding these events, but the inconsistency in these probabilities would be demonstrated if (A) is chosen in both question, considering that in that case the probability of event A occurring would be equalized to the probability of event not A occurring. The same would hold for choosing (B) in both questions.

The average percent of students who demonstrated inconsistent choices is presented in Figure 3.3. Overall, first-semester students are more irrational in the given situation compared to the third semester students. Among different fields of studies, economics students seem to be more rational in their choices related to subjective probability.
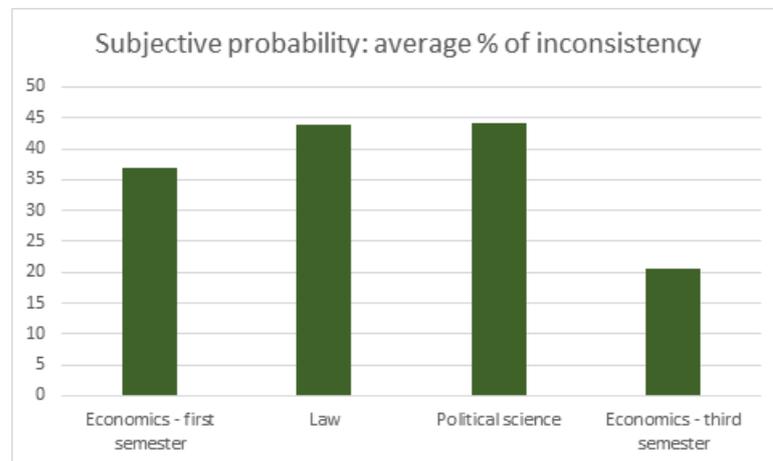
Figure 3.3: Subjective probability

3.4.3 Independence axiom

Violation of independence axiom was analyzed using the following questions on four different lotteries.

"In each of the following problems you are asked to choose between two lotteries. A "lottery" gives you certain monetary prizes with given probabilities. For instance, A is a lottery that gives you 0 with probability 50%, and 1,000 EUR otherwise. A "sure" prize will be represented as a lottery with probability 1, say: B is a "lottery" that gives you 500 EUR for sure.

Please denote your preferences between the lotteries by choosing A or B, or stating that you are indifferent between the two.

I Lottery A gives you 0 with probability 50%, and 1000 EUR otherwise. Lottery B gives you 500 EUR for sure.

II Lottery A gives you 0 with probability 20%, and 4000 EUR otherwise. Lottery B gives you 3000 EUR for sure.

III Lottery A gives you 0 with probability 20%, 400 EUR with probability 40%, and 1000 EUR otherwise. Lottery B gives you 400 EUR with probability 60%, and 500 EUR otherwise.

IV Lottery A gives you 0 with probability 80%, and 4000 EUR otherwise. Lottery B gives you 0 with probability 75%, and 3000 EUR otherwise."

These are constructed in a way that choosing a different lottery within the pairs (I) and (III), or within the pairs (II) and (IV) implies violation of the mentioned axiom based on the calculation of expected outcomes and consistency of risk attitudes. By definition, someone who is an expected utility maximizer will satisfy the independence axiom, which states that two identical outcomes within a gamble should be canceled out in the analysis of the gamble as a whole.

Figure 3.4 reports the average percentage of choices between lotteries A and B related to two different pairs. Overall, decisions seem to be similar for all analyzed groups of students, with the exception of political science students demonstrating a bit more irrationality in this specific case.
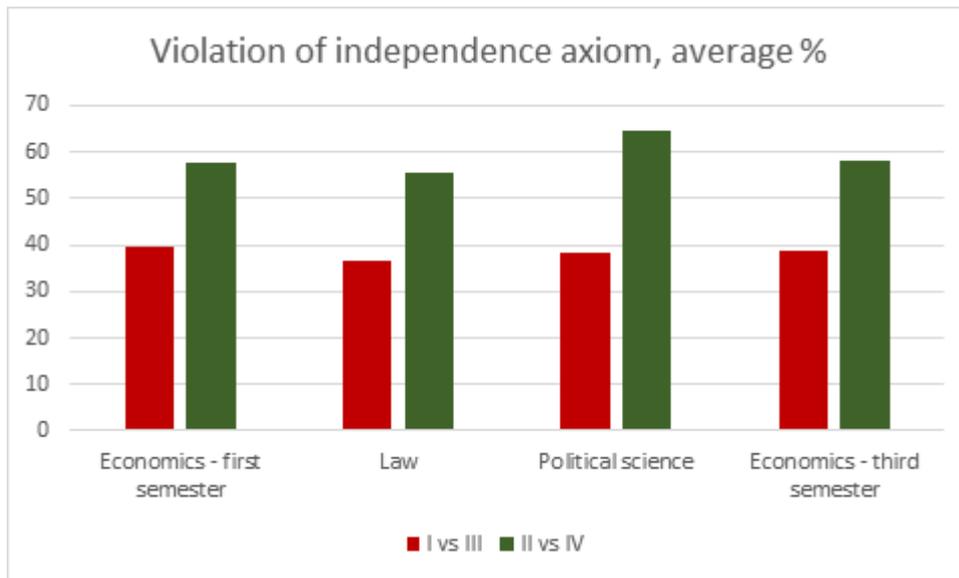
Figure 3.4: Independence axiom

3.4.4 Ellsberg's paradox

Finally, Ellsberg's paradox was analyzed using the following question:

"There is an urn containing 90 balls. Each ball can be red, blue, or yellow. You are also told that there are precisely 30 red balls in the urn. Hence, the remaining 60 balls are blue or yellow, but you don't know how many are blue and how many are yellow. A ball is to be drawn at random from the urn. You are offered choices between pairs of bets, where "betting on an event" implies winning 1,000 EUR if the event occurs, and nothing otherwise:

a. Betting on the ball being red vs. betting on the ball being blue

b. Betting on the ball being red vs. betting on the ball being yellow

c. Betting on the ball being not red vs. betting on the ball being not blue

d. Betting on the ball being not red vs. betting on the ball being not yellow."

The phenomenon that Ellsberg found in his experiments states that many people are uncertainty averse, implying that they prefer known probabilities to unknown ones, or they prefer risk to uncertainty. In this particular example, the probability of ball being red is known (1/3) as well as the probability of the ball not being red (2/3), but the probability of the ball being blue or yellow can only be defined as a joint probability, and in case of separate probabilities it can only be observed within an interval.

Let us consider the choice between red and blue. Many people will bet on red against blue because in that case the probability of winning 1,000 EUR is known to be 1/3, against the probability of blue that can be anywhere between 0 and 2/3 and uncertain. This choice portrays the uncertainty aversion. The same intuition applies if we consider betting on not-red against not-blue. The probability of winning 1,000 EUR if betting on not-red is known to be 2/3, while the probability of not-blue can again be anywhere between 1/3 and 1. Still, when we consider red and blue, or not-red and not-blue, we directly assume that they both yield 0 in case that a yellow ball is drawn. In a way, we would assume that the yellow ball is never drawn, and if it is then the choice between red and blue does not matter anymore,[4] leading us to making decisions on unknown probabilities acting as if we knew them. If we would ignore the occurrence of yellow ball, which is not rational, then red would be equivalent to not-blue, and blue to not-red in the payoff matrix.

Therefore, choosing a different bet in (a) and (c), or in (b) and (d), portrays irrationality since choosing red against blue should also rationally imply choosing not red against not blue, for example. Again, Figure 3.5 shows the average percentage of irrational responses for the given questions by different groups of student. Law students seem to be the most irrational in this case, and third-semester economics students the least irrational.
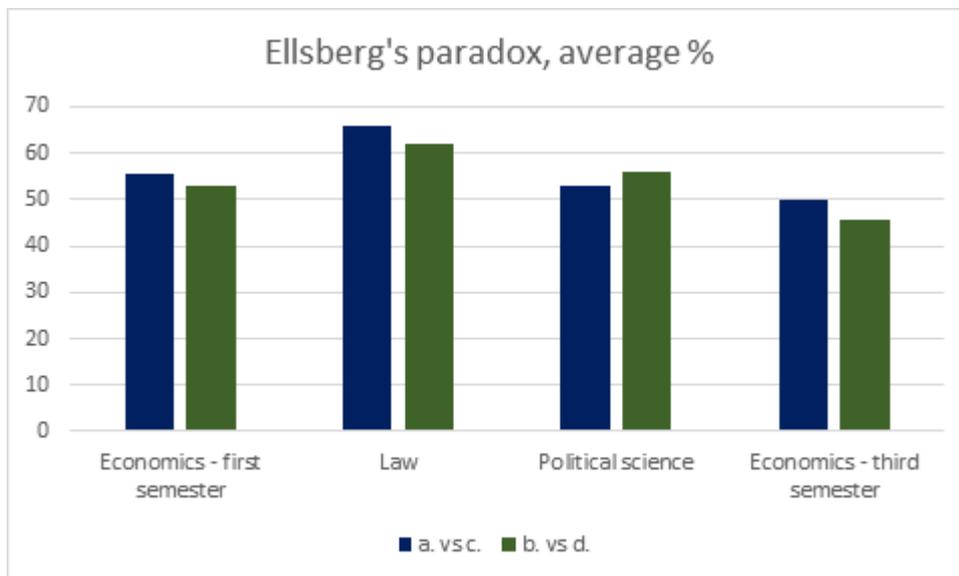
Figure 3.5: Ellsberg's paradox

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[4] Sure-thing principle

3.5 Econometric strategy and results

In order to analyze whether economics students are more rational than law and political science students, we created an index of irrationality and used it as our dependent variable. We coded replies from all above-mentioned questions in a way that value of 1 implies irrational behavior, and 0 otherwise. Naturally, the index is fairly simple as it is an average of different dummies, and the term "irrationality" is used only in relation to the concepts that we surveyed, as an average deviation form expected utility theory. Still, it allows us to merge the replies and analyze on average the difference between economics, political science, and law students.

Our main independent variable when we test for self-selection is a dummy for being first-semester economics student compared to first-semester law and political science students. The interaction effect should not be seen as a control in this analysis, rather as treatment heterogeneity. The following regression equation is used:

$$index_{i,t} = \beta_0 + \beta_1 economics_{i,t} + \beta_2(economics_{i,t} \ x \ grade_{i,t}) +$$
$$+ \beta_3 X_{i,t} + \beta_4 true \ semester_{i,t} + \varepsilon_{i,t}$$

(3.1)

The variable $X_{i,t}$ denotes the vector of student-specific controls: age and gender. $True \ semester_{i,t}$ is a dummy variable with value of 1 if the student is indeed enrolled in the third (or in the first) semester at the time that the survey took place. Students have the possibility to take some courses in a later semester than what the course program suggests, and in this way we control for that case as well. It is supposed to capture the discrepancy between the course semester and actual student semester. Still, more than 80% of students were in their "true semester". $\varepsilon_{i,t}$ is the error term.

Our aim is to infer whether economics students deviate less from rationality compared to law and political science students, and in case they do, whether that is driven by economics students with better grades. First semester students have not had a chance to be influenced by economic teaching, but if there are still statistically significant results for these students, it would be an indicator of the self-selection.

Table 3.2: Regression results, self-selection, all first-semester students

	Irrationality index	Irrationality index
Economics	-0.0240	-0.0216
	(-0.90)	(-0.31)
Economics = 1 x Grade		-0.000948
		(-0.04)
Age	0.00744	0.00744
	(1.00)	(1.00)
Female	0.0764***	0.0763***
	(3.24)	(3.23)
Grade	0.0147	0.0149
	(1.48)	(1.34)
True semester	0.0165	0.0162
	(0.16)	(0.16)
Constant	0.305	0.305
	(1.55)	(1.55)
Observations	375	375
R-squared	0.0442	0.0442

t statistics in parentheses; * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

The results presented in table 2 are not statistically significant and thus do not present evidence for the self-selection into studying economics based on deviation from expected utility theory. The interaction with the grade is also not statistically significant, implying that even economics students with very good grades do not select themselves into this field of study based on already mentioned criteria. The only correlation that is statistically significant is the gender, stating that female students are correlated with more irrationality when making decision on given hypothetical situations. We conclude that there is no enough evidence in support of self-selection effect into studying economics and being more rational. The results remain robust when running separate regressions for each surveyed concepts. This analysis can be found in the appendix.

In order to investigate the learning effect while studying economics, we perform a similar analysis, but focusing on economics students only. We compare students who were surveyed during a third-semester course to economics students who were surveyed during a first-semester course. Economics students who are enrolled in a higher semester are intuitively expected to be more rational, as they have already been exposed to the economic teaching for at least two entire semesters. We apply the following regression equation:

$$index_{i,t} = \beta_0 + \beta_1 third\ semester_{i,t} + \beta_2 X_{i,t} + \beta_3 true\ semester_{i,t} + \theta_t + \varepsilon_{i,t} \qquad (3.2)$$

$X_{i,t}$ is again a vector of student-related controls: age, gender, and grade. θ_t is a time fixed effect, and $\varepsilon_{i,t}$ is the error term.

Table 3.3: Regression results, learning effect, only economics students

	Irrationality index	Irrationality index
Third semester course	-0.118***	-0.106**
	(-2.61)	(-2.33)
Age	-0.00739	-0.00451
	(-1.02)	(-0.60)
Female	0.0398*	0.0367
	(1.66)	(1.52)
Grade	0.0309**	0.0315**
	(2.06)	(2.10)
True semester		0.0462
		(1.50)
Constant	0.645***	0.534***
	(4.05)	(3.05)
Year FE	yes	yes
Observations	346	346
R-squared	0.0589	0.0651

t statistics in parentheses; * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Results in Table 3.3 show that the higher semester is correlated with less irrationality, providing evidence in favor of a learning effect. Economics students in higher semester were already partially trained in economics and they demonstrate more rationality when surveyed for the above-mentioned expected utility theory concepts. Additionally, worse grades are correlated with more irrationality, yielding an additional evidence in support of learning effect. Those economics students who learned more and better, deviate less from expected utility theory than those who showed worse academic performance, and who intuitively learned less. In the appendix, we provide a table with separate regression for each question from our survey. The results are only partially statistically significant. Nevertheless, the data provides the most useful information only when analyzed jointly.

3.6 Conclusions

In order to infer whether economics students differ from law and political science students in rationality when making certain decisions, we used a self-collected dataset to investigate for the self-selection and the learning effect. Learning effect is part of the broader concept, namely socialization effect, that consists of both adapting to the peers in certain attitudes, and changing attitudes and beliefs as a consequence of learning. Deviation from expected utility theory in decision-making cannot be defined as an attitude towards certain topics or as a belief, but rather a skill that might be learned, which is why we focus solely on the learning effect and not the entire socialization effect in our study.

We find that first-economics students are not different from first-semester law and political science students, even when interacting the field of study with the grade. There is no evidence for self-selection into studying economics based on rational decision-making. On the other hand, our results provide evidence in favor of the learning effect when comparing third-semester to first-semester economic students. Those students, who were exposed to economic teaching for longer time, demonstrated more rationality in decision-making process.

Our results indicate that rational economists are indeed rather made than born, considering that there is more evidence in support of socialization effect, and none in support of self-selection. Our results and conclusions are of course strongly conditioned on the survey concepts and our study does not provide a general answer to the question, nor does it exclude the possibility that the self-selection based on rationality in decision-making does not exist. Also, our results are rather based on correlations than causal implications, because of the limitations of our dataset. Still, they do provide evidence of economic training affecting students' decision-making behavior, and therefore their deviation from expected utility theory when compared to students from the other two fields of studies that are significantly different in terms of main principles taught.

An interesting extension of our study would be to compare economics students to student from natural and IT sciences, and observe in more details how they differ. This field of research holds a lot of potential for further research as there are still many differences uncovered, and the conclusions made so far can be reinforced by causal inference and experiments.

Appendices

4.1   Chapter 1: Teachers and politics

Descriptive statistics

Table 4.4: Descriptive statistics - Student survey

Variable	N	Mean	SD	Min	Max
Female	50719	0.46	0.49	0	1
High school grade	50806	2.25	0.65	1	4
Father blue collar worker	50092	0.15	0.36	0	1
Father entrepreneur	50092	0.05	0.22	0	1
Future self employed	45050	0.67	0.47	0	1
Financial pressure	50498	0.18	0.38	0	1
Lehramt	46145	0.10	0.30	0	1
Humanities	45276	0.11	0.31	0	1
Social sciences	45276	0.05	0.22	0	1
Law	45276	0.08	0.26	0	1
Economics	45276	0.11	0.32	0	1
Medicine	45276	0.09	0.28	0	1
Natural sciences	45276	0.16	0.37	0.	1
Engineering	45276	0.12	0.33	0	1

Table 4.5: Descriptive statistics - SOEP

Variable	N	Mean	SD	Min	Max
Teacher	107427	0.08	0.28	0	1
Female	103413	1.45	0.50	1	2
Age	100621	49.48	14.46	18	98
Married	106753	0.70	0.45	0	1
Log income	76531	7.49	0.75	0	11.51
Years of education	107413	16.21	2.02	8.5	18
Degree from East Germany	100951	0.17	0.38	0	1
State (Bundesland)	70551	7.36	3.60	0	16
CDU/CSU(intensity of support)	58386	1.19	1.73	0	5
FDP (intensity of support)	58386	0.22	0.86	0	5
SPD (intensity of support)	58386	0.96	1.61	0	5
Green (intensity of support)	58386	0.67	1.41	0	5

Regression results

Table 4.6: Self-selection, all students - complete Table 1.1

	Green	Social-Democratic	Christian-conservative	Liberal-Democratic	Left/Compatriots
Lehramt	0.0296	0.00180	-0.0109	-0.0336	0.0884***
	(1.35)	(0.08)	(-0.53)	(-1.62)	(3.61)
Medicine	0.0154	0.0105	0.0502**	0.0979***	0.0125
	(0.68)	(0.47)	(2.30)	(4.39)	(0.49)
Natural	0.0562***	-0.00504	-0.0769***	-0.00159	0.0927***
Sciences	(3.44)	(-0.31)	(-5.05)	(-0.10)	(5.09)
Humanities	0.144***	0.0515***	-0.125***	-0.0325*	0.198***
	(7.82)	(2.71)	(-7.47)	(-1.77)	(9.78)
Social	0.183***	0.107***	-0.130***	-0.0403*	0.252***
Sciences	(8.06)	(4.65)	(-6.30)	(-1.71)	(10.24)
Law	-0.102***	-0.0202	0.0925***	0.0902***	-0.0798***
	(-4.38)	(-0.86)	(4.06)	(3.88)	(-3.10)
Economics	-0.100***	-0.0207	0.104***	0.114***	-0.0995***
	(-5.51)	(-1.13)	(5.75)	(6.27)	(-4.94)
Female	0.0806***	0.0288**	-0.0847***	-0.0579***	0.0696***
	(7.08)	(2.52)	(-7.86)	(-5.20)	(5.45)
East Germany	-0.0626***	-0.0448***	-0.0737***	-0.0502***	-0.00421
	(-4.53)	(-3.24)	(-5.71)	(-3.69)	(-0.26)
Father Blue	-0.0249*	0.0553***	-0.0563***	-0.0599***	0.0415**
Collar Worker	(-1.65)	(3.78)	(-4.16)	(-4.21)	(2.49)
Father	-0.0765***	-0.135***	0.121***	0.108***	-0.0993***
Entrepreneur	(-3.24)	(-5.64)	(5.02)	(4.48)	(-3.71)
Financial	0.0552***	0.0213	-0.0896***	-0.0396***	0.0899***
Pressure	(4.06)	(1.55)	(-7.22)	(-2.96)	(5.96)
School Final	-0.0335***	-0.0228***	-0.0192**	-0.0332***	-0.0301***
Grade	(-3.86)	(-2.63)	(-2.30)	(-3.86)	(-3.12)
Future	-0.00474	-0.0638***	0.0165	0.0541***	-0.0138
Self-Employed	(-0.39)	(-5.25)	(1.44)	(4.50)	(-1.01)
Constant	0.697***	0.646***	0.468***	0.447***	0.526***
	(22.16)	(20.13)	(15.61)	(14.33)	(15.26)
Wave FE	Yes	Yes	Yes	Yes	Yes
Observations	8552	8524	8557	8526	6767
R-squared	0.0524	0.0267	0.0617	0.0392	0.0689

t statistics in parentheses, * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 4.7: Socialization effect based on political ideology - a complete Table 1.3

	Green	Social-Democratic	Christian-Conservative	Liberal-Democratic	Left to Compatriots
Semester	0.00969***	0.00691**	-0.00198	-0.000111	0.00713**
	(3.09)	(2.24)	(-0.66)	(-0.04)	(2.04)
Female	-0.0110	0.0232	0.00860	0.0394**	-0.0302
	(-0.61)	(1.28)	(0.50)	(2.31)	(-1.53)
East Germany	-0.101***	-0.0984***	-0.0627***	-0.0122	-0.00578
	(-4.91)	(-4.85)	(-3.24)	(-0.64)	(-0.25)
Father Blue Collar Worker	0.00665	0.0456**	-0.0493**	-0.0443**	0.0332
	(0.30)	(2.15)	(-2.46)	(-2.16)	(1.37)
Father Entrepreneur	-0.0214	-0.0549	0.193***	0.108**	-0.0947*
	(-0.45)	(-1.12)	(4.07)	(2.24)	(-1.80)
Financial Pressure	0.0491**	0.0227	-0.0682***	-0.00620	0.0785***
	(2.37)	(1.10)	(-3.52)	(-0.31)	(3.45)
School Final Grade	-0.00969	-0.0212	-0.0398***	-0.0129	0.00894
	(-0.70)	(-1.53)	(-2.98)	(-0.96)	(0.57)
Future Self-Employed	0.0469**	-0.0191	0.00326	0.0514***	-0.00339
	(2.52)	(-1.02)	(0.18)	(2.81)	(-0.16)
Constant	0.726***	0.663***	0.462***	0.240***	0.525***
	(15.21)	(13.50)	(9.53)	(5.26)	(9.55)
Wave FE	Yes	Yes	Yes	Yes	Yes
Observations	3458	3448	3460	3438	2754
R-squared	0.0248	0.0145	0.0360	0.0154	0.0165

t statistics in parentheses, * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

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Table 4.8: Self-selection based on different policies - a complete Table 1.4

	Increase in use of nuclear energy	Environmentalism	Traditional family	Free market
Lehramt	-0.0866***	0.00863	-0.0506**	-0.0944***
	(-3.50)	(0.51)	(-2.25)	(-4.40)
Humanities	-0.140***	0.0527***	-0.178***	-0.175***
	(-7.43)	(3.79)	(-8.80)	(-9.04)
Social Sciences	-0.140***	0.0594***	-0.198***	-0.183***
	(-5.22)	(3.19)	(-7.56)	(-7.12)
Law	0.00306	-0.1000***	-0.0343	-0.0132
	(0.10)	(-4.79)	(-1.44)	(-0.64)
Economics	-0.0113	-0.0834***	-0.00290	0.0640***
	(-0.44)	(-4.96)	(-0.16)	(4.47)
Medicine	-0.0264	0.0131	0.0110	-0.0157
	(-0.83)	(0.73)	(0.49)	(-0.78)
Natural Sciences	-0.0510**	0.0428***	-0.0847***	-0.0930***
	(-2.45)	(3.44)	(-5.04)	(-6.03)
Female	-0.0976***	0.0499***	-0.0580***	-0.0398***
	(-7.12)	(5.40)	(-4.86)	(-3.67)
East Germany	0	-0.0144	0.0290**	-0.0484***
	(.)	(-1.14)	(1.97)	(-3.47)
Father Blue Collar Worker	0.00172	-0.00484	0.0167	-0.0295**
	(0.08)	(-0.40)	(1.10)	(-2.06)
Father Entrepreneur	0.0284	-0.0574***	-0.0285	0.0597***
	(0.93)	(-2.74)	(-1.14)	(3.03)
Financial Pressure	-0.0522***	0.0259**	-0.0314**	-0.0464***
	(-2.98)	(2.35)	(-2.17)	(-3.43)
School Final Grade	-0.0154	-0.0234***	0.00480	0.0223***
	(-1.35)	(-3.30)	(0.53)	(2.76)
Future Self-Employed	0.0150	-0.00962	-0.00302	0.0663***
	(0.97)	(-1.00)	(-0.23)	(5.49)
Constant	0.229***	0.864***	0.702***	0.714***
	(6.87)	(34.58)	(21.86)	(23.76)
Wave FE	Yes	Yes	Yes	Yes
Observations	3105	7800	7793	7784
R-squared	0.0792	0.0641	0.0359	0.0601

t statistics in parentheses, * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 4.9: Socialization effect based on different policies - a complete Table 1.5

	Increase in use of nuclear energy	Environmentalism	Traditional family	Free market
Semester	-0.00121	-0.00249	-0.00566*	-0.00774**
	(-0.34)	(-1.00)	(-1.71)	(-2.36)
Female	-0.0213	0.00753	-0.00148	-0.00831
	(-1.02)	(0.51)	(-0.08)	(-0.44)
East Germany	0	-0.0371**	0.0592***	-0.0536**
	(.)	(-2.03)	(2.79)	(-2.46)
Father Blue Collar Worker	-0.0450*	-0.0253	-0.0451*	-0.0172
	(-1.88)	(-1.36)	(-1.94)	(-0.74)
Father Entrepreneur	0.0150	0.0182	0.0222	0.142***
	(0.29)	(0.52)	(0.45)	(3.30)
Financial Pressure	-0.0273	0.0370**	-0.0423*	-0.0672***
	(-1.10)	(2.15)	(-1.87)	(-2.98)
School Final Grade	-0.0133	-0.0191*	-0.0296**	-0.000532
	(-0.82)	(-1.75)	(-2.03)	(-0.04)
Future Self-Employed	-0.0124	0.00191	-0.0192	0.0453**
	(-0.58)	(0.13)	(-0.96)	(2.33)
Constant	0.0994**	0.972***	0.716***	0.631***
	(2.09)	(28.69)	(13.84)	(12.26)
Wave FE	Yes	Yes	Yes	Yes
Observations	797	3251	3239	3236
R-squared	0.0449	0.0582	0.0252	0.0178

t statistics in parentheses, * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 4.10: Political attitudes of the teachers vs. other civil servants - a complete Table 1.7

	Green	SPD	CDU	FDP
Teacher	0.0615*	-0.0330	-0.105**	0.0246
	(2.07)	(-0.99)	(-3.21)	(1.80)
Female	0.148***	0.0259	-0.221***	-0.0758***
	(5.29)	(0.82)	(-7.20)	(-5.89)
Age	-0.00546***	0.00612***	0.00259	0.00107
	(-3.98)	(3.97)	(1.73)	(1.70)
Married	-0.0335	-0.00887	0.146***	-0.0364**
	(-1.17)	(-0.28)	(4.64)	(-2.77)
Log net income	-0.189***	0.0689*	0.232***	-0.0465***
	(-7.14)	(2.31)	(8.00)	(-3.83)
Years of	0.0948***	0.0116	-0.0947***	0.00293
education	(11.68)	(1.27)	(-10.67)	(0.79)
Degree from East	-0.464***	-0.171***	-0.142**	-0.0353
Germany	(-11.06)	(-3.63)	(-3.09)	(-1.83)
Constant	0.262	0.619*	1.066***	0.582***
	(1.03)	(2.17)	(3.84)	(5.00)
Wave FE	Yes	Yes	Yes	Yes
Observations	14028	14028	14028	14028
R-squared	0.059	0.020	0.034	0.009

t statistics in parentheses, * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Robustness tests

Table 4.11: Robustness test of the results reported in Table 1.6: Bundesland included

	Green	SPD	CDU	FDP
Teacher	0.131***	0.246***	-0.257***	-0.145***
	(4.79)	(8.16)	(-8.14)	(-8.11)
Female	0.254***	-0.0211	-0.212***	-0.0885***
	(11.99)	(-0.90)	(-8.65)	(-6.38)
Age	-0.0132***	-0.000688	0.0104***	0.00340***
	(-14.07)	(-0.66)	(9.58)	(5.54)
Married	-0.0722***	0.00925	0.129***	-0.00102
	(-3.33)	(0.39)	(5.14)	(-0.07)
Log net income	-0.104***	0.0102	0.159***	0.0444***
	(-7.79)	(0.69)	(10.33)	(5.10)
Years of	0.0809***	-0.0448***	-0.0397***	0.0149***
Education	(14.77)	(-7.39)	(-6.26)	(4.16)
Bundesland	-0.0273***	-0.0307***	-0.000412	-0.00872***
	(-10.05)	(-10.19)	(-0.13)	(-4.90)
Constant	0.256	2.162***	0.335	-0.169
	(1.65)	(12.58)	(1.87)	(-1.69)
Wave FE	Yes	Yes	Yes	Yes
Observations	25630	25630	25630	25630
R-squared	0.065	0.023	0.035	0.019

t statistics in parentheses, * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 4.12: Robustness test of the results reported in Table 1.6: all teachers

	Green	SPD	CDU	FDP
Teacher	0.107***	0.190***	-0.147***	-0.125***
	(4.82)	(7.69)	(-5.73)	(-9.14)
Female	0.262***	-0.0242	-0.175***	-0.0966***
	(15.91)	(-1.32)	(-9.19)	(-9.50)
Age	-0.00699***	-0.000582	0.00728***	0.00285***
	(-9.66)	(-0.72)	(8.67)	(6.38)
Married	-0.0904***	-0.0117	0.198***	-0.0294**
	(-5.44)	(-0.63)	(10.28)	(-2.86)
Log net income	-0.104***	0.0198	0.192***	0.0350***
	(-9.54)	(1.63)	(15.16)	(5.20)
Years of	0.0684***	-0.0210***	-0.0548***	0.0165***
Education	(15.91)	(-4.38)	(-10.97)	(6.19)
Degree from East	-0.417***	-0.183***	-0.133***	-0.0838***
Germany	(-16.67)	(-6.57)	(-4.59)	(-5.42)
Constant	0.0486	1.510***	0.508**	-0.172*
	(0.36)	(10.18)	(3.28)	(-2.08)
Wave FE	Yes	Yes	Yes	Yes
Observations	39131	39131	39131	39131
R-squared	0.0602	0.0160	0.0348	0.0194

t statistics in parentheses, * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 4.13: Robustness test of the results reported in Table 1.1: OLS

	Green	Social-Democratic	Christian-Conservative	Liberal-Democratic	Left/Compatriots
Lehramt	0.112	0.0127	-0.0894	-0.0958	0.270***
	(1.62)	(0.22)	(-1.17)	(-1.49)	(4.41)
Medicine	0.0194	-0.0118	0.152*	0.271***	-0.0238
	(0.27)	(-0.19)	(1.93)	(4.06)	(-0.35)
Natural	0.174***	-0.0296	-0.381***	-0.0571	0.273***
Sciences	(3.25)	(-0.66)	(-6.67)	(-1.15)	(5.82)
Humanities	0.476***	0.125**	-0.636***	-0.200***	0.544***
	(8.03)	(2.35)	(-9.60)	(-3.39)	(10.16)
Social	0.646***	0.229***	-0.690***	-0.264***	0.715***
Sciences	(9.38)	(3.50)	(-8.44)	(-3.43)	(10.70)
Law	-0.500***	-0.0635	0.268***	0.290***	-0.282***
	(-6.25)	(-0.91)	(3.08)	(4.15)	(-4.03)
Economics	-0.429***	-0.0435	0.364***	0.339***	-0.312***
	(-7.21)	(-0.84)	(5.70)	(6.20)	(-6.02)
Controls	Yes	Yes	Yes	Yes	Yes
Wave FE	Yes	Yes	Yes	Yes	Yes
Observations	8552	8524	8557	8526	6767
R-squared	0.0734	0.0365	0.0724	0.0454	0.0893

t statistics in parentheses, * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 4.14: Robustness test of the results reported in Table 1.2: OLS

	Green	Social-Democratic	Christian-Conservative	Liberal-Democratic	Left/Compatriots
Lehramt	-0.0555	-0.0535	-0.170	-0.222**	0.274***
	(-0.49)	(-0.58)	(-1.36)	(-2.28)	(2.78)
Medicine	-0.158	-0.182*	0.132	0.252**	-0.0298
	(-1.40)	(-1.85)	(1.08)	(2.57)	(-0.29)
Natural Sciences	0.328***	-0.0446	-0.476***	-0.00572	0.345***
	(4.07)	(-0.66)	(-5.22)	(-0.08)	(4.91)
Humanities	0.515***	-0.0207	-0.808***	-0.259***	0.639***
	(5.37)	(-0.26)	(-7.47)	(-2.87)	(7.51)
Social Sciences	0.519***	0.143	-0.825***	-0.267**	0.751***
	(4.89)	(1.47)	(-6.66)	(-2.33)	(7.50)
Law	-0.600***	-0.0975	0.280**	0.304***	-0.332***
	(-5.00)	(-0.93)	(2.08)	(3.03)	(-3.11)
Economics	-0.484***	0.0504	0.213**	0.262***	-0.189**
	(-5.28)	(0.63)	(2.13)	(3.25)	(-2.42)
Controls	Yes	Yes	Yes	Yes	Yes
Wave FE	Yes	Yes	Yes	Yes	Yes
Observations	3665	3665	3665	3665	3022
R-squared	0.0969	0.0544	0.0782	0.0581	0.101

t statistics in parentheses, * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 4.15: Robustness test of the results reported in Table 1.3: OLS

	Green	Social-Democratic	Christian-Conservative	Liberal-Democratic	Left/Compatriots
Semester	0.0215**	0.0161**	-0.0160	-0.00651	0.00492
	(2.24)	(1.97)	(-1.43)	(-0.69)	(0.57)
Female	0.0263	0.0778	0.165**	0.202***	-0.0316
	(0.45)	(1.61)	(2.51)	(3.66)	(-0.63)
East Germany	-0.296***	-0.327***	-0.297***	0.0133	0.0868
	(-4.74)	(-6.14)	(-4.19)	(0.23)	(1.53)
Father Blue	0.00967	0.181***	-0.166**	-0.104	0.0647
Collar Worker	(0.15)	(3.36)	(-2.24)	(-1.63)	(1.09)
Father	-0.246	-0.156	0.539***	0.308**	-0.339***
Entrepreneur	(-1.59)	(-1.26)	(3.27)	(2.20)	(-2.60)
Financial	0.111*	0.0738	-0.395***	-0.0875	0.233***
Pressure	(1.68)	(1.30)	(-5.36)	(-1.36)	(4.04)
School Final	-0.00359	-0.0207	-0.139***	-0.0181	0.0481
Grade	(-0.08)	(-0.57)	(-2.82)	(-0.43)	(1.25)
Future Self-	0.169***	-0.0340	0.0514	0.145**	-0.0152
Employed	(2.91)	(-0.68)	(0.77)	(2.55)	(-0.29)
Constant	4.902***	4.631***	3.862***	3.486***	4.544***
	(32.42)	(35.34)	(21.54)	(23.10)	(35.83)
Wave FE	Yes	Yes	Yes	Yes	Yes
Observations	3458	3448	3460	3438	2754
R-squared	0.0208	0.0238	0.0650	0.0218	0.0201

t statistics in parentheses, * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 4.16: Robustness test of the results reported in Table 1.4: OLS

	Increase in use of nuclear energy	Environmentalism	Free market	Traditional family
Lehramt	-0.543***	0.0869	-0.417***	-0.140*
	(-4.40)	(1.51)	(-6.33)	(-1.89)
Humanities	-0.852***	0.300***	-0.625***	-0.622***
	(-8.93)	(5.94)	(-10.25)	(-9.13)
Social Sciences	-1.225***	0.274***	-0.664***	-0.756***
	(-9.30)	(4.15)	(-8.43)	(-8.54)
Law	-0.0187	-0.370***	0.0451	-0.0589
	(-0.14)	(-5.08)	(0.64)	(-0.76)
Economics	0.0776	-0.377***	0.306***	-0.0758
	(0.72)	(-6.90)	(6.13)	(-1.26)
Medicine	0.00198	0.0138	0.0117	0.0622
	(0.01)	(0.23)	(0.18)	(0.82)
Natural Sciences	-0.252***	0.175***	-0.331***	-0.308***
	(-2.70)	(4.02)	(-6.60)	(-5.67)
Controls	Yes	Yes	Yes	Yes
Wave FE	Yes	Yes	Yes	Yes
Observations	3105	7800	7784	7793
R-squared	0.128	0.125	0.0901	0.0451

t statistics in parentheses, * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 4.17: Robustness test of the results reported in Table 1.5: OLS

	Increase in use use of nuclear energy	Environmentalism	Free market	Traditional family
Semester	0.00369	-0.0110	-0.00554	-0.0301***
	(0.19)	(-1.33)	(-0.58)	(-2.73)
Controls	Yes	Yes	Yes	Yes
Wave FE	Yes	Yes	Yes	Yes
Observations	797	3251	3236	3239
R-squared	0.0467	0.131	0.0215	0.0266

t statistics in parentheses, * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 4.18: Robustness test of the results reported in Table 1.1: medicine students dropped

	Green	Social-Democratic	Christian-Conservative	Liberal-Democratic	Left/ Compatriots
Lehramt	0.0322	0.00464	-0.0155	-0.0355*	0.0958***
	(1.47)	(0.21)	(-0.75)	(-1.70)	(3.90)
Natural Sciences	0.0571***	-0.00307	-0.0783***	-0.00148	0.0941***
	(3.49)	(-0.19)	(-5.13)	(-0.09)	(5.16)
Humanities	0.144***	0.0525***	-0.126***	-0.0330*	0.201***
	(7.82)	(2.76)	(-7.55)	(-1.80)	(9.93)
Social Sciences	0.185***	0.110***	-0.133***	-0.0410*	0.257***
	(8.12)	(4.76)	(-6.41)	(-1.74)	(10.44)
Law	-0.102***	-0.0187	0.0918***	0.0903***	-0.0788***
	(-4.39)	(-0.80)	(4.03)	(3.88)	(-3.07)
Economics	-0.0997***	-0.0193	0.103***	0.114***	-0.0987***
	(-5.47)	(-1.05)	(5.69)	(6.26)	(-4.90)
Controls	Yes	Yes	Yes	Yes	Yes
Wave FE	Yes	Yes	Yes	Yes	Yes
Observations	7892	7865	7895	7868	6267
R-squared	0.0565	0.0273	0.0626	0.0373	0.0738

t statistics in parentheses, * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 4.19: Robustness test of the results reported in Table 1.2: medicine students dropped

	Green	Social-Democratic	Christian-Conservative	Liberal-Democratic	Left/Compatriots
Lehramt	0.0175	-0.0106	-0.0350	-0.0652**	0.0993***
	(0.52)	(-0.32)	(-1.07)	(-2.07)	(2.62)
Natural	0.0905***	-0.0171	-0.102***	0.0128	0.115***
Sciences	(3.69)	(-0.69)	(-4.33)	(0.52)	(4.24)
Humanities	0.129***	-0.00728	-0.154***	-0.0573**	0.223***
	(4.65)	(-0.24)	(-5.79)	(-2.05)	(7.41)
Social	0.146***	0.104***	-0.167***	-0.0515	0.265***
Sciences	(4.31)	(3.07)	(-5.26)	(-1.44)	(7.25)
Law	-0.122***	-0.0523	0.0839**	0.0759**	-0.108***
	(-3.49)	(-1.47)	(2.42)	(2.15)	(-2.88)
Economics	-0.108***	-0.0130	0.0674**	0.0962***	-0.0536*
	(-3.95)	(-0.48)	(2.43)	(3.54)	(-1.78)
Controls	Yes	Yes	Yes	Yes	Yes
Wave FE	Yes	Yes	Yes	Yes	Yes
Observations	3383	3383	3383	3383	2799
R-squared	0.0788	0.0386	0.0621	0.0501	0.0860

t statistics in parentheses, * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 4.20: Robustness test of the results reported in Table 1.4: medicine students dropped

	Increase in use of nuclear energy	Environmentalism	Free market	Traditional family
Lehramt	-0.0899***	0.00869	-0.0984***	-0.0549**
	(-3.63)	(0.51)	(-4.57)	(-2.43)
Humanities	-0.142***	0.0518***	-0.176***	-0.180***
	(-7.53)	(3.71)	(-9.08)	(-8.87)
Social Sciences	-0.142***	0.0587***	-0.185***	-0.200***
	(-5.30)	(3.14)	(-7.17)	(-7.62)
Law	0.00291	-0.100***	-0.0135	-0.0351
	(0.09)	(-4.81)	(-0.66)	(-1.47)
Economics	-0.0111	-0.0838***	0.0637***	-0.00363
	(-0.43)	(-4.98)	(4.44)	(-0.19)
Natural Sciences	-0.0503**	0.0425***	-0.0935***	-0.0861***
	(-2.41)	(3.41)	(-6.05)	(-5.12)
Controls	Yes	Yes	Yes	Yes
Wave FE	Yes	Yes	Yes	Yes
Observations	2918	7204	7190	7200
R-squared	0.0802	0.0664	0.0622	0.0370

t statistics in parentheses, * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 4.21: Robustness test of the results reported in Table 1.1: ordered probit

	Green	Social-Democratic	Christian-Conservative	Liberal-Democratic	Left/Compatriots
Lehramt	0.0657	0.00442	-0.0518	-0.0652	0.223***
	(1.44)	(0.10)	(-1.14)	(-1.47)	(4.34)
Medicine	0.0176	-0.00442	0.0804*	0.189***	-0.0165
	(0.37)	(-0.09)	(1.71)	(4.06)	(-0.30)
Natural	0.116***	-0.0255	-0.223***	-0.0392	0.225***
Sciences	(3.29)	(-0.75)	(-6.50)	(-1.15)	(5.78)
Humanities	0.319***	0.102**	-0.384***	-0.132***	0.454***
	(7.86)	(2.48)	(-9.31)	(-3.26)	(9.91)
Social	0.437***	0.183***	-0.404***	-0.173***	0.607***
Sciences	(8.91)	(3.57)	(-7.96)	(-3.27)	(10.29)
Law	-0.311***	-0.0217	0.175***	0.207***	-0.227***
	(-6.12)	(-0.41)	(3.28)	(4.20)	(-4.00)
Economics	-0.282***	-0.0251	0.211***	0.243***	-0.256***
	(-7.60)	(-0.65)	(5.55)	(6.31)	(-6.12)
Controls	Yes	Yes	Yes	Yes	Yes
Wave FE	Yes	Yes	Yes	Yes	Yes
Observations	8552	8524	8557	8526	6767
R-squared	0.0211	0.0107	0.0198	0.0132	0.0279

t statistics in parentheses, * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 4.22: Robustness test of the results reported in Table 1.2: ordered probit

	Green	Social-Democratic	Christian-Conservative	Liberal-Democratic	Left/Compatriots
Lehramt	-0.0379	-0.0411	-0.0944	-0.157**	0.224***
	(-0.52)	(-0.58)	(-1.32)	(-2.32)	(2.77)
Medicine	-0.110	-0.121*	0.0722	0.173**	-0.0186
	(-1.54)	(-1.66)	(1.03)	(2.49)	(-0.22)
Natural	0.203***	-0.0459	-0.270***	-0.00363	0.276***
Sciences	(3.83)	(-0.90)	(-5.07)	(-0.07)	(4.85)
Humanities	0.364***	-0.0334	-0.480***	-0.179***	0.527***
	(5.45)	(-0.55)	(-7.24)	(-2.83)	(7.33)
Social	0.333***	0.108	-0.469***	-0.177**	0.618***
Sciences	(4.55)	(1.42)	(-6.38)	(-2.20)	(7.17)
Law	-0.386***	-0.0477	0.165**	0.218***	-0.256***
	(-5.19)	(-0.60)	(2.07)	(3.01)	(-3.02)
Economics	-0.316***	0.0612	0.111*	0.190***	-0.155**
	(-5.62)	(1.00)	(1.96)	(3.31)	(-2.54)
Controls	Yes	Yes	Yes	Yes	Yes
Wave FE	Yes	Yes	Yes	Yes	Yes
Observations	3665	3665	3665	3665	3022
R-squared	0.0284	0.0164	0.0214	0.0172	0.0310

t statistics in parentheses, * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 4.23: Robustness test of the results reported in Table 1.3: ordered probit

	Green	Social-Democratic	Christian-Conservative	Liberal-Democratic	Left/Compatriots
Semester	0.0138**	0.0131*	-0.0110	-0.00437	0.00380
	(2.07)	(1.93)	(-1.63)	(-0.64)	(0.50)
Female	-0.000936	0.0598	0.0999**	0.143***	-0.0305
	(-0.02)	(1.49)	(2.48)	(3.56)	(-0.69)
East Germany	-0.202***	-0.269***	-0.190***	0.00511	0.0868*
	(-4.64)	(-6.12)	(-4.37)	(0.12)	(1.74)
Father Blue	-0.0276	0.139***	-0.102**	-0.0828*	0.0540
Collar Worker	(-0.63)	(3.04)	(-2.23)	(-1.78)	(1.03)
Father	-0.171*	-0.141	0.303***	0.233**	-0.299***
Entrepreneur	(-1.65)	(-1.41)	(3.14)	(2.26)	(-2.77)
Financial	0.0946**	0.0777	-0.251***	-0.0612	0.210***
Pressure	(2.02)	(1.63)	(-5.47)	(-1.31)	(4.07)
School Final	-0.000166	-0.00980	-0.0860***	-0.0149	0.0445
Grade	(-0.01)	(-0.33)	(-2.86)	(-0.49)	(1.33)
Future Self-	0.116***	-0.0207	0.0385	0.107***	-0.00991
Employed	(2.80)	(-0.50)	(0.94)	(2.58)	(-0.21)
Constant	1.701***	1.469***	1.294***	2.295***	1.781***
	(15.74)	(13.85)	(12.23)	(20.14)	(15.37)
Wave FE	Yes	Yes	Yes	Yes	Yes
Observations	3458	3448	3460	3438	2754
Pseudo R-squared	0.00661	0.00723	0.0185	0.00634	0.00682

t statistics in parentheses, * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 4.24: Robustness test of the results reported in Table 1.4: ordered probit

	Increase in use of nuclear energy	Environmentalism	Free market	Traditional family
Lehramt	-0.353***	0.0916*	-0.313***	-0.0864*
	(-3.93)	(1.84)	(-6.71)	(-1.76)
Humanities	-0.586***	0.318***	-0.453***	-0.392***
	(-8.09)	(6.66)	(-10.45)	(-9.02)
Social Sciences	-1.037***	0.252***	-0.475***	-0.477***
	(-7.11)	(4.38)	(-8.82)	(-8.60)
Law	-0.000479	-0.285***	0.0510	-0.0307
	(-0.01)	(-5.09)	(0.91)	(-0.59)
Economics	0.0675	-0.305***	0.257***	-0.0519
	(1.08)	(-7.37)	(6.06)	(-1.30)
Medicine	0.0209	0.00364	0.00578	0.0478
	(0.26)	(0.07)	(0.12)	(0.93)
Natural Sciences	-0.145**	0.151***	-0.251***	-0.202***
	(-2.50)	(4.00)	(-6.75)	(-5.69)
Controls	Yes	Yes	Yes	Yes
Wave FE	Yes	Yes	Yes	Yes
Observations	3105	7800	7784	7793
R-squared	0.0415	0.0473	0.0306	0.0121

t statistics in parentheses, * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 4.25: Robustness test of the results reported in Table 1.5: ordered probit

	Increase in use of nuclear energy	Environmentalism	Free market	Traditional family
Semester	-0.00325	-0.0110	-0.00405	-0.0194***
	(-0.21)	(-1.50)	(-0.57)	(-2.77)
Controls	Yes	Yes	Yes	Yes
Wave FE	Yes	Yes	Yes	Yes
Observations	797	3251	3236	3239
Pseudo R-squared	0.00736	0.0528	0.00661	0.0143

t statistics in parentheses, * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

4.2 Chapter 2: Does having children create a glass ceiling for women with high-profile career positions?

Descriptive statistics

Table 4.26: Descriptive statistics – individuals working full-time

	N	mean	sd	min	max
Gender	253889	1.354237	.4782825	1	2
Number of children	253889	1.222719	1.194423	0	12
Partner's number of children	173888	1.595412	1.209732	0	12
Having children	253889	.6301139	.4827746	0	1
First class of occupational prestige	253769	.1603072	.3668915	0	1
First class & 90th income quintile	253889	.0567728	.2314085	0	1
One child	253889	.2187019	.4133667	0	1
Two children	253889	.2793819	.4486964	0	1
More than two children	253889	.1320301	.3385242	0	1
Woman in the first class & 90th income quintile	14414	.1132233	.3168765	0	1
Net income in Euros	253889	1847.495	1348.823	0	99999
Partner's net income in Euros	126849	1280.189	1044.097	0	80000
EGP class	249406	3.697421	2.155041	1	7
Partner's EGP class	147082	3.533532	1.972332	1	7
Age at first birth	177598	27.94948	5.893633	11	60
Partner's age at first birth	144905	26.40737	5.398859	10	61
Married	253889	.6274632	.4834812	0	1
Years of education	249212	12.4557	2.781615	7	18
High education	253889	.2583373	.4377213	0	1
High education of the partner	173888	.2253404	.4178075	0	1
Age	253888	41.83191	11.13378	15	89
Partner's age	173888	42.42394	10.58459	17	86
CDU/CSU	253889	.1497505	.3568274	0	1
SPD	253889	.1524052	.3594139	0	1
FDP	253889	.0188586	.136026	0	1
green	253889	.0454766	.2083474	0	1
N	253889				

Regression results

Note: All regressions control for year fixed effects.

Table 4.27: Quantile regressions, DV: log net income

	Q10	Q10	Q50	Q50
Female	-0.154***	-0.167***	-0.179***	-0.208***
	(-15.56)	(-15.72)	(-23.99)	(-32.49)
Having children	0.140***	0.0765***	0.177***	0.106***
	(14.52)	(7.45)	(24.33)	(16.45)
Having children=1	-0.238***	-0.277***	-0.180***	-0.212***
x female=1	(-17.42)	(-18.59)	(-16.91)	(-23.89)
Age		0.0513***		0.0304***
		(20.47)		(25.65)
Age squared		-0.000552***		-0.000273***
		(-18.05)		(-19.34)
Married		0.0343***		0.0738***
		(4.48)		(15.30)
Years of education		0.0259***		0.0361***
		(11.91)		(24.10)
High education		0.0437***		0.0785***
		(3.26)		(8.49)
EGP class		-0.0508***		-0.0511***
		(-29.11)		(-42.15)
Constant	6.383***	5.350***	6.824***	5.962***
	(500.28)	(92.86)	(1016.16)	(196.22)
Observations	253109	244474	253109	244474
r2	0.282	0.448	0.292	0.470

t statistics in parentheses, SE clustered at individual level

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

Table 4.28: Quantile regressions, DV: log net income

	Q90	Q90
Female	-0.286***	-0.290***
	(-16.04)	(-27.77)
Having children	0.214***	0.0962***
	(13.97)	(10.48)
Having children=1	-0.147***	-0.130***
x female=1	(-6.35)	(-9.76)
Age		0.0275***
		(15.41)
Age squared		-0.000220***
		(-10.16)
Married		0.0838***
		(11.39)
Years of education		0.0366***
		(15.93)
High education		0.127***
		(8.36)
EGP class		-0.0645***
		(-34.05)
Constant	7.315***	6.381***
	(457.43)	(144.13)
Observations	253109	244474
r2	0.287	0.461

t statistics in parentheses

SE clustered at individual level

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

Table 4.29: Regression Results DV: Working vs not working

	Women Having children	Men Having children	Women Number of of children	Men Number of children
Having children	-0.296***	0.0682***		
	(-32.54)	(13.65)		
Number of children			-0.0360***	-0.0349***
			(-15.24)	(-9.71)
Age	0.0223***	0.0384***	0.0301***	0.0450***
	(21.47)	(35.01)	(23.67)	(24.40)
Age squared	-0.000252***	-0.000533***	-0.000319***	-0.000596***
	(-28.92)	(-51.70)	(-29.72)	(-34.99)
Partner's age	0.00103*	-0.000218	0.00198***	0.000329
	(1.82)	(-0.45)	(2.83)	(0.45)
Married	-0.135***	0.0571***	-0.0956***	0.0669***
	(-17.94)	(9.13)	(-9.19)	(5.69)
Years of education	0.0154***	0.0338***	0.00608***	0.0400***
	(10.22)	(27.49)	(3.39)	(23.34)
High education	0.0934***	-0.0942***	0.123***	-0.129***
	(9.10)	(-12.30)	(9.83)	(-11.86)
High education - partner	-0.0567***	-0.0248***	-0.0523***	-0.0270***
	(-8.49)	(-4.35)	(-6.58)	(-3.41)
Partner working	0.0578***	0.0635***	0.0293***	0.0184**
	(10.25)	(13.45)	(4.29)	(2.35)
Constant	0.491***	-0.562***	0.00211	-0.720***
	(12.57)	(-10.36)	(0.04)	(-9.46)
Observations	198517	194221	128336	93248
r2	0.162	0.432	0.0932	0.413

t statistics in parentheses, SE clustered at individual level

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

Table 4.30: Regression Results DV: Working vs not working

	Women IV	Men IV
Number of children	-0.000696	-0.257
	(-0.02)	(-1.45)
Age	0.0290***	0.0552***
	(15.47)	(6.50)
Age squared	-0.000310***	-0.000641***
	(-19.59)	(-15.42)
Partner's age	0.00213***	-0.00476
	(2.90)	(-1.14)
Married	-0.0961***	0.0722***
	(-9.14)	(5.11)
Years of education	0.00942**	0.0282***
	(2.03)	(2.95)
High education	0.114***	-0.0798*
	(6.47)	(-1.94)
High education - partner	-0.0530***	-0.0319***
	(-6.55)	(-3.16)
Partner working	0.0350***	-0.0304
	(3.57)	(-0.76)
Constant	-0.0293	0.367
	(-0.19)	(0.18)
Observations	128336	93248
r2	0.0850	0.241

t statistics in parentheses, SE clustered at individual level

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

Table 4.31: Two-stage least squared regression

	Women First stage	Women IV	Men First stage	Men IV
Twins	0.484***		0.145**	
	(3.33)		(2.29)	
Number of children		-0.000696		-0.257
		(-0.02)		(-1.45)
Age	0.0317***	0.0290***	0.0463***	0.0552***
	(6.79)	(15.47)	(9.74)	(6.50)
Age squared	-0.000274***	-0.000310***	-0.000206***	-0.000641***
	(-6.61)	(-19.59)	(-5.28)	(-15.42)
Partner's age	-0.00421	0.00213***	-0.0229***	-0.00476
	(-1.56)	(2.90)	(-9.58)	(-1.14)
Married	0.0153	-0.0961***	0.0252	0.0722***
	(0.49)	(-9.14)	(0.85)	(5.11)
Years of education	-0.0955***	0.00942**	-0.0531***	0.0282***
	(-13.30)	(2.03)	(-9.82)	(2.95)
High education	0.266***	0.114***	0.223***	-0.0798*
	(7.23)	(6.47)	(6.66)	(-1.94)
High education – partner	0.0192	-0.0530***	-0.0227	-0.0319***
	(0.88)	(-6.55)	(-1.01)	(-3.16)
Partner working	-0.161***	0.0350***	-0.220***	-0.0304
	(-7.74)	(3.57)	(-12.75)	(-0.76)
Constant	3.120***	-0.597***	2.070***	0.172
	(27.81)	(-4.12)	(18.46)	(0.46)
Observations	128336	128336	93248	93248
r2	0.0529	0.0850	0.0568	0.241

t statistics in parentheses, SE clustered at individual level

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

Table 4.32: Regression Results, DV: Being on the top (Top 10 & first class)

	OLS Having children	OLS No of children	OLS No of children	IV No of children	IV No of children
Female	-0.0216***	-0.0292***	-0.0866***	-0.0894***	-0.284
	(-4.60)	(-6.74)	(-5.42)	(-13.18)	(-0.38)
Having children	0.0465***				
	(11.36)				
Having children=1 x Female=1	-0.0552***				
	(-9.46)				
Number of children	-0.00173	0.0232***	0.0136***	0.0154	-0.0346
	(-1.62)	(11.67)	(2.96)	(0.12)	(-0.12)
Female=1 x Number of children	0.0000379***	-0.0239***	-0.00122		0.0834
	(2.94)	(-9.38)	(-0.20)		(0.26)
Age	0.000453	-0.00276***	0.00293	0.00280	0.00524
	(1.32)	(-2.58)	(1.39)	(0.33)	(0.32)
Age squared	0.0182***	0.0000471***	-0.0000122	-0.0000110	-0.0000303
	(5.47)	(3.67)	(-0.50)	(-0.15)	(-0.23)
Partner's age	0.0191***	0.000592*	0.000587	0.000601	0.00000932
	(16.04)	(1.73)	(0.97)	(0.47)	(0.00)
Married	0.0807***	0.0165***	0.0247***	0.0247***	0.0256***
	(12.19)	(5.05)	(3.63)	(3.17)	(2.68)
Years of education	-0.00385	0.0191***	0.0244***	0.0244***	0.0245***
	(-0.72)	(16.03)	(13.08)	(9.59)	(10.48)
High education	-0.00298***	0.0790***	0.103***	0.103***	0.105***
	(-4.86)	(11.95)	(9.76)	(6.92)	(4.93)
High education − partner	-0.0216***	-0.00330	-0.000978	-0.000924	-0.000842
	(-4.60)	(-0.62)	(-0.12)	(-0.11)	(-0.10)
EGP class - partner	0.0465***	-0.00339***	-0.00377***	-0.00380	-0.00279
	(11.36)	(-5.49)	(-3.69)	(-1.53)	(-0.49)
Constant	-0.228***	-0.201***	-0.360***	-0.362**	-0.300
	(-9.14)	(-8.14)	(-7.11)	(-2.57)	(-0.88)
Observations	145321	145321	71046	71046	71046
r2	0.162	0.165	0.197	0.197	0.186

t statistics in parentheses, SE clustered at individual level

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

Table 4.33: Two-stage least square regression

	First stage	Second stage	Second stage with interaction
Twins	0.131***		
	(6.38)		
Number of children		0.0154	-0.0346
		(0.12)	(-0.12)
Female		-0.0894***	-0.284
		(-13.18)	(-0.38)
Female =1 x Number of children			0.0834
			(0.26)
Age	0.0683***	0.00280	0.00524
	(27.39)	(0.33)	(0.32)
Age squared	-0.000578***	-0.0000110	-0.0000303
	(-21.51)	(-0.15)	(-0.23)
Partner's age	-0.00999***	0.000601	0.00000932
	(-15.38)	(0.47)	(0.00)
Married	0.0338***	0.0247***	0.0256***
	(3.39)	(3.17)	(2.68)
Years of education	-0.0140***	0.0244***	0.0245***
	(-8.26)	(9.59)	(10.48)
High education	0.0820***	0.103***	0.105***
	(8.49)	(6.92)	(4.93)
High education - partner	-0.0237***	-0.000924	-0.000842
	(-3.69)	(-0.11)	(-0.10)
EGP class - partner	0.0177***	-0.00380	-0.00279
	(11.16)	(-1.53)	(-0.49)
Constant	1.054***	-0.362**	-0.300
	(13.56)	(-2.57)	(-0.88)
Observations	71046	71046	71046
r2	0.0332	0.197	0.186

t statistics in parentheses, SE clustered at individual level

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

Robustness tests

Omitting the partner's characteristics and considering also single individuals

Table 4.34: Robustness check: Partner's characteristics dropped

	DV: working vs not working					
	Women OLS	Men OLS	Women OLS	Men OLS	Women IV	Men IV
Having children	-0.215*** (-37.33)	0.0974*** (21.43)				
Number of children			-0.0323*** (-18.06)	-0.0413*** (-12.62)	-0.0222 (-0.95)	-0.166** (-2.01)
Female						
Female=1 x No of children						
Age	0.0300*** (49.70)	0.0566*** (68.44)	0.0281*** (34.34)	0.0394*** (22.84)	0.0279*** (29.70)	0.0422*** (16.20)
Age squared	-0.0003*** (-57.40)	-0.0007*** (-80.15)	-0.0003*** (-38.77)	-0.0006*** (-33.01)	-0.0003*** (-35.40)	-0.0006*** (-24.36)
Married	-0.104*** (-25.99)	0.0619*** (12.90)	-0.0913*** (-17.96)	0.0574*** (6.76)	-0.0906*** (-16.81)	0.0608*** (6.66)
Years of education	0.0171*** (15.87)	0.0351*** (32.89)	0.00411*** (2.96)	0.0440*** (27.48)	0.00523* (1.77)	0.0348*** (5.58)
High education	0.0693*** (8.73)	-0.0947*** (-13.80)	0.116*** (11.05)	-0.154*** (-15.03)	0.113*** (8.66)	-0.118*** (-4.48)
Constant	-0.299*** (-18.41)	-0.715*** (-36.42)	-0.305*** (-12.62)	-0.183*** (-4.01)	-0.338*** (-4.14)	0.109 (0.55)
Obv	349139	274019	193520	106291	193520	106291
r2	0.161	0.375	0.0983	0.408	0.0976	0.352

t statistics in parentheses, SE clustered at individual level

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

Table 4.35: Robustness check: Partner's characteristics dropped

| | DV: being on the top | |
	OLS	IV
Number of children	0.0103***	-0.564
	(3.07)	(-0.33)
Female	-0.0961***	-1.504
	(-8.78)	(-0.35)
Female=1 x	0.00288	0.580
Number of children	(0.72)	(0.33)
Age	0.00246	0.0269
	(1.47)	(0.37)
Age squared	-0.00000118	-0.000245
	(-0.06)	(-0.33)
Married	0.0110***	0.0404
	(2.59)	(0.45)
Years of education	0.0238***	0.0122
	(16.40)	(0.35)
High education	0.0911***	0.148
	(10.81)	(0.87)
Constant	-0.278***	0.599
	(-7.17)	(0.23)
Observations	103543	103543
r2	0.177	0.091

t statistics in parentheses, SE clustered at individual level

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

Controlling for age at first birth in IV estimations

Controlling for the age at first birth is important in IV estimation because the age itself can be an important determinant of labor supply decisions and earnings (Rosenzweig and Wolpin, 1980; Bronars and Groger, 1994). Estimation results from Tables 2.2 and 2.4 remain robust when controlling for age at first birth. IV results confirm that the marginal effects of the second child are not statistically significant. It should be noted that teh variable "age at first borth" is also endogeneous , especially in terms of reaching the top. It is intuitively possible that very career-driven women postpone the first pregnancy for example.

Table 4.36: Robustness check, controlling for age at first birth

	DV: working vs not working				DV: being at the top	
	Women	Men	Women	Men		
	OLS	OLS	IV	IV	OLS	IV
Number of children	-0.0490***	-0.0306***	0.125	-0.261*	0.0196***	-0.160
	(-18.63)	(-8.11)	(1.43)	(-1.76)	(4.29)	(-0.98)
Female					-0.0726***	-0.504
					(-4.66)	(-0.96)
Female=1 x Number of children					-0.00439	0.176
					(-0.75)	(0.79)
Age	0.0347***	0.0419***	0.0281***	0.0608***	-0.000973	0.0131
	(26.10)	(20.99)	(7.85)	(4.90)	(-0.47)	(1.06)
Age squared	-0.0003***	-0.0006***	-0.0003***	-0.0007***	0.00002	-0.0001
	(-30.25)	(-33.67)	(-10.13)	(-11.46)	(0.66)	(-0.97)
Age at first birth	-0.0161***	0.00378***	-0.00961***	-0.00609	0.00387***	-0.00004
	(-21.28)	(5.37)	(-2.87)	(-0.95)	(5.93)	(-0.01)
Partner's age	-0.000367	0.00218***	0.000967	-0.00740	0.00184***	-0.00144
	(-0.52)	(2.70)	(0.90)	(-1.18)	(2.82)	(-0.46)
Married	-0.0773***	0.0640***	-0.0850***	0.0812***	0.0126**	0.0215**
	(-7.49)	(5.46)	(-6.89)	(4.67)	(1.96)	(2.03)
Years of education	0.0150***	0.0386***	0.0261***	0.0311***	0.0227***	0.0235***
	(8.31)	(22.27)	(4.40)	(6.07)	(12.12)	(9.92)
High education	0.114***	-0.130***	0.0775***	-0.0822**	0.0895***	0.101***
	(9.43)	(-11.92)	(3.32)	(-2.49)	(8.62)	(6.56)
High education	-0.0318***	-0.0323***	-0.0432***	-0.0227**	-0.00707	-0.00638
	(-4.13)	(-4.06)	(-4.14)	(-1.98)	(-0.84)	(-0.69)
Partner working	0.0388***	0.0262***	0.0629***	-0.0423	-0.00259***	-0.00019
	(5.61)	(3.22)	(4.46)	(-0.94)	(-2.58)	(-0.07)
Constant	-0.246***	-0.353***	-0.859***	0.235	-0.341***	-0.104
	(-7.42)	(-7.46)	(-2.77)	(0.61)	(-6.97)	(-0.46)
Observations	127978	93048	127978	93048	70959	70959
r2	0.122	0.414	0.084	0.244	0.183	0.0480

t statistics in parentheses, SE clustered at individual level
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Controlling for health and political attitudes

Table 4.37: Robustness check, controlling for health and political attitudes in table 2.2

	Women	Men	Women	Men
Having children	-0.284***	0.0675***	-0.298***	0.0682***
	(-28.87)	(10.73)	(-32.69)	(13.70)
Age	0.0250***	0.0367***	0.0226***	0.0384***
	(20.52)	(26.39)	(21.76)	(35.02)
Age squared	-0.000272***	-0.000510***	-0.000253***	-0.000535***
	(-27.17)	(-40.63)	(-29.10)	(-51.90)
Partner's age	0.00190***	0.000870	0.00102*	-0.000231
	(3.05)	(1.51)	(1.80)	(-0.47)
Married	-0.145***	0.0413***	-0.135***	0.0559***
	(-16.24)	(5.48)	(-18.02)	(8.98)
Years of education	0.0166***	0.0394***	0.0170***	0.0326***
	(10.26)	(26.81)	(11.21)	(26.40)
High education	0.0745***	-0.124***	0.0913***	-0.0913***
	(6.81)	(-13.57)	(8.91)	(-11.95)
High education - partner	-0.0580***	-0.0309***	-0.0529***	-0.0230***
	(-8.16)	(-4.59)	(-7.92)	(-4.05)
Partner working	0.0665***	0.0756***	0.0580***	0.0637***
	(10.01)	(12.60)	(10.31)	(13.53)
General health (NBS)	0.00230***	0.00439***		
	(9.35)	(16.72)		
Mental health (NBS)	-0.00228***	-0.00181***		
	(-9.48)	(-7.79)		
SPD			-0.0169***	0.0143***
			(-2.66)	(3.22)
FDP			-0.00522	0.0520***
			(-0.29)	(4.51)
Green			-0.0796***	-0.0137
			(-8.32)	(-1.46)
CDU/CSU			-0.0247***	0.0428***
			(-4.39)	(9.99)
Constant	-0.224***	-0.523***	-0.0988***	-0.166***
	(-6.94)	(-13.57)	(-3.73)	(-5.94)
Observations	65976	64741	198517	194221
r2	0.171	0.442	0.164	0.434

t statistics in parentheses, SE clustered at individual level
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Political attitudes variables are coded as dummy variables with the value of 1 if an individual supports the given political party, and 0 if not. Individual can choose only one political party in the SOEP survey. Two largest parties from each spectrum have been taken into account in this analysis. The refrence category are those individuals who don't support any of these 4 political parties.

Redefining the outcome variable

Table 4.38: Robustness check, DV: earning top 10% income in table 2.4

	Having children	Number of children	IV
Female	-0.0611***	-0.133***	0.0288
	(-8.94)	(-6.93)	(0.02)
Having children	0.0552***		
	(8.41)		
Female = 1 x Having children=1	-0.0785***		
	(-9.73)		
Number of children		0.0263***	0.0806
		(4.76)	(0.16)
Female=1 x Number of children		-0.0106	-0.0800
		(-1.47)	(-0.15)
Age	0.00643***	0.00906***	0.00619
	(4.79)	(3.73)	(0.21)
Age squared	-0.0000323**	-0.0000606**	-0.0000373
	(-2.09)	(-2.22)	(-0.16)
Partner's age	0.000348	0.000579	0.00119
	(0.74)	(0.76)	(0.21)
Married	0.0274***	0.0311***	0.0300**
	(6.36)	(3.55)	(2.11)
Years of education	0.0320***	0.0369***	0.0369***
	(21.35)	(16.64)	(12.33)
High education	0.0728***	0.104***	0.101***
	(8.36)	(7.87)	(2.79)
High education - partner	-0.0325***	-0.0330***	-0.0328***
	(-4.89)	(-3.33)	(-3.14)
EGP class partner	-0.00844***	-0.00968***	-0.0107
	(-9.23)	(-7.00)	(-1.05)
Constant	-0.401***	-0.499***	-0.564
	(-12.43)	(-8.30)	(-0.92)
Observations	144869	70766	70766
r2	0.177	0.228	0.220

t statistics in parentheses, SE clustered at individual level

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

4.3 Chapter 3: Are rational economists born or made?

Desciptive statistics

Table 4.39: Economics students (2012 – 2018)

	count	mean	sd	min	max
age	350	21.00857	1.836415	18	29
female	350	.46	.499111	0	1
grade	347	2.612872	.7897957	1	5
Student semester	345	2.872464	1.767264	1	11
True semester	350	.7485714	.4344554	0	1
Third semester	350	.6971429	.4601518	0	1
Average index	348	.4918582	.2188246	0	1
N	350				

Table 4.40: Political Science students (only 2018)

	count	mean	sd	min	max
age	104	19.82692	1.765045	18	29
female	103	.5339806	.5012833	0	1
grade	104	2.388462	.8168502	1	5
Student semester	104	1.019231	.1961161	1	3
True semester	104	.9903846	.0980581	0	1
Avg index	100	.555	.2369548	0	1
N	104				

Table 4.41: Law students (only 2018)

	count	mean	sd	min	max
age	173	19.54335	1.335832	18	27
female	173	.6589595	.475435	0	1
grade	173	3.600578	1.186234	1	5
Student semester	173	1.023121	.2144153	1	3
True semester	173	.9884393	.1072077	0	1
Average index	171	.5623782	.2236239	0	1
N	173				

Regression results

Table 4.42: Regression results, self-selection, entire sample

	Irrationality index	Irrationality index	Irrationality index	Irrationality index
Economics	-0.0515**	-0.0259	-0.0872	-0.0714
	(-2.12)	(-0.98)	(-1.54)	(-1.24)
Age	-0.00382	0.00349	-0.00399	0.00345
	(-0.68)	(0.58)	(-0.71)	(0.57)
Female	0.0509***	0.0584***	0.0508***	0.0584***
	(2.77)	(3.18)	(2.77)	(3.18)
Grade	0.0203**	0.0211**	0.0157	0.0154
	(2.25)	(2.35)	(1.41)	(1.39)
Economics=1		-0.0169*		-0.0178*
x Grade		(-1.68)		(-1.75)
Student semester		-0.0724		-0.0706
		(-1.36)		(-1.33)
Third semester			0.0132	0.0169
			(0.70)	(0.89)
Constant	0.522***	0.455***	0.540***	0.475***
	(4.10)	(3.37)	(4.15)	(3.47)
Year FE	yes	yes	yes	yes
Observations	616	613	616	613
R-squared	0.0537	0.0696	0.0544	0.0708

t statistics in parentheses, * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 4.43: Separate regressions for each question, self-selection, only first-semester students

	Gambler's fallacy	Subjective probability I	Independence axiom I	Independence axiom II	Ellsberg's paradox I	Ellsberg's paradox II
Economics	-0.0814	-0.0441	-0.0356	0.0293	-0.00781	-0.0236
	(-1.54)	(-0.74)	(-0.60)	(0.50)	(-0.13)	(-0.40)
Age	0.0144	-0.00929	0.0398**	0.0231	-0.0194	-0.00229
	(0.99)	(-0.57)	(2.45)	(1.44)	(-1.21)	(-0.14)
Female	0.0730	0.0684	0.0215	0.00315	0.132**	0.162***
	(1.55)	(1.30)	(0.41)	(0.06)	(2.55)	(3.12)
Grade	0.0108	0.0138	-0.0135	0.0276	0.0220	0.0231
	(0.55)	(0.63)	(-0.61)	(1.28)	(1.01)	(1.06)
Constant	0.405	0.539	-0.162	-0.170	0.840**	0.471
	(1.37)	(1.62)	(-0.49)	(-0.52)	(2.56)	(1.43)
Observations	375	381	381	381	381	381
R-squared	0.0195	0.0112	0.0167	0.0104	0.0288	0.0340

t statistics in parentheses, * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 4.44: Separate regressions for each question, self-selection, with the interaction effect

	Gambler's fallacy	Subjective probability I	Independence axiom I	Independence axiom II	Ellsberg's paradox I	Ellsberg's paradox II
Economics	-0.206	-0.0690	-0.0699	-0.209	0.182	0.217
	(-1.50)	(-0.45)	(-0.45)	(-1.38)	(1.19)	(1.42)
Economics=1	0.0478	0.00958	0.0132	0.0918*	-0.0730	-0.0925*
Grade	(0.98)	(0.17)	(0.24)	(1.70)	(-1.35)	(-1.71)
Age	0.0141	-0.00933	0.0398**	0.0227	-0.0191	-0.00190
	(0.97)	(-0.57)	(2.45)	(1.42)	(-1.19)	(-0.12)
Female	0.0752	0.0688	0.0221	0.00716	0.129**	0.158***
	(1.60)	(1.31)	(0.42)	(0.14)	(2.49)	(3.05)
Grade	0.000960	0.0119	-0.0161	0.00913	0.0367	0.0418*
	(0.04)	(0.48)	(-0.66)	(0.38)	(1.51)	(1.72)
Constant	0.440	0.546	-0.153	-0.107	0.790**	0.407
	(1.47)	(1.63)	(-0.46)	(-0.33)	(2.39)	(1.23)
Observations	375	381	381	381	381	381
R-squared	0.0220	0.0113	0.0169	0.0180	0.0335	0.0414

t statistics in parentheses, * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 4.45: Separate regressions for each question, learning effect

	Gambler's fallacy	Subjective probability I	Independence axiom I	Independence axiom II	Ellsberg's paradox I	Ellsberg's paradox II
Third semester course	0.0230	-0.166*	-0.0725	-0.0822	-0.225**	-0.182*
	(0.25)	(-1.84)	(-0.70)	(-0.83)	(-2.17)	(-1.75)
Age	-0.00832	-0.00440	0.0150	-0.00389	-0.0177	-0.0238
	(-0.57)	(-0.30)	(0.90)	(-0.24)	(-1.06)	(-1.42)
Female	0.0151	0.102**	0.0453	-0.0121	0.0471	0.0312
	(0.31)	(2.12)	(0.82)	(-0.23)	(0.85)	(0.56)
Grade	0.0697**	-0.00937	0.0495	0.142***	-0.0130	-0.0523
	(2.29)	(-0.31)	(1.44)	(4.28)	(-0.37)	(-1.51)
Constant	0.734**	0.478	0.117	0.173	1.064***	1.275***
	(2.28)	(1.50)	(0.32)	(0.49)	(2.90)	(3.47)
Year FE	yes	yes	yes	yes	yes	yes
Observations	346	347	347	347	347	347
R-squared	0.0394	0.0496	0.0235	0.0675	0.0358	0.0339

t statistics in parentheses, * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Author's contributions

The essay *Teachers and politics* is single-authored.

The essay *Does having children create a glass ceiling for women with high-profile career positions?* is joint work with Heinrich Ursprung. The main and broader idea for the paper originated from Heinrich Ursprung and we developed it together into a more specific research question. We discussed each part together and wrote the theory. The econometric analysis and the final version of the paper was done by me, with inputs from my co-author.

The essay *Are rational economists born or made*? is also joint work with Heinrich Ursprung. He started collecting the data in his lecture at the University of Konstanz even before I started my PhD studies. I have later joined as tutor in his course and we discussed various ways in which data that he has been collecting could be analyzed. I assisted in collecting the data from 2016 and digitalized them in order to have a proper dataset that we can use in our analysis. We came up with the research question together and discussed the method. The econometric analysis was done by me, as well as the final version of the paper.

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