

Rational decisions in the life course

Four essays in labor and education economics

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4. Beitrag 3: Pushing the wheelchair or marching in step? Wage differences between draftees in military and civilian service in West Germany
5. Beitrag 4: Revisiting the gender-specific training gap of part-time and full-time workers
6. Zusammenfassung

¹Ich weise darauf hin, dass der erste Beitrag nicht vervielfältigt werden darf und bitte darum, diesen Beitrag im Original zu zitieren.

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1. Introduction

In the life course of a person, numerous educational and career decisions can have far-reaching consequences for later life. The first major decisions are made by one's own parents soon after birth and concern if and when to attend a nursery school and kindergarten. The subsequent decisions during childhood and adolescence (such as choosing the secondary school, starting apprenticeship training or studying) often are still strongly influenced by the parents (e.g., Maaz et al., 2010; Schnabel et al., 2002; Schneider, 2008). In adulthood, decisions related to further professional development (such as continued education, participation in training opportunities or a change in profession or job) arise, and in later life, the timing of retirement has to be decided. Numerous reasons and situational factors are involved and various theories and explanatory approaches are used to explain individual decisions and thereby social behavior.

These theories and approaches differ and may conflict between and within various research fields such as economics and sociology; however, they commonly attempt to explain individual behavior: in sociology, rational-choice theories (e.g., Breen and Goldthorpe, 1997; Erikson and Jonsson, 1996) are very popular, while in economics, the human capital theory (Becker, 1962; Schultz, 1961) is well-known. Assuming that individuals make important decisions in life mostly rationally, the following dissertation uses aspects of rational behavior as the theoretical framework and presents four empirical studies of various decisions during the life course. Using rational decision-making theories as framework, all studies consider different topics in educational and labor economics to explain and understand individual behavior. Each study analyzes a different important decision in the life course of individuals.

The first study analyzes the decision after the compulsory elementary education regarding the secondary school track, where in Germany one has to decide between three major secondary school tracks: upper secondary track ("Gymnasium") is required for university enrollment, while medium secondary track ("Realschule") and lower secondary track ("Hauptschule") qualify one for apprenticeship training. The second study analyzes decisions after secondary education and particularly examines both the transition into apprenticeship training and labor market entry after a successful apprenticeship. The third

study investigates young men's choice (and its monetary consequences) between military ("Wehrdienst") and civilian service ("Zivildienst"). The last paper analyzes the decision to participate in employer-sponsored further training during the working life. The following sections of the introduction present the institutional and theoretical framework and the different data sources and provide a short overview and a summary of the four studies (in Chapters 2 to 5).

1.1. Rational decisions in the life course

In Germany, a number of key educational decisions are made throughout one's life. From 1996, each child from the age of 3 has been entitled to a kindergarten place and since 2013 each child from the age of 1 has been granted a nursery school. After kindergarten, all children have to attend elementary school that usually lasts 4 to 6 years (cf. Figure 1.1).

After elementary school, the German educational system distinguishes three primary types of secondary school track choices that usually end with the corresponding school leaving degree: lower secondary ("Hauptschule"), middle secondary ("Realschule") and upper school ("Gymnasium").¹ The secondary school types last between five (lower secondary school) to nine (upper secondary school) years. While graduates of a lower secondary school usually start apprenticeships, graduates of a middle secondary school can choose between apprenticeships and additional education at specialized schools ("Fachoberschule") that award the entrance qualification for universities of applied sciences (see also Figure ?? in Chapter 2). High school graduates of an upper secondary school obtain the university entrance qualification and can start their studies at a university as well as at a university of applied sciences.

Apprenticeship training combines firm-based on-the-job training with education in vocational schools ("Berufsschule"). After apprenticeship training that lasts between two to four years, firms decide whether to continue employing an apprenticeship trainee. After a successful apprenticeship training or a study degree, the decision is between the entry into the labor market and continuing additional education. During the working life, career decisions regarding occupational or job changes that can be accomplished with participation in further formal and non-formal training participation are relevant. At the end of the employment career, the timing of retirement has to be decided.

¹There are also comprehensive schools ("Gesamtschule") that exist in some federal states. While comprehensive schools offer usually more than one secondary school track, lower, middle and upper secondary schools offer only one degree.

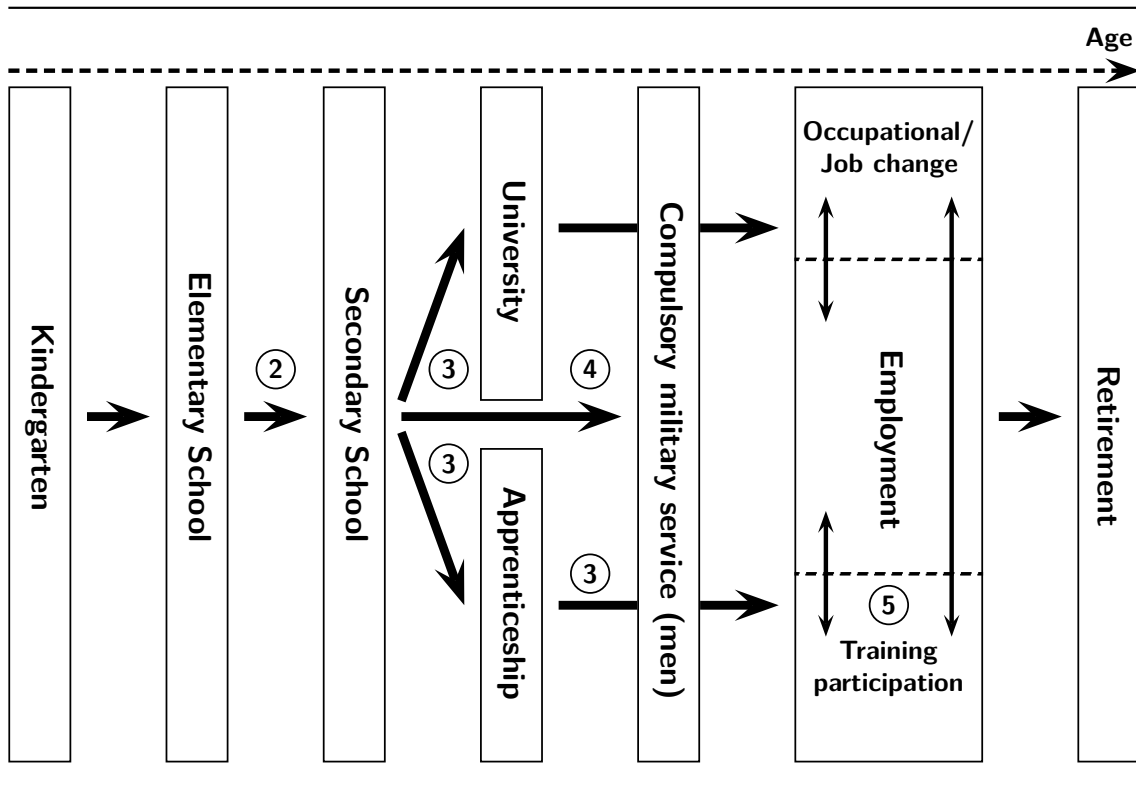


Figure 1.1.: Simplified illustration of educational decisions in the life course

Note: The illustration shows the typical educational decisions in the life course. The bold arrows specify the typical decision between two stages. The numbers refer to decisions that are analyzed in this dissertation and the corresponding chapter.

The consequences and path dependencies of each transition can reach far into later life. First, early tracking decisions, such as the transition from primary school to secondary school, are important and decisive for educational career and predetermine the secondary schooling and a vocational or academic career (Blossfeld, 1988). Second, the effect of parental resources on children's educational attainment is high and intergenerational mobility is low (Heineck and Riphahn, 2009). Third, the German labor market is fairly standardized and requires a university degree or a recognized and standardized vocational certificate to obtain a skilled job (Müller and Gangl, 2003; Shavit and Müller, 1998). Fourth, apprenticeship training is a key element in the German educational system: in 2010, more than 50% of an age cohort successfully passed firm-based apprenticeship training.² While many decisions are decisive for educational attainment, each decision is associated with a particular degree of uncertainty. There is uncertainty of the likelihood of educational success (e.g., dropping out of a university or apprenticeship), the potential returns such as income and career prospects and of costs (e.g., monetary or non-monetary)

²The results are based on authors' own calculations using the German Mikrozensus 2010.

of the educational decision. The greater the uncertainty is, the more difficult it is to decide correctly. Although it is impossible to consider all relevant information about future and external economic or social changes that may occur, it is plausible to assume that important life and educational decisions are not made entirely by chance. Therefore, the theoretical baseline for the dissertation is the assumption that individuals decide rationally at least for the most part. Rationality also means that individuals decide on the basis of available information.

1.2. Decision making theories: rational behavior

Rational behavior is fundamental to many educational decisions. There are several theories to explain individual decisions. The human capital theory and rational choice theories are often used to explain educational attainment, although such theories may contradict others. This section describes the theoretical background, particularly the human capital theory and the rational choice theory of subjective expected utility, and formulates the framework for the four different studies. Where appropriate the dissertation includes other theoretical explanations.

1.2.1. Human capital theory

The human capital theory (Becker, 1962; Schultz, 1959, 1961) explains educational decisions in terms of investment decisions. Most importantly, the human capital theory assumes that educational investment modifies individuals' skills and qualifications and therefore their productivity. Investments in human capital raise productivity that in turn affects individuals' compensation, particularly, wages and earnings. The expression "human capital" broadly describes characteristics that may improve not only an individual's abilities (that improve productivity and create economic value) such as know-how and knowledge, but also individual traits, preferences and attitudes.

Following Becker (1993), such investments in human capital can be diverse (e.g., schooling, on-the-job training, and medical care) and they influence future income by increasing individuals' resources. Although Becker (1993) focused on schooling as an investment in human capital he also referred to other investment types: *"they [investment types] differ in their effects on earnings and consumption, in the amounts typically invested, in the size of returns, and in the extent to which the connection between investment and return is perceived. But all these investments improve skills, knowledge, or health, and thereby raise money or psychic incomes (Becker 1993, p.11)."* Simpli-

fyng, the human capital theory postulates that each investment in human capital can raise an individual's productivity and therefore can increase an individual's monetary or non-monetary income.

But, educational investment involves not only benefits but also costs. The costs of investments in education include not only the direct financial costs, e.g., tuition fees for attending university and material costs, but are also non-monetary and opportunity costs in the form of foregone income. As with all investments, the question therefore arises as to whether the decision is economically worthwhile, i.e. whether the benefits exceed the costs. Comparing the incurring costs and the discounted income gains, a cost-benefit analysis is carried out. The comparison between the possible income gains and the related costs is based on a lifetime perspective. The future returns of the educational decision are calculated. The potential life income, including the necessary investment in human capital, is compared with the life income if no investment in education is made. Considering the costs of the investment in education, the investment is made if the additional income exceeds the alternative life income without investment (Blaug, 1976). An educational investment is made as long as the present value of investment exceeds the present value of the cost of investment.

1.2.2. Rational choice theory: subjective expected utility

In economics and sociology, rational choice theories are very popular. Starting with early works, e.g., Becker (1976) and Coleman (1986), various approaches to rational choice "theories" have been explored (for more details, cf. Diekmann and Voss, 2004). All of these theoretical approaches are based on three assumptions. First, there are individual actors. Second, these actors have resources and restrictions that include, e.g., time constraints and income and institutional regulations. Actors have preferences and can choose between at least two alternatives. Third, each approach states a decision rule that describes how actors decide. An individual makes decisions conditionally on resources and restrictions. Therefore, various decisions, e.g., utility maximization, subjective expected utility maximization or maximization of prospects (Kahneman and Tversky, 1979) can be found in rational choice theories.

In sociology, a widely used rational choice theory assumes that "subjective expected utility" (SEU) can explain educational decisions (cf., Erikson and Jonsson, 1996).³ In

³There are other rational choice approaches (Breen and Goldthorpe, 1997; Esser, 1990, 1991) that explain educational decisions. The foundations of such approaches are very similar. In many cases, the core element is the distinction of primary and secondary effects, included by Boudon (1974), and a utility calculation.

contrast to human capital theory, this rational choice theory explains educational decisions by expected utility considerations and not by investment considerations. Simplifying, for each educational alternative, D_i , an expectation benefit, $SEU(D_i)$ can be formed through various returns, U_{ij} . Assessing the specific objective j , persons value the consequences of the possible alternatives D_i . Furthermore, for each alternative a subjective expectation of success p_i and the expected cost of the educational alternative C_{ik} are important. $SEU(D_i)$ will be equal to the subjective probability of success p_i multiplied by the sum of returns U_{ij} less the cost C_{ik} . For each alternative the SEU can be calculated and the person will choose the alternative with the highest $SEU(D_i)$ (cf. Stocké, 2010, p. 76f.):

$$SEU(D_i) = p_i * U_{ij} - C_{ik}$$

Objectives j with respect to labor market outcomes could be a higher income and professional career or job security, yet it could also be a non-monetary or non-economic outcome such as job and life satisfaction, and particularly, social status attainment and social origin are primary factors (Stocké, 2010). In comparisons involved in various educational decisions, the chances of higher income prospect and career options should increase the motivation for higher education, while low job security or a bad job reputation should lower the motivation. The subjective probability p_i of successfully completing an alternative may depend on various factors, such as school performance, cognitive or non-cognitive skills, or parental resources. The costs C_{ij} could represent direct expenditure such as tuition fees yet could also be indirect opportunity costs, such as foregone labor income or financial and time constraining costs of commuting. To choose among the alternatives, all benefits and costs are measured by the same unit, i.e., “the unit is a psychological category” (cf. Erikson and Jonsson, 1996, p. 14.), and can at least be ordered according to a rank. The alternative with the lowest rank, i.e., the highest utility, will be chosen.

To summarize, both theories may explain human decisions based on rational behavior. In both theories, individuals consider benefits and costs and choose the best alternative. One major difference between the theories is the calculation of lifetime income vs. utility. Contrary to the human capital theory, the subjective expected utility theory assumes that individuals do not calculate their entire lifetime income but only estimate their income gains, while also considering additional objectives, such as status, life and job satisfaction and working conditions.

1.2.3. Decision points

Secondary school track choice

The first article (chapter 2) analyzes the secondary school track choice in Germany. Investments in education such as schooling are the foundation of Becker's human capital theory. There is vast literature showing the positive correlation between earnings and education (e.g., Psacharopoulos and Patrinos, 2004). Following the human capital theory, it can be assumed that individuals and students with promising higher returns to education tend toward higher education. In Germany, medium and upper secondary school tracks offer better job and income perspectives than the lower secondary track (e.g., Schmillen and Möller, 2012). Therefore, the question arises as to why parents (and children) do not invest in education to avoid the lower secondary school track.

Several important factors determining the decision regarding secondary education, such as social background and parental education are well-known (e.g., Baumert and Schümer, 2001; Block, 2006; Bos et al., 2004; Dustmann, 2004; Maaz et al., 2010). In particular, a student's school grades and regulations of the federal educational system at the end of the primary school are also relevant factors that determine the secondary school track choice (e.g., Lohmann and Groh-Samberg, 2010; Neugebauer, 2010). Children are streamed into secondary school tracks with different demands according to children's cognitive skills. Conditional on these cognitive skills, the secondary school track choice can be considered as an investment in children's human capital. However, the educational decision is accompanied by risk. As Becker (p. 91f., 1993) explains, the return on human capital depends on various factors, e.g., one's lifespan, uncertainty of own ability and other external factors that influence the return on human capital. Therefore, predicting monetary and non-monetary costs and gains is difficult and the calculation of the payoff is impossible. It is even more difficult for decisive early tracking decisions, such as secondary school track decision that largely predetermine the educational career. Therefore, the secondary school track decision is particularly risky.

Complementing the human capital framework, rational choice theories emphasize social origin and social status attainment as primary factors affecting differences in educational attainment (Boudon, 1974; Breen and Goldthorpe, 1997; Erikson and Jonsson, 1996). Families of higher social status, being more concerned with a potential social downgrade, may make decisions that can lead to an inappropriate school track choice, i.e., assuming that the actual costs can exceed the actual gain. For instance, parents (un-)willingly take into account a high risk and choose the upper secondary school track to avoid a lower educational level and child's social status downgrade, even if lower or middle

secondary school track choice would be appropriate. If parents' background, preferences and aspirations are very important at this transition (Kleine et al., 2010), it can be assumed that parental risk attitudes also matter. Given that investments in human capital are subject to uninsurable and nondiversifiable risks, an individual's risk preferences may be relevant (p. 627, Shaw, 1996). The first article (chapter 2) contributes to this branch of literature and investigates parental risk attitudes as potential factor for child's secondary school track choice.

Apprenticeship decision and labor market entry

The second article (chapter 3) analyzes the decision to start an apprenticeship training after secondary school and the decision to enter a higher education track or the labor market after apprenticeship training. Both transitions are important educational decisions with far-reaching consequences for life course. Both decisions can be explained following the human capital theory. Simplifying, graduates of lower secondary track choose between apprenticeship training and entering the labor market as unqualified workers. Graduates of middle and upper secondary track can additionally decide to opt for higher education (i.e., to study at a university or a specialized school). Following Becker (1962), apprenticeship training (or studying) is an investment in human capital and should lead to higher productivity and therefore to higher wages. After leaving the secondary school, individuals should therefore choose an apprenticeship training or studying (instead of entering the labor market as unqualified workers) if income prospects and gains are higher than the estimated costs.

Although the advantages of firm-based apprenticeship training, such as a smooth transition from school to work or better job matching (cf., e.g., Forster et al., 2016; Gangl, 2003; Hanushek et al., 2017), and determinants such as school grades, students' interests and the number of apprenticeship places are well-known, the enrollment rates in apprenticeship training differ strongly with school leaving degree. The question arises as to which additional factors can explain the apprenticeship decision.

Analyzing the decision into and out of apprenticeship training, the article adds the social origin and training firms' perspective as relevant factors. First, following the rational choice theory, intergenerational social status maintenance (Erikson and Jonsson, 1996) is crucial. While the impact of social origin on schooling decisions has been well-explored (cf., e.g., Glaeser and Cooper, 2011; Jacob and Tieben, 2009), the influence of social origin on the apprenticeship decision is less well-understood. Theoretically, the parents' educational or occupational career should also affect the student's educational decision after a successful graduation. Although, the social origin is a relevant fact and all students

aim to avoid a lower social status than their parents, the required educational levels depend on the class level (Breen and Goldthorpe, 1997). Social origin should therefore be track-related and differ for lower, middle and upper secondary tracks.

Second, the training firm's perspective and motivation play a role within the apprenticeship system. Training firms offer necessary apprenticeship places to recruit promising and productive workers. During apprenticeship training firms offer training on the job (leading to the development of general and specialized human capital) and teach necessary manual skills. After a successful apprenticeship, training firms decide whether to continue employing their apprenticeship trainees. Therefore, firm-specific training motives should also influence students' decisions, particularly the decision at the end of apprenticeship training. The second article (chapter 3) examines both social origin and the training firm's motive to explain the apprenticeship decision.

Deciding between military and civilian service

Up to 2011, the compulsory military service ("Wehrpflicht") affected many cohorts of young men in Germany. Reaching the appropriate age, young men had to fulfill their duty in the military service. Several young men rejected the military service ("Wehrdienst") and participated in alternative service, called the civilian service ("Zivildienst"). Following the human capital theory, the investment of time in any type of compulsory service period can increase young men's productivity and thereby their wages.

In addition, to explain wage differences between the two different types of draftees, Becker's distinction between general and specific human capital is useful. Both types of human capital can raise productivity. General human capital acquired in both service types during the compulsory service period would increase the basic skills, such as manual skills (e.g., operating machinery and obtaining a driver's license), academic skills (e.g., foreign language competencies) and non-cognitive skills and personality traits (e.g., empathy, obedience and patience). General human capital is not only useful during the service time, but is also easily valued afterward in the labor market. In contrast, service type-specific human capital consists of skills that are differently valued in the labor market and are non-transferable from duty time to jobs. Therefore, different amounts of acquired general and service-specific human capital should lead to varying productivity gains for draftees in the military and civilian service. On average wage differences between the two different types of draftees would be the result. Young men would opt for the choice between civilian and military service that promises higher wages.

An alternative explanation for wage differences is offered by discrimination theories. Statistical discrimination (Altonji and Pierret, 2001; Arrow, 1973; Phelps, 1972) and

taste-based discrimination (Becker, 1973) explain wage gaps between two groups. The statistical discrimination theory assumes that firms (or individuals) have only limited information about the true skills of potential workers. Assuming that easily observable characteristics (e.g., gender, race or origin) correlate with the expected productivity, firms use these observables as proxies for expected productivity. Taste-based discrimination assumes that firms (or individuals) may dislike certain group members. Therefore, the affected group members must compensate the former. In the context of the labor market, an employer that feels antipathy towards certain minority workers discriminates against them. Although productivity would support higher wages, minority workers compensate the employer and accept lower wages.

Considering to the object of research of wage differences, the draftees in the civilian service would be the minority group. Such draftees reported discrimination in employment or private contexts (Krölls, 1980; Kuhlmann and Lippert, 1991) and were viewed negatively as “slackers”. Wage differences can be explained by compensating employers with lower wages; alternatively, employer might assess the draftees in the civilian service as less productive. The third article (chapter 4) analyzes the wage differences between former draftees in the military and civilian service and explores mechanisms that can explain the differences.

Further training participation

After entering the labor market, decisions about career progression can occur during the working life. In addition to larger individual decisions, e.g., occupational or job changes, job-related further training participation is a suitable means for a) being able to succeed professionally and b) being able to react to ongoing changes in the job market and in the world. The decision to participate in further training can be explained in terms of the human capital theory. This decision initially represents an investment in human capital that raises productivity. The investment can include both general and company-specific knowledge (chapter III, Becker, 1993). On the one hand, the learned general skills (such as a language course or basic computer skills) are not only helpful in the current employment but also potentially interesting to other employers. On the other hand, specific further training courses in company-owned computer programs or production facilities are only relevant to the current company. While companies are more willing to promote training in company-specific topics, employees have a greater interest in general training courses, to increase e.g., their chances of changing employers and increasing income.

In this simplified form, other potential factors are omitted. In addition to firm-specific factors (e.g., firm size and job location), individual factors (e.g., gender, education and

family) appear to be important. For instance, Albert et al. (2010) show that the motivation to participate in further training may also depend on employment status. Two recent studies of the Netherlands and Switzerland show a lower training participation of part-time employees among men, but not women (Backes-Gellner et al., 2014; Picchio and Ours, 2016). The findings are explained by the fact that part-time work is more common among women than men, and thus women who work part-time are less subject to statistical discrimination and are not considered to be unproductive. Men who work part-time are more strongly exposed to social stigmas than women who work part-time. The last article (chapter 5) demonstrates that a distinct understanding of gender roles exists in Germany and that other mechanisms for participation in further training are important. The results show, in contrast, that part-time employment in Germany means a significant reduction in working time for men and women, in most cases to approximately 50% of working hours (rather than to 65% to 75% as in the Netherlands or Switzerland).

In addition to human capital theory, the results appear to be consistent with a model of identity-based payoffs in a utility function (Akerlof and Kranton, 2000). According to this model, individuals gain utility by behaving according to their assigned social stereotypes. On the one hand, women should accept the negative characteristics of part-time jobs, including social stigmata and (statistical) discrimination, because part-time work allows for them to follow the common stereotype of a caring housewife. On the other hand, in addition to the inferior job quality of part-time jobs, men suffer from negative, identity-based utility payoffs from part-time work. Social stigma should therefore force a stronger negative self-selection of less productive workers into part-time jobs among men than women.

1.3. Data

The cumulative dissertation uses three different data sources that are briefly described in this section. The first article in chapter 2 uses the SOEP data. The second and third articles in chapters 3 and 4 use the ALWA data. The fourth article in chapter 5 uses the adult cohort (SC 6) of the NEPS data.

Socio-economic Panel Study [SOEP]

The German Socio-economic Panel Study (SOEP) is one of major and best known data sources in Germany that is widely used in various disciplines (e.g., sociology, economics, psychology, politics). It is a representative, annual household panel study performed in

West Germany in 1984 (Wagner et al., 2007). In the beginning, it contained data over 12,000 adult respondents from approximately 6,000 households. After the reunification in 1990, it was extended to the former East Germany and now contains data on more than 20,000 adults. SOEP also continues tracking children born within a surveyed household after they leave the household. Thus, SOEP, in particular, is an important database for research on intergenerational mobility. It covers a broad range of various aspects of individual's life, e.g., education, (un)employment, individual attitudes, cognitive and non-cognitive skills, income trajectories and life satisfaction yet it also covers contextual information at the household level. Two major advantages for the analysis are, first, its broad recording of various aspects of life and respondents' attitudes and, second, in-depth information on parent-children relationships.

Working and Learning in a Changing World [ALWA]

The "Working and Learning in a Changing World survey" (Antoni et al., 2011) is a retrospective life course survey of the German population performed in 2007 and 2008. The data contain information on approximately 10,400 respondents born between 1956 and 1988. The data cover the entire lives (e.g., schooling, education, (un)employment history, partnership and children) of respondents on a monthly basis and permits an in-depth analysis of educational decisions, labor market behavior and regional mobility. In addition, two more combinations are available: ALWA-LiNu (Kleinert et al., 2012; Wölfel and Kleinert, 2012) and ALWA-ADIAB (Antoni and Seth, 2012).

First, for a subsample of almost 4,000 participants, ALWA-LiNu contains standardized test scores on cognitive skills in two domains, numeracy and prose literacy. Second, ALWA-ADIAB links the ALWA survey with administrative data (Integrated Employment Biographies and Establishment History Panel). The administrative data originate from the German Federal Employment Agency. The Integrated Employment Biographies (IEB) provide spell information on daily wages, registered unemployment, dependent employment and further aspects of active labor market policy. Additionally, information on firm characteristics such as the number of employees, firm location and industrial classification is available (Dorner et al., 2010; Hethey-Maier and Seth, 2010). Combining the advantages of both data sources, administrative data provide highly reliable information on daily earnings and the firms at which individuals were employed, while survey data provide detailed information on each individual's life. Of the original 10,400 participants in the ALWA survey, 8,166 respondents were linked in the administrative dataset corresponding to over 250,000 spell observations. The linked ALWA-ADIAB data are used in the second article (chapter 3) to assess the impact of social origin and training firms'

investment strategy within the German apprenticeship system. The third article (chapter 4) uses the ALWA-ADIAB data and the information on test scores (ALWA-LiNu), to estimate and explain wage differences.

Adult sample of the National Educational Panel Study [NEPS]

The National Educational Panel Study contains six different start cohorts (Blossfeld et al., 2011). The article in chapter 5 uses the adult cohort (starting cohort 6). The starting cohort is a representative sample of the German population from the birth cohorts 1944-1986. The ALWA survey was a forerunner study; its panel participants are integrated in SC6. Similarly to the ALWA dataset, it contains information over the life course on approximately 17,100 individuals (Allmendinger et al., 2011). The core questionnaire contains yearly updates of various aspects of the life course, schooling and educational attainment, (un)employment history and information about participants' partners and children. In addition, cross-sectional information on various topics (e.g., social and political participation, personality traits and health status) is surveyed. One focus and a major advantage of SC6 is the detailed recording of non-formal training participation on a yearly basis. It allows for a panel analysis (as in chapter 5) and studies of long-term consequences of participation in employment-related further training.

1.4. Overview and summary

This cumulative dissertation is divided into four self-contained articles, each analyzing important decisions during the life course. Rational behavior is the theoretical framework for each article. Starting with childhood, the first investigates the decision among various secondary school tracks following elementary school. The second examines the decisions after secondary school related to transitions from secondary track into apprenticeship training and from apprenticeship training into the labor market. The third investigates the consequences of a decision in early adulthood and analyzes wage differences for men based on the type of compulsory military service. The fourth considers lifelong learning and analyzes working hours and gender-specific training participation. Table 1.1 provides an overview of all articles.

The first article (chapter 2) is co-authored with Guido Heineck and has already been published (see Wölfel and Heineck, 2012). In Germany, the secondary school track choice is crucial and largely determines schooling and vocational career (cf., e.g., Brunello and Checchi, 2007). On the one hand, there is significant quantity of research showing that

parental education (e.g., Ermisch and Francesconi, 2001; Heineck and Riphahn, 2009), parents' educational aspirations and social class are influential (Erikson and Goldthorpe, 2002; Paulus and Blossfeld, 2007; Stocké, 2007). On the other hand, there is less research into whether other parental attitudes or non-cognitive skills influence children's educational decisions. In the context of Germany, the article examines the relationship between parents' risk preferences and their children's secondary schooling track. Using a sample of adult respondents with children between the ages of 10 and 15, the overall results show an inverse relationship between parental risk aversion and children's secondary school track. Compared to children with risk-neutral mothers children of risk-averse mothers tend toward the lower secondary school track and are less likely to continue to the upper secondary school track. The article concludes that in addition to parental education, parental non-cognitive skills and attitudes appear to be important factors of educational attainment.

The second article (chapter 3) has been written with Hans Dietrich. In the context of Germany, applying a sequential logit and simulation model, the article investigates the decision after secondary school education to continue to apprenticeship training and the decision to proceed from successful apprenticeship training into the labor market. Theoretically, the article extends the status attainment model (Blau and Duncan, 1967) and introduces the firm as a further independent actor (Kerckhoff, 1995). Assuming different institutional mechanisms with respect to school leaving degree, the article expects that social origin influences students' decisions differently.

Consistently with the existing literature (cf., Glaesser and Cooper, 2011; Jacob and Tieben, 2009), the results indicate differences with respect to school leaving degree. First, for graduates of upper secondary tracks, individuals' school performance and social origin strongly influence the decision between apprenticeship training and enrolling in a university but not the following decision to enter the labor market. Second, for graduates of medium secondary tracks the results do not indicate any substantial influence of social origin. Third, for graduates of lower secondary tracks the results show that school performance and social origin influence both transitions. Fourth, for all three school leaving groups the training firm investment strategy strongly affects the labor market decision after apprenticeship training. Investment-oriented training firms (Stevens, 1994) with above-average apprenticeship wages increase the likelihood of entering the labor market instead of continuing to pursue additional higher education. While the quality of training supports a smooth transition into the labor market and grants access to an advantageous labor market career, social origin related variables favor the continuation of education.

The third article (chapter 4) analyzes wage differences between the two main types of conscripts in Germany, draftees in the military service and those in the civilian service. Based on the linked survey data with highly reliable administrative data in Germany for 1980-2008 (ALWA-ADIAB), the results show that draftees in the civilian service receive an overall lower wage. Beyond that, several robustness checks and sensitivity analyses demonstrate a significant employer learning effect for labor market entrants. The findings suggest, that in the beginning of employment career, receiving lower wages, young draftees in the civilian service were assessed as inferior and were discriminated; however, the wage penalty diminished as draftees accumulated work experience. The findings of the analysis of the unobserved heterogeneity show further differences with respect to firm size, male-dominated occupations and birth cohorts. The pattern implies that occupational sorting could be one potential mechanism. The results suggest that the stigmatization and discrimination of certain groups, in this case, former draftees in the civilian service, existed; however, such prejudices may also decline over time.

Table 1.1.: Overview of articles

Title	Main results	Data	Co-Author
Chapter 2: Parental Risk Attitudes and Children's Secondary School Track Choice	Inverse relationship between parental risk aversion and children's secondary school track	SOEP	Guido Heineck
Chapter 3: Apprenticeship training as an equalizer? Individual decisions, institutional arrangements and the stratification process	a) the impact of social origin and school performance depends on school leaving degree; b) a higher quality of training provided by firms increases the likelihood of entering the labor market	ALWA-ADIAB	Hans Dietrich
Chapter 4: Pushing the wheelchair or marching in step? Wage differences between draftees in military and civilian service in West Germany	Stigmatization and wage discrimination of draftees in civilian service at the beginning of their employment careers	ALWA-ADIAB ALWA-LiNu	
Chapter 5: Revisiting the gender-specific training gap of part-time and full-time workers	Part-time working women in Germany may be likely to suffer from social stigma or statistical discrimination	NEPS-SC6	Simon Janssen

The fourth article (chapter 5) represents joint work with Simon Janssen and examines the relationship between working hours and gender-specific training participation in Germany. Using a very unique panel data source (NEPS, SC6), the article analyzes the mechanism that accounts for the gender-specific training participation of part-time and full-time workers. Similar to the existing evidence for the Netherlands and Switzerland, the article observes a larger unconditional training gap between part-time and full-time working men than between part-time and full-time working women. However, as soon as the article exploits the panel nature of the data and accounts for unobserved heterogeneity on the worker level, the part-time/full-time training gap disappears for men but remains relatively large and significant for women. This result remains in contrast to the previous evidence, where unobserved heterogeneity can explain the part-time/full-time training gap for women but not for men. The results suggest that gender-specific social norms at the individual level may account for the gender-specific training gap of part-time workers. These results are important because the share of part-time work has increased in virtually all developed countries, and part-time work is likely to be a main determinant of inequality in the labor market. Finally, chapter 6 provides the summary and conclusions.

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2. Parental Risk Attitudes and Children's Secondary School Track Choice¹

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3. Apprenticeship training as an equalizer? – Individual decisions, institutional arrangements and the stratification process^{*}

3.1. Introduction

Social origin is a key factor in individuals' educational and status attainment. Blau and Duncan (1967) introduced a blueprint for analyzing the mechanism of status attainment from an intergenerational perspective, and Baron and Bielby (1980) introduced a structural and institutional perspective focusing on labor market institutions. Kerckhoff (1995, 355ff.) argue that country-specific institutions provide a specific set of educational and labor market alternatives and thus delimit individuals' choices and shape the status attainment process. The institutional setting creates considerable variation in the "orderliness" of individuals' transitions from school to work and contributes to country-specific characteristics in the intergenerational process of the social reproduction of class position.

However, the status attainment framework considers educational institutions in a stylized form that contains several shortcomings, particularly for countries with a stratified educational system, such as Germany. School-to-work transitions differ among countries due to the differentiation and stratification of educational institutions (Allmendinger, 1989; Ryan, 2001; Van de Werfhorst and Mijs, 2010). Firm-based vocational training reduces search time after graduation and smooths the transition from school to work (Forster et al., 2016; Hanushek et al., 2017), and apprenticeship training improves job matching and reduces job change over the life course (Gangl, 2003). While the economic literature analyzes only firm-specific contributions to trainees' labor market allocation, the sociological attainment literature widely ignores apprenticeship training as an educational option for graduates from the academic track of upper secondary education (Schneider

^{*}This chapter is joint work with Hans Dietrich.

and Tieben, 2011) or disregards firms' contributions to individuals' status attainment process.

The status attainment framework introduces educational institutions as options in individuals' decisions but not as independent actors that contribute to individual's future decisions. (Training) firms have a significant impact on graduates' labor market entry (Dietrich et al., 2016; Von Wachter and Bender, 2006) and future educational decisions, especially in the case of firm-based apprenticeship training. From that perspective, this article contributes to three aspects of the current status attainment research

First, the article addresses the effect of social origin on the transition from general to vocational education and from vocational education to further education or the labor market in Germany. Given the horizontal and vertical differentiation of education among various institutions, the article considers alternative educational tracks, distinguishing a lower, a middle and an upper secondary track. In line with the literature, track-specific educational and labor market outcomes are expected (Roth, 2017; Schindler, 2017), and individuals' track-related educational decisions are identified.

Second, the article introduces the training firm as an independent actor moderating individuals' educational decisions. The findings show that training firms shape individuals' transitions from apprenticeship training to the labor market in a specific way. In contrast to schools, training firms offer apprenticeship training based on firm-specific cost-benefit considerations.

Third, the introduction of sequential logit models by Mare (1980) elicited an intense debate on the effects of unobserved heterogeneity (e.g., Cameron and Heckman, 1998; Mare, 2006). Unobserved heterogeneity might cause biased estimates due to missing variables and result in a selective subsample for subsequent transitions. To assess the possible impacts of unobserved heterogeneity in sequential decisions, the article applies simulations (Buis, 2011) and follows Buis' strategy of varying the amounts of unobserved heterogeneity and simulating their respective impact.

First, the findings for graduates from the lower secondary track indicate individuals' school performance and social origin affect both the decision to enter apprenticeship and the decision to pursue additional education after successful apprenticeship training. Second, the findings for graduates from the middle secondary track show no impact of social origin or school performance on the decision to start an apprenticeship, but the findings demonstrate a positive effect of both factors on additional (higher) education or training after successful apprenticeship. Third, in contrast, for graduates from the upper secondary (academic) track, it seems that school performance and social origin influence only the decision to enter apprenticeship and not the decision to start employment after

graduation from apprenticeship training. Fourth, for all three groups of graduates, the results indicate an independent and strong impact of training firms' strategy, i.e., higher quality of training firms' significantly increases the probability of entering the labor market instead of additional (higher) education.

The findings are interpreted as follows: for graduates from the upper secondary track, both decisions, the first decision between higher education and apprenticeship training and the second decision between higher education and labor market entrance, are strongly related. Thus, the first decision predetermines the second decision. In contrast, for graduates of lower secondary track, the first decision to enter apprenticeship is only weakly related to the subsequent decision, and social origin still has an effect. Regarding the strong effects of firm-based training strategy, the results indicate that training firms seem to be highly relevant and may interact with social origin.

The next section describes the German apprenticeship system and presents the theoretical background. Section 3.3 describes the data and the methods. Section 3.4 presents and discusses the results. Section 3.5 presents robustness analyses. Section 3.6 concludes and summarizes the findings.

3.2. Apprenticeship training and educational decisions

3.2.1. Apprenticeship training as part of the German educational system

Compared to the educational system in the US, the German educational system is rather complex. Early school tracking at age 10 to 12 and vertically differentiated educational pathways stereotype alternative school careers in Germany. Even after decades of expanding general and academic education, firm-based apprenticeship training is a core element of Germany's educational system and the dominant form of vocational education and training. Apprenticeship training is attractive for graduates from all level of general secondary education, even for those from academic tracks who are prepared to attend tertiary education. However, the appeal of apprenticeship varies by track, and students from the different tracks face different educational options after graduating from apprenticeship training. In 2010, approximately 58% of an age cohort successfully passed firm-based apprenticeship training. Enrollment rates in apprenticeship training differ with regard to level of general education attained and range from 27% for students graduating from the upper secondary academic track (Gymnasium) up to 89% for graduates from the middle

secondary level.¹

The German educational system enables individuals to accumulate vocational and general degrees. Overall, 5% of individuals 30 to 35 years old report earning degrees from both apprenticeship training and academic study. In detail, 13% of all graduates from the vocational track of upper secondary education (“Fachoberschule”), and 10% of graduates from academic upper secondary education (“Gymnasium”) graduated from both apprenticeship training and university study. This so-called “double qualification” is a result of repeated educational choices such as apprenticeship training in a first step and higher education in a second step, or vice versa.

Graduates from apprenticeship training transition smoothly from training to work. Search time between training and first employment contract is short on average, resulting from a high level of retention by training firms (Bol and Van de Werfhorst, 2013; Shavit and Müller, 1998). Graduates have a low unemployment risk both at the transition into the labor market and within their further life course. In addition, independent of training firm and training occupation, apprenticeship training could offer advantageous income prospects (Schmillen and Stüber, 2014). In Germany, occupational mobility between training and work and within the further employment career is low compared to other European countries (Ryan, 2001). Thus, German apprenticeship training both channels and smooths individuals’ transitions from school to work (Scherer, 2004) and reduces the risk of unemployment and educational mismatch.

German apprenticeship training combines time for working and learning at training firms with school-based general and vocational education at the upper secondary level. School-based learning is provided by specialized vocational schools, and occupation-specific curricula define the learning content of approximately 350 distinct training occupations. In Germany, apprenticeship training and the role of training firms and vocational schools is covered by federal laws (“Berufsbildungsgesetz and Handwerksordnung”). Employer and employee organizations, chambers of commerce and trade, and public employment services are involved in the training framework via organizing or supporting the selection process into training, supervising and developing the vocational training curricula for both training firms and vocational schools, or in organizing and administering the exams.

Apprenticeship training in Germany is vocation specific, and, in contrast to general education, it is highly standardized at the federal level (Ryan, 2001; Van de Werfhorst and Mijs, 2010; Wolter and Ryan, 2011). General education in Germany is highly vertically differentiated, while apprenticeship training itself is regarded as low stratified (Allmendinger, 1989, 52.ff.). However, the empirical results indicate a severe vertical differentiation

¹The results are based on authors’ own calculations using the German Mikrozensus 2010.

among apprenticeship training programs with respect to training occupation and type of training firm (e.g., with respect to occupational-specific levels of entry qualification, drop-out rates, apprenticeship wages or retention rates after graduation).

Overall, German apprenticeship training seems to have strong allocative power and is highly selective. The allocative and selective effect of apprenticeship training is mainly connected with two decisions. First, which school leavers choose apprenticeship training as a first vocational training? Second, conditional on successful graduation from apprenticeship training, which graduates enter the labor market, and which graduates continue (vocational) education?

3.2.2. Educational decisions and social origin

From the point of view of the individual, Becker (1993) coined the basic model of educational decisions with his human capital approach. Individuals invest in education as long as the expected benefit outweighs the cost. Boudon (1974) enhanced the educational decision model by introducing individuals' class background as a key factor for educational decisions. Indirectly, social origin affects educational decisions through family socialization and foregone educational decisions that affect individuals' school performance (Boudon, 1974; Erikson et al., 2005; Jackson, 2013), and access within the educational system is closely related to individuals' school performance. The role of school performance within apprenticeship training in general is less strict, but access to prestigious training firms and training occupations is closely linked to school performance. Higher levels of general degrees and better school grades are even needed to gain access to training in more attractive firm-based occupational programs (Jackson, 2013, p.3).

In addition to the indirect or primary effects that constitute educational choices as a limiting factor for access to educational alternatives, individuals' educational decisions are influenced by the direct effects of social origin. As a benefit factor, Boudon (1974) introduced the status maintenance motive, which motivates parents to "ensure, so far as they can, that their children acquire a class position at least as advantageous as that from which they originate" (Breen and Goldthorpe, 1997, p. 283). Cost factors include the individual perception of the probability of success for the alternatives of choice, the differences in resources across classes, and the perceived costs of educational alternatives (Breen and Goldthorpe, 1997; Stocké, 2007).

In a reduced formal model, Breen and Goldthorpe stylized an educational decision tree that provides two alternatives at each stage of a decision: a) staying in school or b) entering the labor market. With respect to a tracked approach to education, the more recent literature considers an expanded risk set within the educational system (e.g.,

Gamoran and Mare, 1989; Glaesser and Cooper, 2011; Holm et al., 2013; Jacob and Tieben, 2009).

From an empirical perspective, the effect of social background on educational decisions is broadly explored, but the main body of literature is focused on single educational decisions (see e.g., Becker and Hecken, 2009; Stocké, 2007). Mare (1980) was one of the first to conceptualize the status attainment process as a sequence of decisions. Mare formalized the educational career in the US as a sequence of hierarchical educational steps from elementary to post-college education. Within each step, Mare distinguished individuals' enrollment or attendance in and completion of an educational level. The institutions involved in those educational transitions are simply represented by stages and are not considered independent actors or gate-keepers that affect individuals' decisions.

3.2.3. The training-firm as an independent actor

Both Blau and Duncan's status attainment model and sequential choice models of educational decisions are mainly interested in the contribution of social origin to individuals' educational or, more generally, status attainment. The second and third generation of intergenerational mobility research (Ganzeboom et al., 1991), however, greatly undervalues the institutions involved in the attainment process. Kerckhoff draws attention to the institution's perspective and emphasizes the specific settings of German apprenticeship training. It is specific to German apprenticeship training that the training firm is both connected to the educational system and the employment system or the economic sector. While schools follow a universalistic allocation approach, training firms try to recruit and train promising candidates due to firm-specific needs. Thus, firms employ apprenticeship training as an effective tool to recruit productive workers in a cost-effective way. From the individual's perspective, apprenticeship training is decisive as a "career start" (Soskice, 1994), especially for graduates at the secondary level of education in Germany.

With regard to the mechanism of allocating individuals into training firms, Soskice (1994) suggested an equilibrium-based heuristic that combines two tournaments. On the one hand, the competition among students to gain access to apprenticeship training at prestigious firms and occupations, and on the other hand, the competition among firms contracting the most promising candidates for apprenticeship training. Individuals' school performance, identified by level of school degree and school grades, links the two tournaments.

Following human capital theory, the acquisition of firm-specific human capital is not a core element of the training curriculum. Hence, there is no reason that firms should pay for general education such as apprenticeship training (Becker, 1993). A solution to the

Becker dilemma is to take into account not only firms' investment in training but also apprentices' productivity during training. In this way, Becker's investment consideration is supplemented by a production-oriented motive, which makes it possible to reassess apprenticeship training.

Following production theory-oriented considerations (Lindley, 1975), employing apprentices could be a substitute for low-paid work. It is important in this approach that apprentices become productive during the training period and that the net cost of training is marginal or negative. Hiring qualified apprentices after training is not required for the training firm according to the cost structure of training. The probability that graduates will leave the training firm and the occupational field of training is high; thus, the income prospects of the trainees are very low.

In contrast, investment-oriented training strategies (Stevens, 1994) assume that rewards are obtained from the productivity of employed graduates of apprenticeship training. In this case, it is assumed that firms' net costs for training are positive and that training firms receive rewards for their training results from the well-observed productivity of their trainees after graduation, given retention. In addition, recruiting qualified workers in the market increases firms' uncertainty about employees' expected productivity and the risk for unrealistic wage offers. Compared to firms that do not provide training, training firms experience a wage advantage that compensates for the net costs of training (Acemoglu and Pischke, 1998). As the German labor market is heavily regulated and lay-off costs are very high, investment-oriented training considerations are of particular importance. Thus, firms compete for promising and productive trainees. Better-qualified (in terms of level and grades) school leavers show a higher probability for entering apprenticeship training in general and a higher probability for entering a training that follows the investment-oriented regime. Following the theoretical considerations, correlations between type of training regime and level of income, job-security and internal career opportunities (Soskice, 1994) are assumed.

In summary, it is a common finding in the research on intergenerational mobility that social origin strongly influences an individual's educational decisions. However, in the case of apprenticeship training, training firms also matter. Motivated by theory-based considerations, the article assumes that additional firm-specific training motives influence students' decisions, especially the probability of transition to the labor market. Furthermore, the choice set after successful graduation from general education strongly differs with respect to school-leaving degree. Because options after school graduation vary greatly in terms of school-leaving degree, it is expected that social origin influences students' decisions but that its influence varies with degree-specific educational decisions. Table 3.1 summarizes

the expected impacts of the direct and indirect effects of social origin and the impact of the training firm's strategy.

With respect to school performance (subjective grades), the article expects that better school performance negatively influences the decision to participate in apprenticeship for graduates from the middle and upper secondary track while better school performance takes a positive impact on the decision to participate in apprenticeship for graduates from lower secondary track. For the former, poor school performance (grades) should diminish the probability to access the more challenging (university) educational institutions, but takes a less disadvantaging effect in choosing apprenticeship training. For the latter, the likelihood of entering apprenticeship should be lower for students with poor grades. Apprenticeship training is the first best choice for graduates from lower secondary track. Therefore, only school leavers with good grades gain access to these apprenticeship positions.

Table 3.1.: Expected effects on apprenticeship and employment decision

	Primary effects		Secondary effects		Investment
	Appren- ticeship	Employ- ment	Appren- ticeship	Employ- ment	Employ- ment
Graduation level					
Lower secondary	-	+	+	-	+
Middle secondary	+	+	-	-	+
Upper secondary	+	+	-	-	+

Note: Primary effects are school performance, secondary effects are parents' educational level.

Example: For students who graduated from the lower secondary level, a negative impact of worse school performance on the probability of choosing apprenticeship is expected, i.e., these students are less likely to choose apprenticeship. In the case of successful apprenticeships, a positive impact on the probability of entering the labor market and starting employment is expected.

In the case of successful apprenticeship training, the article expects a higher likelihood of entering the labor market (instead of higher education) among students with poor grades, because in all three groups worse school performance limits the access to higher education.

Following social status attainment theory, direct effects of social origin on educational decisions should push individuals towards higher education. Thus, for graduates from middle and upper secondary tracks, the article hypothesizes a negative impact of social origin on the decision to pursue apprenticeship (first decision) or enter the labor market (second decision) because additional higher educational qualifications are worth more. For

graduates from the lower secondary track, entering apprenticeship (instead of entering the labor market without a vocational qualification) and pursuing education after successful apprenticeship training should be the best options. Firm-specific training motives should not differ for the three tracks. Following the theoretical expectations, investment-oriented training firms offer better job perspectives with respect to income and career prospects; thus, the access to training firms providing investment orienting training should increase the likelihood of entering the labor market after apprenticeship training.

3.3. Data, variables, and models

3.3.1. Data and sample

The population of analysis is drawn from the ALWA survey (Antoni et al., 2011), a retrospective life course survey of the German population conducted in 2007 and 2008. The sample includes individuals from birth cohorts 1962 to 1982 who left general education in the West German states (without Berlin)² and whose life course was observed to at least age 25 years. The ALWA data provide information about individuals' educational attainment and social origin. Individuals' participation in apprenticeship training and their subsequent employment career relies on register-based data derived from the "Integrated Employment Biographies" (IEB). The IEB are administrative data from the German Federal Employment Agency and include spell information on individuals' employment and unemployment episodes and apprenticeship training. The administrative data also provide information regarding training firms (Establishment History Panel, BHP, for more information see, Dorner et al., 2010; Hethy-Maier and Seth, 2010), such as industry and firm size. The survey data and the register-based data are matched to the ALWA-ADIAB via individual and firm-specific identifiers (Antoni and Seth, 2012). The sample of analysis includes 3,700 individuals. As the alternatives to educational decisions systematically vary with the level of degree, the sample consists of three subgroups: Graduates from the lower, the middle and the academic upper secondary track.

3.3.2. Modeling and simulations: taking unobserved heterogeneity into account

Sequential (logit) models are widely used to study the effect of social origin on educational decisions (see Buis, 2011; Holm and Jæger, 2011; Mare, 1980). Sequential logit models

²Register data are not available before 1991 for individuals from the former East Germany.

estimate separate logistic regressions for the population at risk at each transition point and model the transition probabilities. This type of model has been critiqued, particularly by Cameron and Heckman (1998) in their seminal paper. Sequential models simplify reality and thus cannot include all relevant variables that influence transition probability. The main concern in estimating transition models is that the probability of passing a second (or higher) transition depends on whether or how individuals have passed the first transition. Hence, the sample at risk in later transitions could be selective to an unknown extent. Popular methods of addressing this unobserved heterogeneity are instrumental variable approaches or propensity score matching, which are employed to eliminate the selection problem. Since the data do not provide any convincing instrumental variables, the article uses another option and relies on simulations (see Buis, 2011). Section 3.5 and A.2 describe these simulations in more detail.

In the following and in a stylized way, the focus lies on transitions in and out of apprenticeship training. Taking into account the level of graduation from general education, the article models these transitions in and out of apprenticeship training as a sequence of two decisions (see Figure 3.1).³

Regarding graduation from the lower secondary track, students must decide between postsecondary vocational education and entrance to the labor market as an unqualified worker at the first step, and those who decide to pursue apprenticeship training must decide between upgrading their education and entering the labor market as a qualified worker at the second step. In contrast, graduates from the middle secondary track must choose between apprenticeship training and higher general education in the first step. After successful apprenticeship training, these students decide between higher education and entrance into the labor market. In the case of graduation from the academic upper secondary track (the German Abitur), students must decide between vocational training at the postsecondary level and university study at the first step. Those who pursue apprenticeship training must then decide between university study and the labor market at the second step.

³Due to early tracking, students in Germany can graduate from general education at various levels of secondary education. In Germany, students may graduate from general education at grade nine 9 (Hauptschulabschluss), grade 10 (Realschulabschluss), grade 12 (Fachoberschule; vocational-specific access certificate for universities of applied sciences) and at grade 13 (Gymnasium; general university access certificate). In contrast to grade 12 and grade 13 degrees, grade nine and grade ten certificates do not qualify students for access to tertiary education.

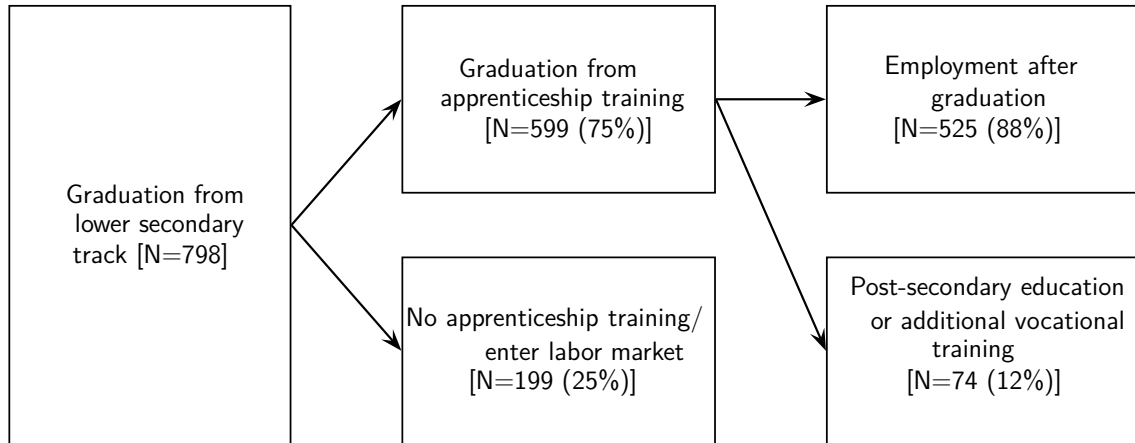
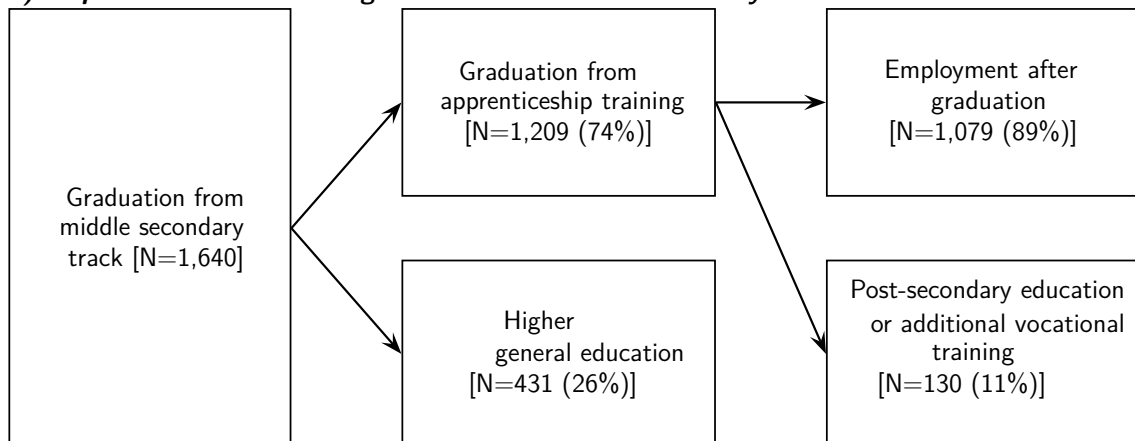
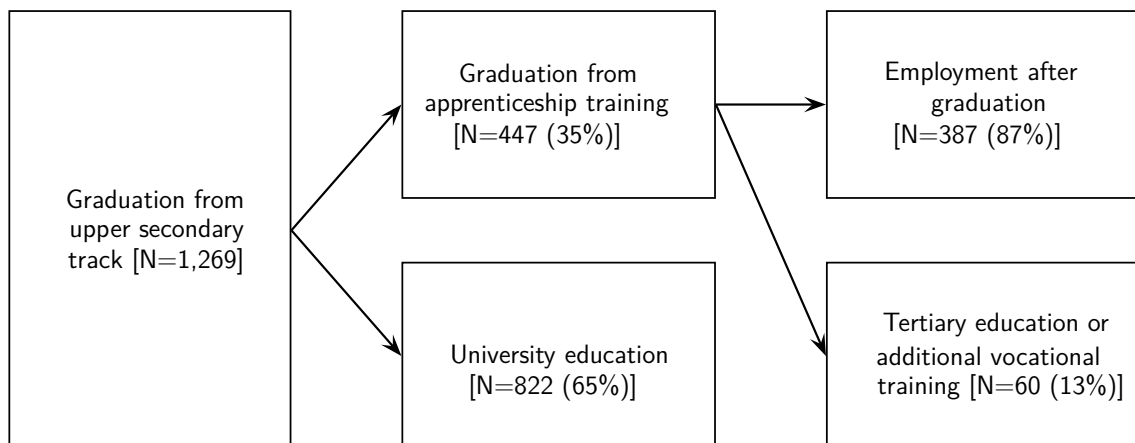
a) Sequence of decisions for graduates from the lower secondary educational track**b) Sequence of decisions for graduates from middle secondary educational track****c) Sequence of decisions for graduates from upper secondary educational track**

Figure 3.1.: Stylized model of educational decisions for graduates

3.3.3. Variables

As explanatory variables at the individual level, the level of family of origin and, for individuals' participation in apprenticeship training, the firm level are employed (see Table A.1). In line with the theoretical considerations, individuals' school performance is the primary or indirect factor for educational decisions. Tracking within general education and access to tertiary education is linked to individuals' school performance as a precondition. However, individuals' school performance is already shaped by social origin (familial socialization and foregone educational decisions; see Jackson, 2013). Self-rated performance in mathematics and German language in school are included as a compound variable, similar to higher German school grades indicating worse levels of performance. Additionally, type of degree from middle secondary track is introduced ("Realschulabschluss" and "Fachoberschulabschluss").

The theoretical considerations and empirical findings indicate a severe direct effect of social origin on individuals' educational decisions. To identify the effect of social origin, the article uses fathers' education as a main variable. A dummy variable indicates that an individual's father attained an upper secondary degree. As fathers' and mothers' educational status are highly correlated, the model attempts to avoid collinearity and applies only a reduced form of mothers' labor market status when the individual was 15 years of age as a control variable.⁴ To address the availability of economic resources, household-type at the respondents' age of 15 years is introduced. A dummy variable indicates whether a respondent grew up in a single parental household, which controls indirectly for economic constraints during the respondent's youth. Unfortunately, the direct and indirect effects of social origin cannot perfectly be disentangled with the dataset employed (see Dronkers and Korthals, 2016).

The quality of apprenticeship training is identified by training firms' investment strategy. Following Stevens (1994) and Wagner and Zwick (2012), production-oriented and investment-oriented training strategies are a direct measurement of last apprenticeship wages, and above-average apprenticeship wages indicate an investment-oriented regime. Last apprenticeship wage is used in a logarithm form.

As control at the individual level, gender is included.⁵ Additionally, year, federal, and state fixed effects as well as unemployment rate at the federal and state levels control for regional and year-specific differences. Demographic changes at the federal and state level are considered for the population aged 15 to 20 years. Similar to unemployment rate, a

⁴In further analyses, mothers' information are included without substantial changes. The results are available upon request.

⁵A different model includes also individual's age. The results remain the same.

contracting or expanding youth population indicates a change in educational opportunities.

3.4. Results

Table 3.2 shows the baseline estimates. First, both social background and school performance have a negative impact on the educational decision (first decision) of graduates from the lower educational track. Poor school performance and fathers' education show a significantly negative impact on the decision to enter apprenticeship training. The negative impact of school performance is in line with theoretical expectations, i.e., graduates with low school performance are less likely to obtain an apprenticeship offer and start an apprenticeship and/or are keener to begin working and earning money than graduates with better grades. The strong impact of fathers' education remains unclear and contradicts the expectations.

Theoretically, apprenticeship training should be the first and best choice for graduates from the lower educational track. In that case, higher qualified fathers should favor apprenticeship training for their children as the relative best option, allowing those students to pursue additional educational upgrades later. Men are more likely to start apprenticeship training than women, and graduates from foreign-language households are less likely to start an apprenticeship than other graduates. Incomplete families (single-parent households) reduce individuals' probability of entering apprenticeship training.

Regarding the second decision among graduates from the lower secondary track, the results are partially in line with the theoretical expectations. Apprenticeship graduates with below-average school performance are more likely to enter the labor market than to pursue further education, although the effect is statistically insignificant. Fathers' education increases the probability of further higher education, while mothers who are labor market inactive correlate positively with entry into the labor market. Foreign household language strongly decreases the likelihood of an apprenticeship and has no statistical impact on the decision to enter the labor market or pursue additional education at the second decision.

Second, for graduates from the middle secondary track, social background and school performance have no (statistically significant) impact on the apprenticeship decision, although the effects show the expected directions. Similar to graduates from the lower secondary track, graduates from the middle secondary track with migration background or from single-parent households have a lower chance to start an apprenticeship training. Instead, graduates from migrant and single parent households or female graduates show a higher probability to continue higher education after graduation from the middle secondary track. Graduates from technical secondary school ("Fachoberschule") are more

likely to continue higher education compared to those other graduates from the middle secondary track (“Realschule”).

Conditional on a successful graduation from apprenticeship training (second decision), higher social origin (better educational level) students and graduates from technical secondary school are more likely to pursue higher education than enter the labor market. Gender and household composition (single parents, labor market-inactive mothers) show no significant effects on the second decision for graduates from the middle secondary track, which contrasts with the findings for graduates from the lower secondary track.

Third, the impacts for graduates from the upper secondary track are partially different. Graduates with lower school performance are more likely to start an apprenticeship than graduates with better school performance, whereas males are less likely to start an apprenticeship and choose higher education than females. These findings are striking and contrast with the results for the other two track groups, particularly with the results for graduate from the lower secondary track. On the one hand, the results confirm the different decision-making pathways for the different types of school graduates and the need for separate estimations depending on educational level. On the other hand, the results also show the different significance of apprenticeship training in Germany for the three different educational tracks. Fathers’ education significantly reduces students decision for apprenticeship and favors the higher education path (university entrance), which is in line with social status maintenance theory.

Conditioned on successful apprenticeship training, school performance and fathers’ educational level seem to be irrelevant for the second transition, that is, selectivity due to social background is relevant only for the apprenticeship decision. The findings can be explained as follows: Employers know less about potential apprentices’ true skills and abilities; thus, school grades are an important (more or less objective) indicator of students’ abilities. In case of graduation of apprenticeship training, employers obtain more reliable information about graduates’ true abilities and are better able to assess graduates’ performance or productivity. Thus, for graduates from upper secondary education, school performance and track type align with the theoretical expectations. The same holds for social origin. Fathers’ education affects the respondents’ choice to enter apprenticeship training, while mothers’ labor market status and household type are weak in size and nonsignificant.

Table 3.2.: Average marginal effects after logit estimates, baseline estimates

	Lower sec. graduates			Middle sec. graduates			Upper sec. graduates		
	Appren- ticeship	Employ- ment	Employ- ment	Appren- ticeship	Employ- ment	Employ- ment	Appren- ticeship	Employ- ment	Employ- ment
Father with upper secondary degree	-0.149* (-2.05)	-0.147* (-2.24)	-0.120+ (-1.89)	-0.026 (-0.84)	-0.065** (-2.72)	-0.057* (-2.39)	-0.115*** (-4.21)	-0.029 (-0.81)	-0.026 (-0.74)
School performance (self-rated)	-0.044* (-2.00)	0.031 (1.60)	0.032+ (1.67)	0.024 (1.51)	0.007 (0.50)	0.010 (0.71)	0.078*** (4.29)	0.007 (0.27)	0.018 (0.69)
Mother not employed in youth	-0.031 (-1.07)	0.066* (2.49)	0.065* (2.47)	0.048* (2.32)	0.016 (0.93)	0.016 (0.90)	0.014 (0.54)	0.017 (0.53)	0.020 (0.62)
Broken family	-0.105* (-2.00)	0.104*** (4.13)	0.108*** (4.63)	-0.086+ (-1.85)	-0.036 (-0.85)	-0.029 (-0.68)	0.104+ (1.70)	0.089+ (1.76)	0.089+ (1.77)
Male	0.151*** (4.94)	0.121*** (3.89)	0.081** (2.69)	0.075*** (3.74)	0.011 (0.61)	0.002 (0.14)	-0.078** (-3.05)	-0.029 (-0.83)	-0.035 (-1.00)
Foreign household language	-0.423*** (-8.65)	0.035 (0.87)	0.039 (1.03)	-0.407*** (-10.21)	0.047+ (1.70)	0.042 (1.49)	-0.249*** (-7.38)	0.068 (0.98)	0.061 (0.83)
Upper sec. applied degree				-0.232*** (-6.74)	-0.126*** (-3.33)	-0.127*** (-3.37)			
Last wage in apprenticeship			0.131*** (4.06)			0.043** (3.12)			0.086** (2.73)
Observations	798	599	599	1,640	1,209	1,209	1,269	447	447
Pseudo R^2	0.164	0.158	0.201	0.145	0.108	0.120	0.102	0.102	0.122

Note: Average marginal effects are shown. T-statistics are in parentheses. Further controls not shown: individual, federal, regional, demographic and year effects. ***/ **/ * / + indicates significance at the .1/1/5/10%-level.

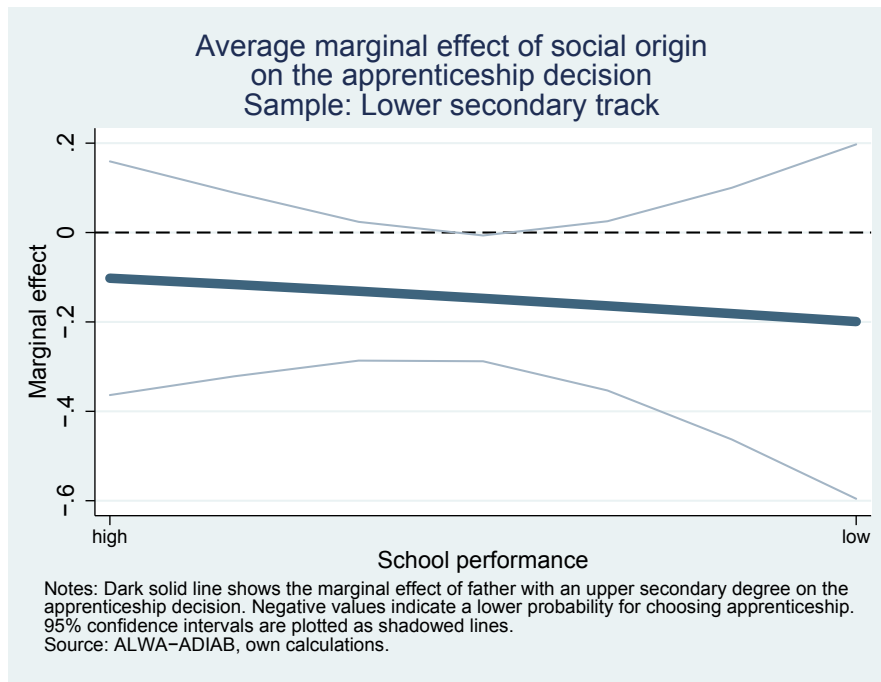
Source: ALWA-ADIAB, own calculations.

In a second step, the articles investigate interaction effects of individual's school performance (subjective grades) and father's education (as indicator for social origin). The following figures (3.2, 3.3 and 3.4) present these findings as conditional effects plots of interacting indirect effects (school performance) and direct effects (fathers' education) of social origin at the first (apprenticeship training) and the second (labor market entry) decision.

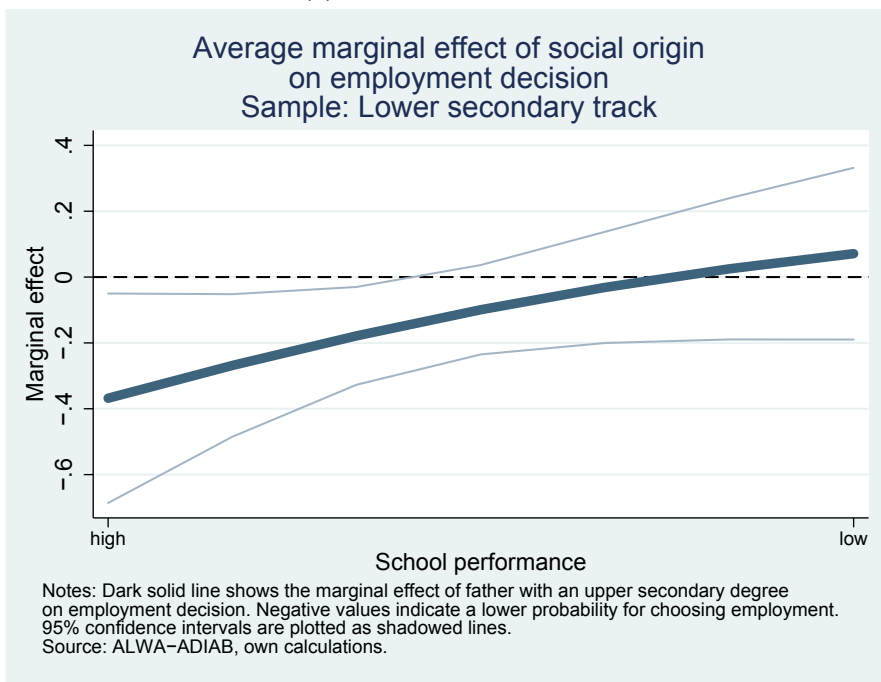
For graduates from the lower educational track, Figure 3.2 indicates no interaction effect for the apprenticeship decision, i.e., there is only a slight and nonsignificant effect of school performance and fathers' education. Regarding the employment decision, the findings indicate a weak interaction effect. Higher social origin and school performance favor ongoing education instead of labor market entry. The findings indicate, that in case of better school performance and higher social origin parents motivate graduates from apprenticeship training to continue education to achieve higher status positions. In case of low performance apprenticeship graduates, parents are realistic and satisfied with the obtained apprenticeship training and the path towards labor market entry.

For graduates from the middle secondary track, Figure 3.3 shows a significant interaction of school performance and social origin for the first decision. The parents of students with better school performance perceive better chances for their children to obtain higher social status and try to push their children towards more education. The parents of students with lower school performance do not perceive such chances. As can be seen, there is no interaction effect for employment decision, and the social origin effect remains nearly constant.

For graduates from upper secondary tracks, Figure 3.4 shows a severe interaction between school performance and fathers' education. The parents of these graduates try to push their children away from apprenticeship training and towards more education more strongly than the parents of middle secondary school graduates. In this case, higher education means study at a university.

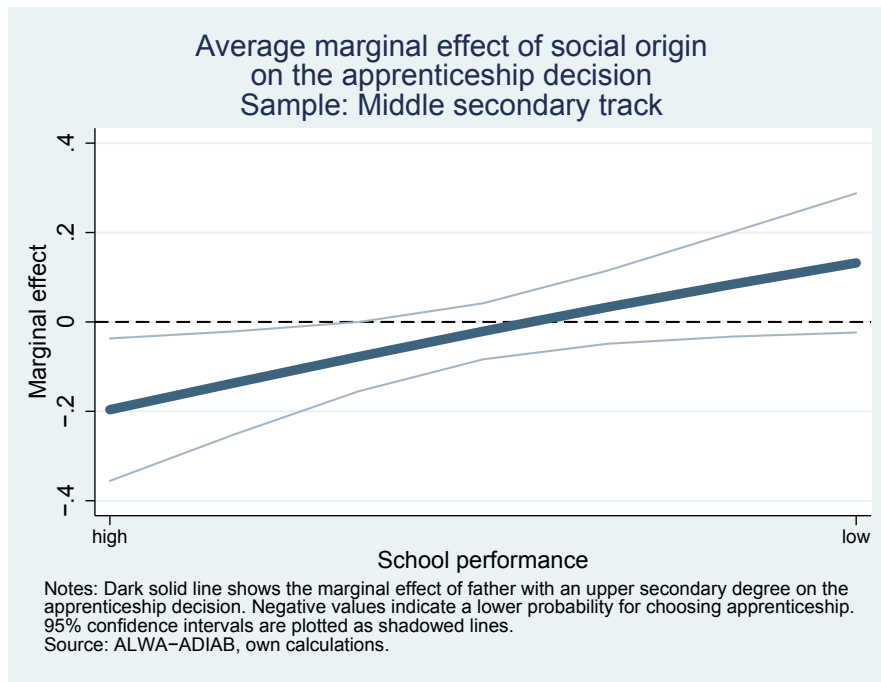


(a) Apprenticeship decision

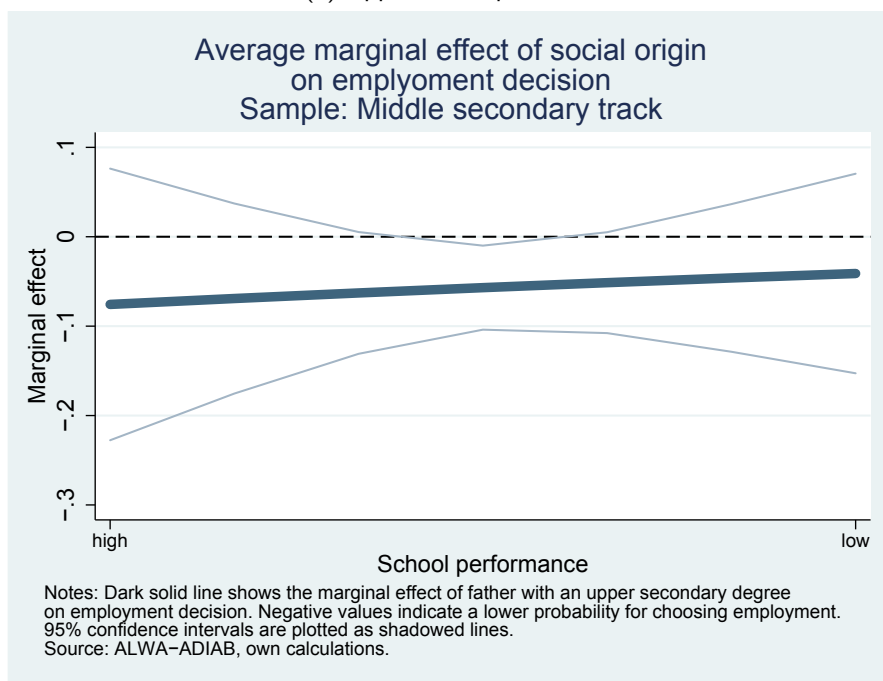


(b) Employment decision

Figure 3.2.: Interaction of primary and secondary effects, graduates from lower secondary track

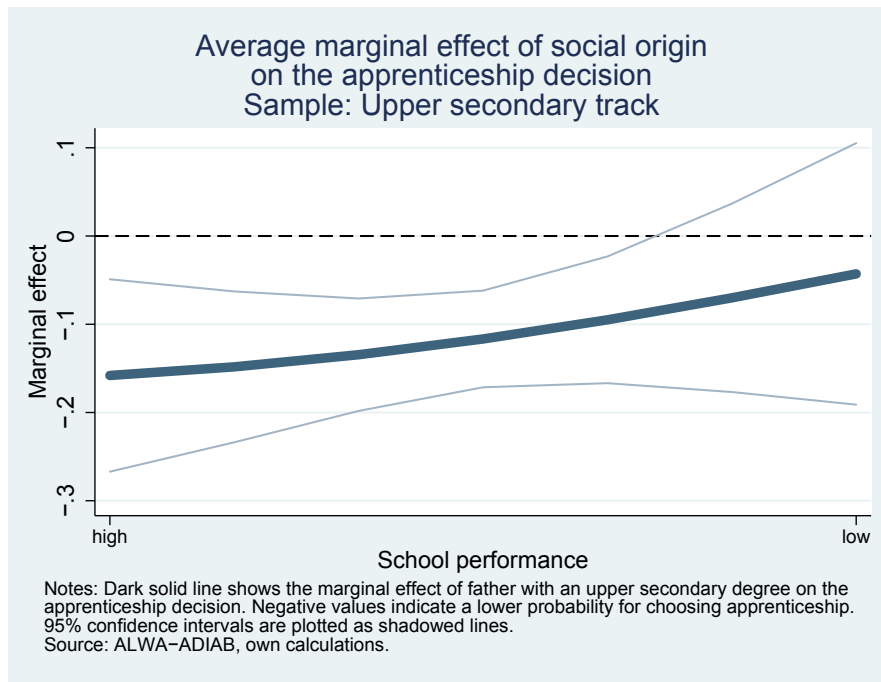


(a) Apprenticeship decision

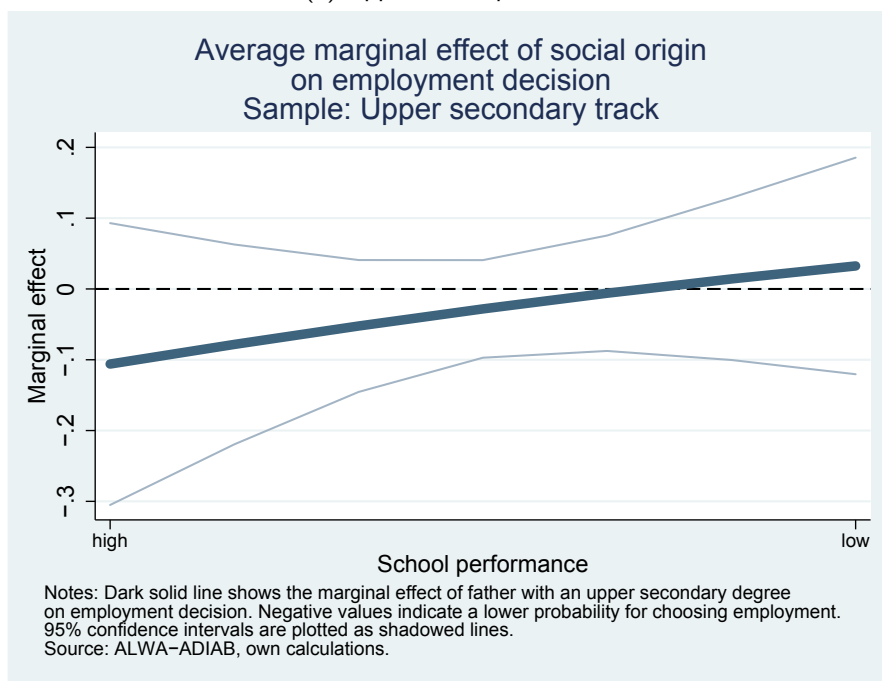


(b) Employment decision

Figure 3.3.: Interaction of primary and secondary effects, graduate from middle secondary track



(a) Apprenticeship decision



(b) Employment decision

Figure 3.4.: Interaction of primary and secondary effects, graduates from upper secondary track

In a third step, the training firm is included as independent actor. Due to cost-benefit considerations, firms differ according to their training strategies. In line with the literature, it is assumed that training firms' strategy correlates with quality of training and that quality of training improves individuals' labor market entry. As Table 3.2 (columns, 4, 7 and 10) indicates, firms' training strategy has a strong impact on individuals' decision to enter the labor market instead of continuing their education; although, the remaining variables stay quite stable.⁶

In terms of the second decision following graduation from apprenticeship training, upper secondary track level is the most important predictor, and it weakens when quality of training is introduced. Similar to lower and middle secondary graduates, quality of training increases the probability of entering the labor market instead of continuing with tertiary education to a remarkable degree. These findings are in line with the expectations. Since firms with investment-oriented training regimes are more attractive, i.e., offer higher wages and better careers, it seems reasonable that successful graduates enter the labor market and do not pursue further education. This decision is also reasonable from the perspective of firms and confirms Stevens' theory that firms' net costs for training are positive and that training firms receive rewards for training results from the well-observed productivity of their trainees after graduation, given retention.

3.5. Sensitivity analysis

3.5.1. Robustness: Simulation of the impact of unobserved heterogeneity

The models presented here do not take into account the problem of unobserved heterogeneity. However, transition probabilities depend on both observed (such as social background) and typically unobserved (such as ability, motivation) or unknown factors, as Cameron and Heckman (1998) expressed in their seminal paper. For example, an individual's ability or preferences and attitudes towards education are potential factors that could impact the results, but no direct measures of these factors are available.

Unobserved heterogeneity can lead to biased estimates, even if the unobserved variables are not confounding variables in the first stages. This issue needs to be accounted for in order to achieve unbiased estimates. Several methodological approaches address the problem of selection caused by unobservable variables. Frequently applied methods are, e.g., propensity score matching and instrumental variables estimations. Both methods

⁶Unfortunately the data employed do not allow to control for firm-side effects on the first decision.

are sensitive and require random assignment to the treatment and/or additional, reliable information to deliver unbiased estimates.⁷ Since the data cannot provide any convincing (and available) instrumental variables simulations attempt to assess the possible impact of unobserved heterogeneity (Buis, 2011).

The basic idea of these simulations is to include the unobserved heterogeneity as an additional variable that represents all unobserved factors. This unobserved variable can be interpreted as a weighted sum of all omitted factors, for example, individuals' ability, motivation, preferences or social skills. Appendix A.2 explains the simulation setting in more detail. To summarize, simulations are executed to provide reasonable conditions and assess impacts on the variables of interest. Hence, the estimations are unable to detect pure causal effects of social origin, but the estimations show the robustness of the estimates.

The simulations of unobserved heterogeneity are presented in Tables 3.3 and 3.4. Table 3.3 shows the results for a constant amount of unobserved heterogeneity in both decisions, assuming alternatively a low or a high level of unobserved heterogeneity. For all three samples and over both transitions, the simulations indicate robust results with no substantial changes.

⁷A good introduction to the topic and methods is given in the special issue of Research in Social Stratification and Mobility (Buis, 2011).

Table 3.3.: Simulating constant amount of unobserved heterogeneity

a) Graduated from lower secondary track						
First decision: Apprenticeship vs. employed as unqualified worker				Second decision: Employment vs. Higher (additional) education		
	Amount of unobserved heterogeneity				Amount of unobserved heteogeneity	
	Baseline (0)	Low (.25)	High (1.5)		Baseline (0)	Low (.25) High (1.5)
School performance (self-rated)	−0.0442* (−2.00)	−0.0443* (−2.01)	−0.0456* (−2.03)	School performance (self-rated)	0.0321+ (1.65)	0.0319 (1.63) 0.0271 (1.27)
Father with upper secondary degree	−0.149* (−2.05)	−0.149* (−2.05)	−0.155* (−2.04)	Father with upper secondary degree	−0.125* (−1.96)	−0.127* (−1.97) −0.158* (−2.18)
b) Graduated from middle secondary track						
First decision: Apprenticeship vs. Higher (additional) education				Second decision: Employment vs. Higher (additional) education		
	Amount of unobserved heterogeneity				Amount of unobserved heteogeneity	
	Baseline (0)	Low (.25)	High (1.5)		Baseline (0)	Low (.25) High (1.5)
School performance (self-rated)	0.0241 (1.52)	0.0241 (1.52)	0.0242 (1.46)	School performance (self-rated)	0.0104 (0.75)	0.0105 (0.76) 0.0121 (0.84)
Father with upper secondary degree	−0.0260 (−0.83)	−0.0262 (−0.83)	−0.0288 (−0.87)	Father with upper secondary degree	0.0597** (−2.62)	−0.0598** (−2.62) −0.0644* (−2.57)
c) Graduated from upper secondary track						
First decision: Apprenticeship vs. Higher (additional) education				Second decision: Employment vs. Higher (additional) education		
	Amount of unobserved heterogeneity				Amount of unobserved heteogeneity	
	Baseline (0)	Low (.25)	High (1.5)		Baseline (0)	Low (.25) High (1.5)
School performance (self-rated)	0.0783*** (4.29)	0.0790*** (4.29)	0.0961*** (4.37)	School performance (self-rated)	0.0196 (0.75)	0.0205 (0.77) 0.0482 (1.24)
Father with upper secondary degree	−0.115*** (−4.21)	−0.116*** (−4.22)	−0.140*** (−4.28)	Father with upper secondary degree	−0.0276 (−0.79)	−0.0287 (−0.81) −0.0672 (−1.28)

Note: Average marginal effects are shown. T-statistics are in parentheses. Further controls not shown: individual, federal, regional, demographic and year effects. ***/ **/ * / + indicates significance at the .1/1/5/10%-level.

Source: ALWA-ADIAB, own calculations.

Table 3.4 assumes decreasing or increasing heterogeneity at the second decision in contrast to the first decision (decision to enter apprenticeship training). The unobserved heterogeneity at the first decision is fixed at a high level, and the effect of varying unobserved heterogeneity at the second decision is explored. Again, the results for observable characteristics (baseline model) remain quite stable (only small changes in size and no substantial change in pattern).

Table 3.4.: Simulating varying amounts of unobserved heterogeneity

a) Graduated from lower secondary track			
Second decision: Employment vs. Higher (additional) education			
	Amount of unobserved heterogeneity		
	Baseline (0)	Low (.25)	High (1.5)
School performance (self-rated)	0.0321 ⁺ (1.65)	0.0318 (1.61)	0.0275 (1.40)
Father with upper secondary degree	-0.125* (-1.96)	-0.130* (-2.00)	-0.137* (-2.03)
b) Graduated from middle secondary track			
Second decision: Employment vs. Higher (additional) education			
	Amount of unobserved heterogeneity		
	Baseline (0)	Low (.25)	High (1.5)
School performance (self-rated)	0.0104 (0.75)	0.0108 (0.77)	0.0101 (0.80)
Father with upper secondary degree	-0.0597** (-2.62)	-0.0609** (-2.62)	-0.0563* (-2.54)
c) Graduated from upper secondary track			
Second decision: Employment vs. Higher (additional) education			
	Amount of unobserved heterogeneity		
	Baseline (0)	Low (.25)	High (1.5)
School performance (self-rated)	0.0196 (0.75)	0.0223 (0.81)	0.0335 (1.03)
Father with upper secondary degree	-0.0276 (-0.79)	-0.0313 (-0.85)	-0.0450 (-1.03)

Note: Average marginal effects are shown. T-statistics are in parentheses. Further controls not shown: individual, federal, regional, demographic and year effects. *** / ** / * / + indicates significance at the .1/1/5/10%-level. The amount of unobserved heterogeneity at the first decision is fixed at 0.75 (medium high).

Source: ALWA-ADIAB, own calculations.

To summarize, in line with the theoretical considerations, the results confirm the expected effects of individuals' school performance and social origin on educational deci-

sions within a sequence of educational decisions (transitions into and out of apprenticeship training in Germany). Additionally, the results demonstrate an important effect of training firms' quality of training, which affects the probability of individuals' labor market access.

Further, the article implements simulations in the models, allowing the unobserved heterogeneity to vary from zero to high levels and allowing a variation in heterogeneity in decision 2 after fixing the unobserved heterogeneity in decision 1 at an extremely (unrealistic) high level (0.75). The coefficients of the observable variables (here, individuals' school performance and social origin) remain robust and do not change substantially.

3.5.2. Different specification

The baseline estimations use a dummy variable that indicates whether a father has an upper secondary degree or not ("Abitur") as proxy for social origin. In Germany, (vocational) certificates are very important. Hence, as sensitivity analysis, the models use a qualitative variable with three outcomes that indicates a) if the father has no vocational apprenticeship, b) if the father has a vocational apprenticeship degree or c) if the father has a university degree. As seen in Table 3.5, the distribution of fathers' vocational degree strongly differs according to students' secondary school level, especially for the share of fathers with no vocational degree and with an academic degree.

Table 3.5.: Students' secondary school level by father's educational level

	Students graduated from		
	Lower sec. level in %	Middle sec. level in %	Upper sec. level in %
Father with:			
No vocational degree	29.6	16.0	10.8
Vocational degree	68.2	75.2	59.1
Academic degree	2.2	8.8	30.1
Observations	798	1,640	1,269

Source: ALWA-ADIAB, own calculations.

Table 3.6 shows the results that use this specification. The baseline estimates for the lower secondary school graduates shows a negative impact of school performance and fathers' education on the probability of an apprenticeship. The results are robust for school performance and indicate that the relationship between social origin and apprenticeship could be U-shaped. A child with a father without a vocational degree has a significantly lower probability of choosing apprenticeship training. One reason for this result could be that for fathers without a vocational degree, fathers' occupational career

acts as role model and thus entices children to follow the same path. For students with a middle secondary school degree, the patterns are quite similar to the baseline results, indicating that there is no significant impact on the first decision. The positive impact of fathers' education remains after a successful apprenticeship decision, but it becomes insignificant. The result for the third group, graduates of the uppers secondary track, are robust and clarify to an even greater extent the positive impact of parental education. At both stages, fathers with an academic background clearly push their children towards more education (here, academic degrees) and away from apprenticeship and labor market entrance after successful apprenticeship training. Therefore, these findings support social status attainment theory and the prior results.

Table 3.6.: Average marginal effects after logit estimation, categorical specification

	Lower sec. graduates		Middle sec. graduates		Upper sec. graduates	
	Appren- ticeship	Employ- ment	Appren- ticeship	Employ- ment	Appren- ticeship	Employ- ment
Father without apprenticeship training	-0.088* (0.034)	-0.014 (0.032)	0.033 (0.026)	0.018 (0.022)	-0.014 (0.045)	-0.038 (0.060)
Father with academic degree	-0.097 (0.105)	-0.096 (0.111)	-0.048 (0.038)	-0.059 (0.038)	-0.176*** (0.027)	-0.087+ (0.047)
School performance (self-rated)	-0.037+ (0.022)	0.033+ (0.019)	0.023 (0.016)	0.009 (0.014)	0.076*** (0.018)	0.017 (0.026)
Mother not employed in youth	-0.034 (0.029)	0.064* (0.026)	0.047* (0.021)	0.015 (0.018)	0.017 (0.026)	0.022 (0.032)
Broken family	-0.069 (0.051)	0.110*** (0.023)	-0.095* (0.048)	-0.036 (0.045)	0.099 (0.062)	0.094* (0.047)
Male	0.146*** (0.030)	0.080** (0.030)	0.075*** (0.020)	0.002 (0.018)	-0.082** (0.025)	-0.038 (0.035)
Foreign household language	-0.392*** (0.052)	0.042 (0.038)	-0.416*** (0.040)	0.039 (0.030)	-0.249*** (0.034)	0.067 (0.070)
Last wage in apprenticeship (log.)		0.137*** (0.033)		0.043** (0.014)		0.085** (0.031)
Upper sec. applied degree			-0.233*** (0.034)	-0.133*** (0.038)		
Observations	798	599	1640	1209	1269	447
Pseudo R^2	0.168	0.196	0.147	0.118	0.115	0.133

Note: Average marginal effects are shown. T-statistics are in parentheses. Further controls not shown: federal, regional, demographic and year effects. ***/ **/ * / + indicates significance at the .1/1/5/10%-level.

Source: ALWA-ADIAB, own calculations.

3.6. Discussion and conclusions

Using linked ALWA-ADIAB data the article explores the contribution of social origin and apprenticeship firms training behavior on individual decisions to start apprenticeship training after graduation from general education, and conditional on a decision for apprenticeship training the subsequent decision between entering the labor market, continuing upper secondary or tertiary education and further apprenticeship training. Compared to school-based forms of vocational education (at upper or post-secondary and tertiary level), apprenticeship training differs. In case of apprenticeship training the training firm is the key holder of vocational education.

First, firms' training behavior is related to firms' business performance and firms' position on the economic market (Dietrich and Gerner, 2007). Second, the quality of training varies greatly between training firms, even if federal laws define a mandatory framework (e.g. vocation-specific training curricula quantity and quality of vocational schooling in addition to firm-based training). In addition, apprenticeship training is the dominant form of vocational education and training at the secondary level: two-thirds of a typical German age cohort is passing apprenticeship training. Following Kerckhoff (1995) the article introduces the training firm as an independent actor in the decisions shaping individuals' school to work transition. Thus, the article expands the status attainment model introduced by Blau and Duncan (1967).

Since vertically differentiated educational degrees (Allmendinger, 1989) and related track-mobility patterns (see Glaesser and Cooper, 2011; Jacob and Tieben, 2009) deliver degree-specific opportunity sets for educational decisions, the article assumes different institutional mechanisms and analyzes a sequence of educational decisions separately for graduates from lower, middle and upper secondary general education in Germany.

The model estimates sequence logit models (see e.g., Breen and Goldthorpe, 1997; Mare, 1980) of two educational decisions and uses simulations to assess the possible effect of unobserved heterogeneity (Cameron and Heckman, 1998). The article estimates the direct (father's educational level) and indirect (school performance) effects of social origin and also addresses the effect of training firms' investment strategy on individuals' educational decisions.

First, the results for graduates from lower secondary school track confirm the theoretical expectations that the school performance and the father's education should influence both decisions. Second, the results for middle secondary school graduates show no significant influence of the father's education or school performance on the likelihood of choosing apprenticeship training. Third, among graduates from upper secondary track,

the first decision between apprenticeship training and university study is determined by their school performance and their father's education. Fourth, the results for all three types of graduates show a strong and independent effect on the post-training decision (between continuing higher education and entry into the labor market) of training firms' strategy, i.e. quality of firm-based training.

The results imply several important points. First, the overall findings suggest that social origin is not only important for educational decisions (see Glaesser and Cooper, 2011), but it is also an important element within the apprenticeship training system. Following Boudon (1974), social origin works directly (father's education) and indirectly (school performance). For graduates from lower secondary track, their social origin is essentially aimed at securing a high social status and is permanently pushing for additional (higher education). It seems that, in order to achieve a higher social status, parental education is pushing for more education to secure the social level. The findings suggest that for upper secondary graduates, the first decision between university study and apprenticeship training usually anticipates the second decision. Unlike graduates from lower secondary track, graduates from upper secondary tracks can in fact choose between two forms of education, the academic form of higher education and the more applied form of apprenticeship. Therefore, the decision to start an apprenticeship is most important and the effect of individuals' school performance is less decisive for the labor market entry. In contrast to graduates from lower secondary track, parents (and students) seem to get used to this decision, accept it and no longer seek more education.

Second, the results imply that the training firms' strategy strongly influence individuals' labor market decision after completion of apprenticeship training. Training firms are an important actor and a necessary part of the apprenticeship training system that deserves more attention. The willingness to offer apprenticeship places is linked to training firm's investment strategy. A higher quality of training (investment-oriented training) facilitates the transition to the labor market.

Limitations of the findings are connected to missing data. The data do not provide additional information to introduce firm-specific characteristics when modeling the first educational decision and the article uses simple proxy information representing firms' quality of training. Given the severe effect of firms on the second decision, it has to be argued that a similar effect shapes selection into training. A lack of firm-specific data prohibits the attempt to perform additional simulations for the firm side. This may both limit the findings and present challenges for future data designs.

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4. Pushing the wheelchair or marching in step? Wage differences between draftees in military and civilian service in West Germany

4.1. Introduction

Nations recruit their military personnel in different ways, including volunteer military, general conscription, conscription with alternative services (conscientious objection). Volunteer military and general conscription have a long history (since the late modern ages).¹ General conscription enforces young men for military services (Foerster, 1994; Hecker, 1954) and is yet widely-used (CIA's World Factbook 2017). As the period of compulsory military service usually coincides with that of labor market entry and high investments in human capital, the interruption can cause human capital losses not only in the short run but also in the medium and long run. A large international literature exists, particularly for the US, on the relationship among the conscription system, military experience and subsequent labor market outcomes (e.g. wages, education).

However, (West-)Germany's conscription system has its own characteristics which have not yet been analyzed so much. After World War II, West Germany established the system of a mandatory military service (*Wehrpflicht*) for all young men. As a consequence of Germany's Nazi history, parliament enshrined the right to refuse any military service in the German constitution. Young men who followed their conscience and rejected military service had to participate in an alternative service, the civilian service (*Zivildienst*). Until the 1980s, politics and society had little respect for this alternative military service

¹Up to the late 19th century mercenary forces were very common. Afterwards, since the beginning of the 20th century volunteer military and general conscription are widely used

(Bernhard, 2005), and the public image of young conscripts in the civilian service as a “slacker” was extremely negative. For most conservatives and traditionally minded citizens, the military service was a necessary part of being a “true” male, and every young man who did not fulfill his duty was eyed critically and sometimes reported discrimination in both employment and private situations (Krölls, 1980). Over the following decades, this image slowly changed, the number of civilian draftees steadily increased, changing from the rare exception to a socially acceptable choice (see Figure 4.1).

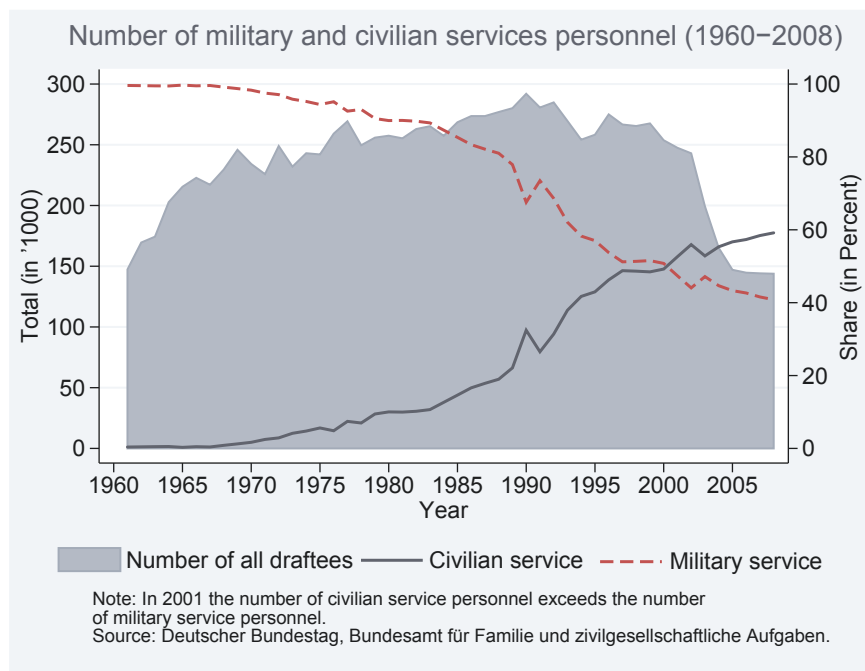


Figure 4.1.: Development of military and civilian service personnel (1960-2008)

As the relationship between military service and civilian service and Germany society changed substantially between 1961 and 2011, one could expect large differences between the two service types. Therefore, the article focuses on wage differentials between these two main types of compulsory military service in Germany. For the years from 1980 to 2008, the article reports time trends in the wage differentials for young men born between 1956 and 1988. Using linked survey data with administrative data, the study analyzes in-depth wage differentials between these two types of draftees by including a broad range of information on males' socio-economic background, work experience and occupational information. Hence, the rich data set allows me to investigate and show discrimination and wage disadvantages for draftees in the civilian service which has not been analyzed so far.

The article demonstrates an overall wage disadvantage for draftees in the civilian service by about 10%. Even after controlling for worker characteristics such as occupation, firm,

working experience and job tenure the wage gap remains relatively stable and statistically significant and reveals a strong negative signalling effect of the civilian service. Beyond that, several robustness checks and sensitivity analyses indicate a significant employer learning effect for labor market entrants. The findings suggest, that at the beginning of their employment career, young draftees in the civilian service initially were discriminated and received lower wages, but the wage penalty diminished as they accumulated work experience.

Analyzing the unobserved heterogeneity and the mechanisms indicates the following results: First, there are differences with respect to firm size, i.e. the wage gap is more pronounced in small-sized firms. Second, analysis of the first employment after service time reveal that draftees in the civilian service with an upper secondary school leaving degree have larger wage disadvantages than draftees without an upper secondary school leaving degree. Third, results show that new labor market entrants receive a penalty gap. In contrast, the penalty gap reduces for more experienced workers. Fourth, while draftees in the civilian service in female-dominated occupations have no significant wage gaps, draftees in the civilian service in male-dominated occupations receive a wage penalty. Fifth, the wage gap is likely more persistent for older birth cohorts. Sixth, measures of cognitive competencies, i.e. literacy and numeracy skills, do not explain the wage gap. Seventh, while draftees in the civilian service value friends and acquaintances more highly, draftees in the military service value family and children and, particularly, work and occupation higher. Eighth, occupational sorting enables draftees in the civilian service to reduce the wage gap.

On the one hand, these results suggest that the draftees in the civilian service receive a wage penalty, even, after controlling for unobserved heterogeneity. Employers and firms value the two types of service differently. If draftees in the civilian service had a negative reputation in certain occupations or firms, the draftees started their employment career with wage disadvantages. Therefore, the results are consistent with the hypotheses that employer learning exists. Hence, employer discriminated older draftees in the civilian service because of their own prejudices, but not because of differences in productivity. Over time, though, through job sorting or firm changes, former draftees in the civilian service search for better jobs in which the signal of their service type is highly valued, resulting in higher wage growth and wage gains for more experienced workers.

On the other hand, the results also show that individual preferences and unobserved heterogeneity still exist. This suggest that some part of the remaining impact of the civilian service variable may be attributed to some extent to further unobserved differences such as lower motivation and various importance of one's professional career or working

attitude. Possibly, the draftees in the civilian service may devote less attention to relevant labor market outcomes, explaining some part of the wage differences. The results also indicate that the negative impact of the civilian service has been more pronounced for older birth cohorts than for younger birth cohorts. This suggests that societal changes influence individuals' life course.

To sum up, the results have shown that an important early life decision course, such as refusing military service, can have longer-lasting consequences in life. The results indicate that the stigmatization and discrimination of certain groups, here draftees in the civilian service, exist, but, that these prejudices can also decrease over time. The findings suggest that there were prejudices against the draftees in the civilian service. But, societal changes can take the image of conscripts in the opposite direction. The results are important because of recent discussions about the quality of voluntary military personnel and the image of military service in general. Discussions about the possible reintroduction of compulsory military service should therefore take into account that the image of military service in German society has changed in recent decades and that a change in the acceptance of compulsory military service can be problematic.

The next section summarizes the existing studies for Germany, explains the theoretical expectations and develops the hypotheses. Section 4.3 presents the data and provides descriptives. The baseline results are reported in section 4.4. Section 4.5 addresses unobserved heterogeneity and performs several sensitivity analysis. Section 4.6 discusses the main findings and gives explanations for the wage gap and section 4.7 concludes with a brief summary.

4.2. Background and hypotheses

4.2.1. Compulsory military service and labor market outcomes in Germany

In Germany, political discussions focused both on the military draft and whether one could justify having some young men not fulfill their military duty (see, for example, Neubauer, 1984; Schäfer, 2000; Schleicher, 1996; Schütte, 1991; Trabold et al., 2006).² Haberhauer and Maneval (2000) use aggregated data for the period from 1970 to 1996 to analyze the determinants of conscientious objection. Their results indicate a positive time trend and a significant influence of political circumstances, such as the Kosovo War in 1992 and the Gulf War in 1991, on the numbers of applications for conscientious

²For a brief overview over international literature see Appendix B.3.

objection. They also show that higher opportunity costs of civilian service, measured as the difference between the time spent in military and in civilian service, decrease the number of applicants.

Whereas Haberhauer and Maneval (2000) analyze the determinants at the macro level, Schneider (2003) analyzes the determinants at the micro level and compares the selectivity of serving in the military or civilian service to not serving. Using the German Socio-Economic Panel (SOEP) from 1984 to 1999, he estimates the probability of entry into military or civilian service relative to not serving at all. His main results indicate a high selectivity of the entry into the military draft: On the one hand, he shows a positive effect of the baby boomer cohort size on the probability of completing the required period of service. On the other hand, young men with an upper secondary school degree (*Abitur*) show higher draft proportions than their less-educated counterparts. Both patterns are even more pronounced for younger cohorts.

Only a few studies (Bauer et al., 2012, 2014; Kunze, 2002; Paloyo, 2010) explore long-term labor market effects. Bauer et al. (2014) analyze the impacts of compulsory military service on educational attainment for men with an upper secondary school degree. Using the legal threshold of the White Cohort³, they apply a regression-discontinuity design to determine the impact of conscription on the probability of obtaining a university degree and find a strong positive effect (approximately 10 percentage points). Those results are in line with existing studies and patterns for other countries.

Kunze (2002) uses an employment sample of administrative data from the Federal Employment Agency and estimates a return of approximately 3 percent on conscription for the period 1975-1997. All other studies use a register dataset from the Federal Employment Agency linked with administrative data from the state pension authorities. Similarly, Paloyo (2010) and Bauer et al. (2012) use the White Cohort for West Germany as a starting point for in-depth analyses of the impacts of conscription. Whereas Bauer et al. (2012) apply a regression-discontinuity design, Paloyo (2010) uses a difference-in-differences approach to estimate the effect of conscription on daily wages. Both studies find no effect of compulsory military service on subsequent labor market outcomes.

In contrast to Kunze (2002), who finds a significant positive effect, Paloyo (2010) and Bauer et al. (2012) correct for possible bias that could explain the different results: Draftees with worse health status were more likely to be excluded from military service. As better health status can be expected to result in better labor market outcomes, differences between conscripts and non-conscripts might thus not be directly related to military ser-

³Under this law, all men born after June, 30, 1937, have to serve in the military. As a result, the so-called White Cohort (men born before July, 1, 1937) were excluded from obligatory military service.

vice. Additionally, Bauer et al. (2012) analyze the effects of conscription on (cumulative) lifetime earnings and days of employment. Their results show that conscripts' advantages in labor market outcomes can be explained by a nonrandom selection mechanism.⁴

In summary, the previous literature is concerned with the impact of the conscription system per se on either wages or education, i.e. whether young men who fulfilled the compulsory military service had (dis-)advantages against young men who were rejected from the compulsory military service. In contrast, this study focuses on the returns to wages *with respect to the type of compulsory military service*, providing initial evidence of wage differences between the two most common types of draftees, those in military service and civilian service. Therefore, the article observes only persons who fulfilled the compulsory military service, either in military or in civilian service, and not compare persons who were rejected.

4.2.2. Theoretical expectations of wage differences

Human capital theory (Becker, 1993; Schultz, 1959, 1961), network effects and network theory (Granovetter, 1973; Scott, 2000), signalling theory (Spence, 1973) and discrimination theory (Arrow, 1973; Becker, 1973) can explain wage differences between military and civilian service draftees.

First, following human capital theory, general and specific human capital acquired during the compulsory service period is subsequently valued in the labor market (Becker, 1993). On the one hand, for potential soldiers, military service primarily provides basic skills applicable to military devices but also develops soft skills such as (military) obedience and a sense of duty. Whereas human specific capitals such as military-specific skills should be less valued in later labor market careers, general human capital such as manual skills (e.g., mechanics), academic skills (such as foreign language competencies) or driving licence for motor trucks are useful if positions suited to those skills are available in the military. Additionally, sharing barracks and spending the week together may have effects on the personality of draftees in the military service.

On the other hand, civilian draftees predominantly worked in the social sector or as cheap labor substitutes (Kuhlmann and Lippert, 1991), many in service jobs such as assistants in hospitals and nursing or retirement homes, in transport services or as caretakers

⁴Since the focus of this study is on economic consequences, the literature review provides no details on further aspects of how military service affect individuals' lives. Nevertheless, the literature shows that military service has far-reaching positive and negative consequences on, for example, family structure (see Call and Teachman, 1991; Elder Jr. et al., 1991; Heerwig and Conley, 2013) and psychological well-being and health (see London and Wilmoth, 2006). MacLean and Elder (2007) provide a broad survey of further relationships between military service and the individual life course.

for handicapped individuals. This general human capital such as medical or manual skills can pay off later. Janitorial tasks in retirement homes require additional skills, such as organizational skills and flexibility, both of which are valued in the labor market. Additionally, experiences such as caring for dying people in retirement homes or hospitals can influence young men's personalities and attitudes, such as empathy. Thus, whether the specific human capital obtained in the military or civilian service provides advantages or disadvantages in later life remains unclear.

Second, wage differentials between military and civilian draftees could arise through network effects (e.g. Granovetter, 1973; Scott, 2000). Such networks established either in the military or civilian service could become valuable throughout an individual's career. These social networks are helpful for finding new or better-paid jobs later in life. While civilian draftees usually slept at home if possible (to remain close to their family) and spent their working time with only a few or no fellow civilian draftees, military draftees lived together in barracks and thus spent more time together. Moreover, military draftees later frequently participated in military reserve duty. Each type of "oldboy" network (civilian and military) can have value in later life.

Third, signalling (Spence, 1973) and discrimination (Arrow, 1973; Becker, 1973) theories provide a further explanation for differences between the two service types. As shown before, the relationship and the acceptance of the military and civilian draftees changed substantially over the last decades. Furthermore, it strongly depends both on time and context-specific circumstances and the recipients of the signal. Therefore, it is unclear whether draftees in the military or the civilian service received a positive or negative signal. Conscientious objectors reported strong disadvantages arising from their service choice, e.g., in apprenticeship or employment (Krölls, 1980). Both of these signal-related theories suggest that males who completed civilian service suffered from a lower social reputation and being considered slackers (Kuhlmann and Lippert, 1991).

On the one hand, upon entering the labor market, former draftees met with older, possibly conservative people who positively valued military service. Into the 1980s, almost every older man who had completed his compulsory duty had chosen military service (see Figure 4.1). Since many individuals prefer individuals who are alike themselves and because older, more experienced people occupy higher positions in firms and in human resources departments, the negative reputation of civilian draftees would have directly translated into monetary disadvantages, that is, lower wages.

On the other hand, because of their own negative experiences of war, some older men might disapprove of military service. In such cases, draftees who registered as conscientious objectors and decided not to pursue military service would have sent a positive signal.

The problem, of course, is that no former draftee knew what type of boss or coworkers he would encounter. Beyond these theoretical explanations, an individual's choice not to perform military service could ultimately have positive or negative consequences for his labor market career. For many years, the image of the draftees in the civilian service was very poor. Thus, as first hypothesis, the article expects a discrimination against the former draftees in the civilian service, i.e., that the negative image dominates the positive aspects .

H1: Draftees in civilian service have, c.p., lower wages than draftees in military service.

Changes in societal attitudes and acceptance of military and civilian service could have a further impact. Over time, the initial negative attitudes toward civilian service in German society declined, and since the late 1980s, the image of conscientious objectors as slackers disappeared (Kuhlmann and Lippert, 1991). Young males increasingly rejected military service and opted for civilian service. Additional information about the actual relevance of the civilian service became more widely known in society and rejection of military service was easier. Employment in the social sector (i.e., caretaking, supportive work in hospitals) and the increasing economic relevance of civilian service for non-profit organizations altered perceptions of such service and highlighted its contribution to society (Bernhard, 2005).

H2: Conditional on an initial wage differential, the wage differential declines over time.

Further differences and heterogeneity due to service type are possible. After completing compulsory military service, young males entered the labor market or higher education tracks, applied for new jobs or returned to their former employers. According to employer learning theory (Altonji and Pierret, 2001; Farber and Gibbons, 1996; Lange, 2007), employers cannot observe young men's true productivity during the application process. Employers use apparent productivity characteristics (e.g., educational degree or service type) to assess applicants' skills and productivity. Recruitment and wage setting are based on these considerations. Over time, more information on men's true productivity becomes observable. Conditional on wage determinants, such as tenure, firms better observe workers' productivity and the limited initial information becomes redundant. An additional hypothesis assumes a decreasing impact of civilian service as tenure increases:

H3: Conditional on an initial wage differential at the beginning of draftees' employment careers, the wage differential declines with tenure.

As shown, education is an important predictor of a) conscription per se (Schneider, 2003) and of b) the decision to be a conscientious objector (Räder, 1994). Young males with an upper secondary degree were less likely to opt for military service and tended toward civilian service (Kuhlmann and Lippert, 1991; Puzicha and Meißner, 1981). Possible explanations for this development are a trend toward rejecting military service and the better ability to formulate one's conscientious objection. Students with upper secondary degrees were more critical and did not believe compulsory military service to be an obligation (Gille, 2000). Instead, they had more individual, self-conscious reasons against engaging in military service. Students with upper secondary degrees are trained and expected to fill positions with higher qualification requirements and better paying jobs. Deviations from such social norms should have stronger impacts. The social norm was to complete the duty time in military service rather than refuse military service and complete civilian service. Because students with an upper secondary degree frequently rejected military service (Gille, 2000; Schneider, 2003), the image of these students as slackers was reinforced:

H4: The higher the degree of educational attainment, the higher the wage differential.

4.3. Data and methods

The ALWA-ADIAB (Antoni and Seth, 2012) consists of two different data sources. The 2007/2008 survey "Working and Learning in a Changing World" (ALWA) administered to over 10,000 individuals includes longitudinal and cross-sectional information on the life course of individuals surveyed: educational and employment trajectories and residential and partnership histories (Kleinert et al., 2011). Administrative data from the German Federal Employment Agency are the second source. The Integrated Employment Biographies (IEB) provide precise information on daily wages, registered unemployment, dependent employment and further aspects of active labor market policy. Additional information on firm characteristics such as the number of employees, firm location and industrial classification (Dorner et al., 2010; Hethey-Maier and Seth, 2010) is available. The article exploits the advantages of both data sources. Administrative data contain highly reliable information on daily earnings and information on the firms at which individuals were employed. To construct person-year data, the life course information is used to determine the time and type of compulsory service.

The sample is restricted to men born in West Germany who fulfilled their compulsory

service in West Germany, either in the armed forces or in the civilian service.⁵ The East German population is disregarded because it is only included in the social security register data after German reunification (1992) and because East Germany's military service policy was different. Observed individuals who fulfilled the compulsory service in various ways, e.g., as professional soldiers, policemen or employees in the civil protection system, are also not comparable and hence dropped.

It is important to stress that the sample includes only males who actually fulfilled their compulsory service to explore possible differences according to the type of service. The focus is not on the (dis-)advantages of compulsory service in general (Bauer et al., 2012). All men in the sample were examined and classified as fit for military service. The sample is restricted to men who a) actually completed their compulsory service time and b) did so either in military service or civilian service. Thus, it is assumed that there exists no systematic bias due to health differences, which are shown to be important in other studies (e.g., Bauer et al., 2014). Nevertheless, section 4.5 discusses other factors such as motivation, parental background or opportunity costs.

Further, the sample includes only men with full-time employment. Differences between men employed full- and part-time are well known and could bias the results.⁶ The final sample includes 1,266 men (896 with military service) who fulfilled their compulsory service. This results in an unbalanced data structure of 18,404 male-year observations (with a maximum of 29 observations per man) over the period 1980-2008.

The survey information on the life course is used to determine the timing and type of compulsory service. The main variable of interest is a dummy variable indicating whether the person completed military service (reference category) or civilian service. Because of the upper earning limits on social security contributions, wages are right-censored. Following Gartner (2005) and Reichelt (2015) data are imputed. The dependent variable is the log daily wage, deflated to the year 2005 according to the consumer price index. Figure 4.2 and Figure 4.3 provide a first impression of the relationship between wages and service type. Figure 4.2 shows, for each calendar year, the mean wage of both service types. The time trend for both services is positive. For the entire period, the average wage of men having fulfilled civilian service is smaller.⁷

⁵No information are available about the process of physical medication (*Musterung*). Life-course information provide information whether a) young men fulfilled military service, b) fulfilled civilian service or c) no service at all. Hence, young men who were completely rejected (*Ausmusterung*) are in the last group and not included in the sample.

⁶In robustness checks, part-time episodes were included. The patterns remain quite stable, and the results are available upon request.

⁷The dip in Panel A in the mid-1980s can be explained by the low number of observations engaged in civilian service during that period.

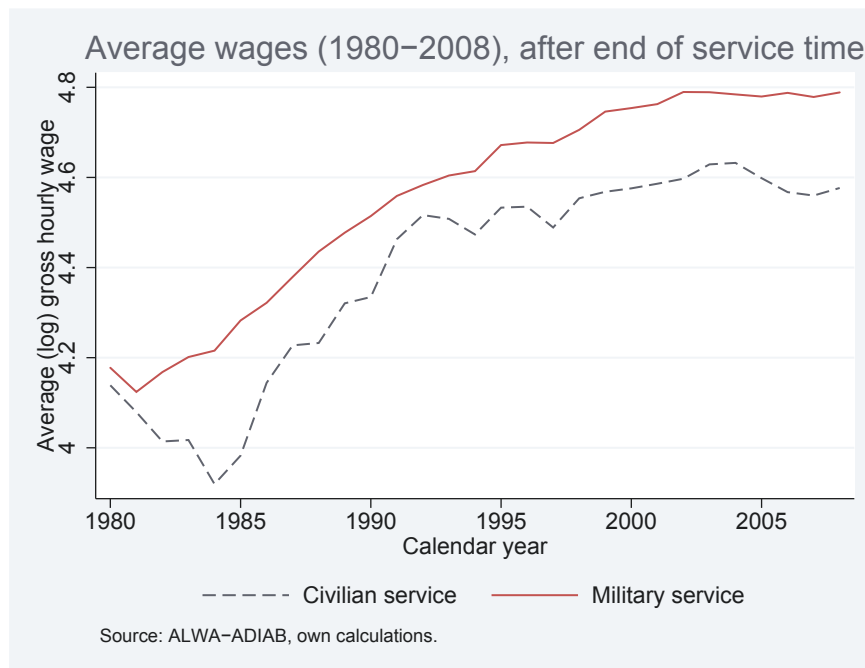


Figure 4.2.: Average wages by years

Figure 4.3 shows the wage profiles, but now as a function of the time after the end of compulsory service. The patterns imply that wage differences exist immediately in the first years after compulsory service. As employer learning theory would predict, the difference vanishes after a few years.

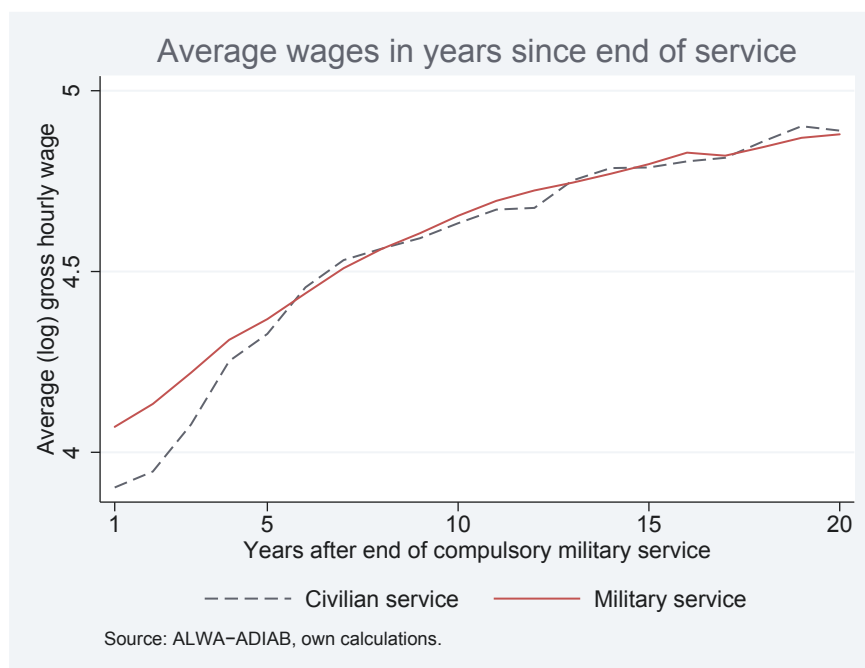


Figure 4.3.: Average wages by years since end of service time

Because these descriptive patterns could be affected by additional factors, the baseline model includes further control variables for a man's human capital and socioeconomic characteristics. Educational attainment is a categorical variable: unskilled, vocational training and an academic degree. Age and tenure and its polynomial terms are included. Following Angrist and Pischke (2009), the article uses only a parsimonious baseline model to avoid potential selection bias. However, extended models also include job and firm characteristics such as occupations or industry sectors.

To test the employer learning hypothesis, an individual's tenure with the service type is interacted. The coefficient on the service type variable describes the wage difference at the beginning of employment with a new employer, and the interaction term describes differences after accounting for tenure. A positive interaction term indicates a surplus for draftees in the civilian service over time, i.e., steeper wage growth. In the first step respondent's overall employment experience is not included due to its high collinearity with tenure. It is plausible to assume that tenure with the same employer is a better indicator for individual's productivity because more individual information are available (for the employer). In a second step (see section 4.5) different specifications are used including employment experience.

As a proxy for individual's cognitive ability, the regressions include the respondent's (self-rated) school performance in mathematics and German language.⁸ For readability, the grades were recoded, e.g., a higher value indicates a better grade. Dummy variables for Federal States control for regional fixed effects and year variables control for time effects. The regional unemployment rate controls for overall economic conditions. Interaction terms of year and service type test the hypothesis that the pattern changes over time. Conditional on a wage penalty, a positive coefficient on the interaction variable suggests a decrease in the wage differential. Information on the life course is used to test the differences with respect to educational attainment. A categorical variable with three categories for educational attainment (lower, intermediate and upper secondary degree) before the start of compulsory service is interacted with the service type dummy variable. Table 4.1 provides a descriptive summary of the main variables.

Exploiting the panel structure of the data, the article applies the wage estimations as follows:

$$y_{it} = s_i' \lambda + x_{it}' \beta + (\alpha_i + \epsilon_{it}); \quad \text{with } i = 1, 2, \dots, N \quad \text{and } t = 1, 2, \dots, T.$$

⁸Because the interviews were conducted in 2007/2008 and, hence, after compulsory service was completed, this information is possibly endogenous. Models without both variables do not generate different results.

Table 4.1.: Descriptive summary, mean by service type

	Service typ		Test statistics ¹
	Civilian service	Military service	
Age [in years]	33.29	34.33	9.73***
Employment experience [in years]	8.51	11.78	27.53***
Tenure [in years]	4.86	7.40	27.67***
School performance: German²	3.36	3.20	10.82***
School performance: Math²	3.47	3.63	7.53***
Year after end of service	10.90	13.10	16.95***
Educational attainment³			442.14***
Unskilled	6.40	4.61	
Vocational training	54.59	72.99	
Academic degree	39.01	22.40	
School degree before service time³			760.60***
Lower secondary degree	13.99	37.41	
Intermediate secondary degree	31.12	28.53	
Upper secondary degree	54.89	34.07	
Firm size³			58.29***
Small [1-49 employees]	34.38	32.92	
Medium [50-249 employees]	27.89	22.79	
Large [>249 employees]	37.73	44.30	
Observations	3,281	15,123	18,404

Source: ALWA-ADIAB, own calculations. Omitted: occupation groups, economic branches, federal states and unemployment rate.

¹ Results from t-Tests respectively χ^2 -Tests. Significance levels: *** $p < 0.01$.

² In Germany, the grades rating is usually from 1 [very good] to 6 [very bad]. As convenience, the grades were recoded, i.e. 6 indicates the best grade.

³ For categorical variables columns percentages are shown and χ^2 -Tests applied.

The dependent variable y_{it} represents daily wages in logs, s_i' is an indicator variable for the type of service, and x_{it}' are the additional control variables, including the interaction terms. α_i denotes the individual-specific effect, and ϵ_{it} is an idiosyncratic error term. Because the focus is on a time-consistent variable (military or civilian service), fixed effects estimators are not feasible, and random effects estimators (FGLS) are applied instead. All regressions use robust standard errors clustered at the individual level.

4.4. Results

Table 4.2 provides the estimates from the baseline model. The results for the covariates are in line with typical findings: Tenure, age and its polynomials are highly statistically significant and indicate a positive but decreasing association. Men with an academic degree earn substantially more and demonstrate the high relevance of professional credentials. The school performance regressors indicate a positive influence on wages.

Table 4.2.: Wage differences (RE-GLS estimates): Baseline estimates

	(1)	(2)	(3)
Civilian service	−0.137*** (0.025)	−0.111*** (0.020)	−0.112*** (0.022)
Vocational degree		0.065 (0.042)	0.071* (0.042)
Academic degree		0.365*** (0.046)	0.369*** (0.046)
Age in years		0.084*** (0.005)	0.071*** (0.006)
Age in years [squared]		−0.001*** (0.000)	−0.001*** (0.000)
Tenure in years		0.012*** (0.002)	0.012*** (0.002)
Tenure in years [squared]		−0.000*** (0.000)	−0.000*** (0.000)
School performance: Mathematics		0.061*** (0.009)	0.060*** (0.009)
School performance: German		0.032** (0.013)	0.033** (0.013)
Constant	4.643*** (0.013)	2.409*** (0.103)	2.567*** (0.112)
Federal states	no	yes	yes
Regional unemployment rate	no	yes	yes
Year	no	no	yes
R2 overall	0.002	0.396	0.399
R2 within	0.000	0.400	0.404
R2 between	0.029	0.403	0.405

Source: ALWA-ADIAB, own calculations.

Note: The standard errors (in parentheses) are White-Huber standard errors accounting for correlation at the individual level. ***/ **/ * indicates significance at the 1/5/10% level.

The main variable of interest shows a statistically significant wage differential of almost 11 percent that is attributable to the disadvantage faced by draftees in the civilian service. Controlling for year effects (column 3) does not alter the overall result. This clearly corroborates hypothesis H1, that is, a penalty for young men who fulfilled civilian service. However, these results do not indicate whether there simply are no positive effects, or whether the negative effect of signaling or prejudice dominates the positive effect.

Testing for a time trend does not support any significant changes over time (results not reported). Figure 4.4 shows the corresponding marginal effects when interaction terms of the year and service type are included as linear functions.⁹ In 1980, the first year of observation, the wage differential is approximately 18%, which then only slightly declines over time. Whereas the overall difference (both terms are jointly) is statistically significant, the interaction term itself is statistically insignificant.

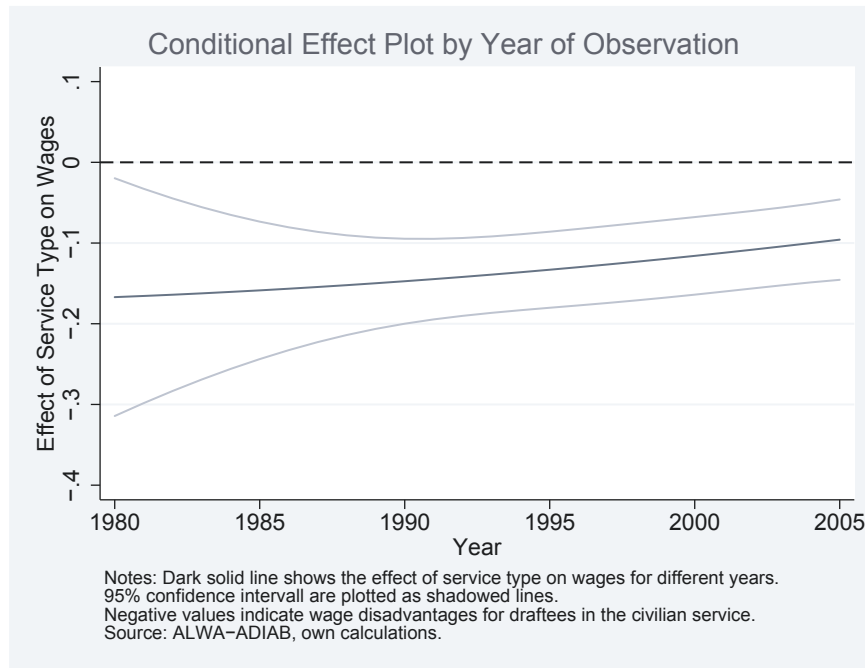


Figure 4.4.: Effect of Service Type on Wages by Year

Table 4.3 and Figure 4.5 provide the results from testing the employer learning hypothesis using tenure with the same employer. As presumed, wage disadvantages for the civilian service are more pronounced in the first years after compulsory military service, i.e. with less years of tenure. The coefficients for the control variables barely change (not reported), but there exists a wage penalty for draftees in the civilian service beginning to work for a new employer (without any tenure) of 13%. The model in column 2 assumes a linear interaction of tenure with service type and indicates a positive impact of civilian service and tenure. Both estimates are jointly significant at the 1% level or higher. Testing for a nonlinear interaction (column 3) is not supported. Figure 4.5 shows the marginal effect (and its confidence interval) of the two service types when varying the amount of tenure.

The difference is approximately 13% absent tenure, but this gap shrinks for each additional year of tenure and becomes statistically insignificant after 13 years. The results

⁹Using other time specifications such as with fixed, linear or cubic terms reveals a similar picture.

Table 4.3.: Wage differences (RE-GLS estimates) testing employer learning

	(1)	(2)	(3)
Civilian service	−0.112*** (0.022)	−0.129*** (0.022)	−0.130*** (0.023)
Tenure in years	0.012*** (0.002)	0.011*** (0.002)	0.011*** (0.002)
Tenure in years [Squared]	−0.000*** (0.000)	−0.000*** (0.000)	−0.000*** (0.000)
IA: Civilian service X tenure		0.005** (0.002)	0.006 (0.005)
IA: Civilian service X tenure [squared]			−0.000 (0.000)
Constant	2.567*** (0.112)	2.572*** (0.112)	2.573*** (0.112)
Individual controls	yes	yes	yes
Federal states	yes	yes	yes
Regional unemployment rate	yes	yes	yes
Year controls	yes	yes	yes

Source: ALWA-ADIAB, own calculations.

Note: The standard errors (in parentheses) are White-Huber standard errors accounting for correlation at the individual level. ***/ **/ * indicates significance at the 1/5/10% level.

show that men who opted for the civilian service, c.p., began their labor market careers with lower wages than men who selected military service. Young men who chose the civilian service, c.p., initially received a lower wage, but this gap declines as tenure increases because of steeper wage growth. This is interpreted as support for the employer learning hypothesis.¹⁰

One explanation is that at the beginning of individuals' careers, firms tend to assess the productivity of draftees in civilian service as lower and that hiring managers are prejudiced against them. Draftees in the civilian service were long regarded as slackers, which explains the initial wage differential. After being employed by a firm for several years, this prejudice declines, and the wage gap for young men is reduced. The results are robust to different model specifications (see Section 4.5) and strongly support the existence of a negative overall impact of civilian service. The results show that the negative impact decreases with tenure.

Hypothesis H4 assumes differences with respect to educational attainment. The next

¹⁰Using fixed-effects models to estimate wage equations either for draftees in the civilian or in the military service reveal consistent results, i.e. that the wage growth is not explained by unobservable individual factors.

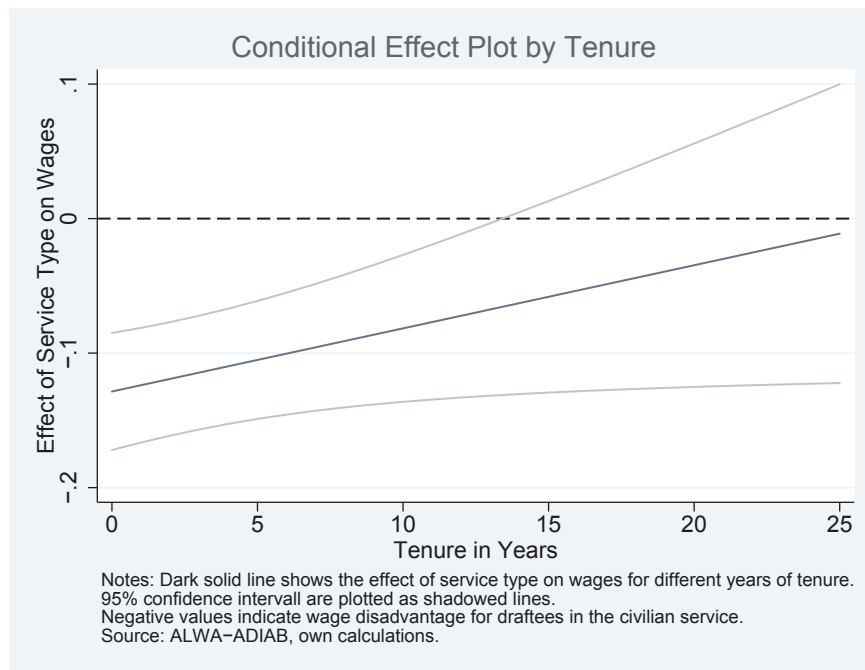
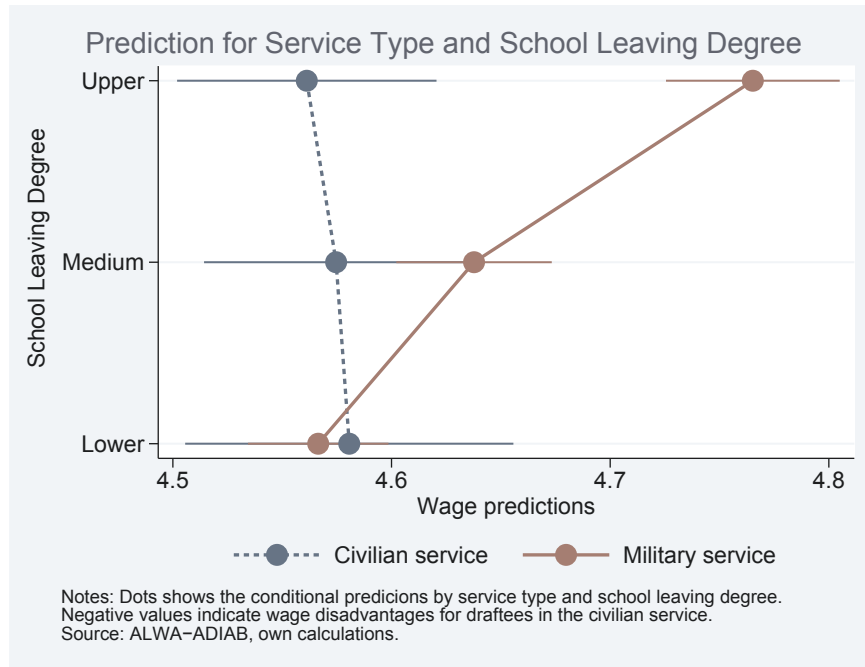


Figure 4.5.: Effect of Service Type on Wages by Tenure

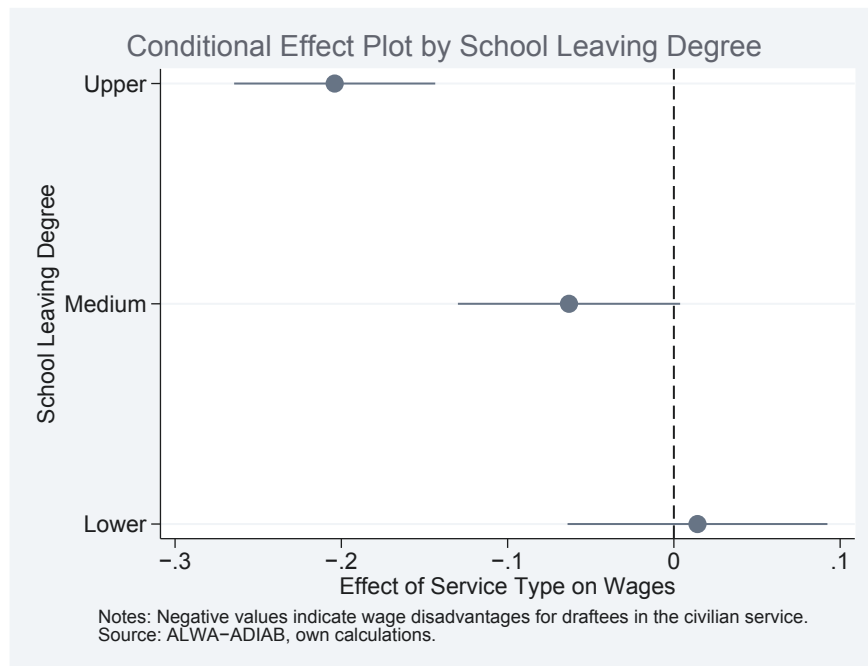
specification include interaction terms of service type and highest degree. Figure 4.6 presents the results as predictions and conditional effects for the different levels of schooling. On the one hand, the patterns for military draftees indicate a positive relationship between service type and schooling, e.g., higher wages for students with upper secondary degrees. On the other hand, the patterns for civilian draftees indicate the opposite relationship between service type and schooling, with particular disadvantages for those who completed an upper secondary degree. Whereas the effect of civilian service is positive and statistically insignificant for those with low education, the effect is negative and statistically significant for those with intermediate and upper secondary degrees.

Theoretically, one explanation is that young men with an upper secondary degree receive a stronger penalty from not selecting military service because they deviate more substantially from expected social norms. It was more reasonable to follow the expected norm and pragmatically complete one's service in the armed forces because of the shorter period of service. Hence, young men who opted for the civilian service and in particular those who completed school with an upper secondary degree were more critically assessed and penalized.¹¹

¹¹When additional control variables for firm size and dummies for occupations and economic sectors are included, the differences for those with upper secondary degrees are decreased but remain statistically significant.



(a) Predictions by educational attainment



(b) Marginal effects by educational attainment

Figure 4.6.: Differences by service type and educational attainment

Alternatively, a non-random positive selection of students who opted for the civilian service (Kuhlmann and Lippert, 1991; Schneider, 2003) could explain the declining advantage of schooling. The duration of civilian service has long been substantially longer, and hence, the opportunity costs were also higher (i.e., time, foregone income, later labor market entry). Only young men who were prepared to accept these disadvantages and considered the opportunity costs to be lower selected civilian service. Specifically, it is likely that these young men who selected the civilian service differ in their attitudes toward labor-market-relevant outcomes that foster the wage differentials.

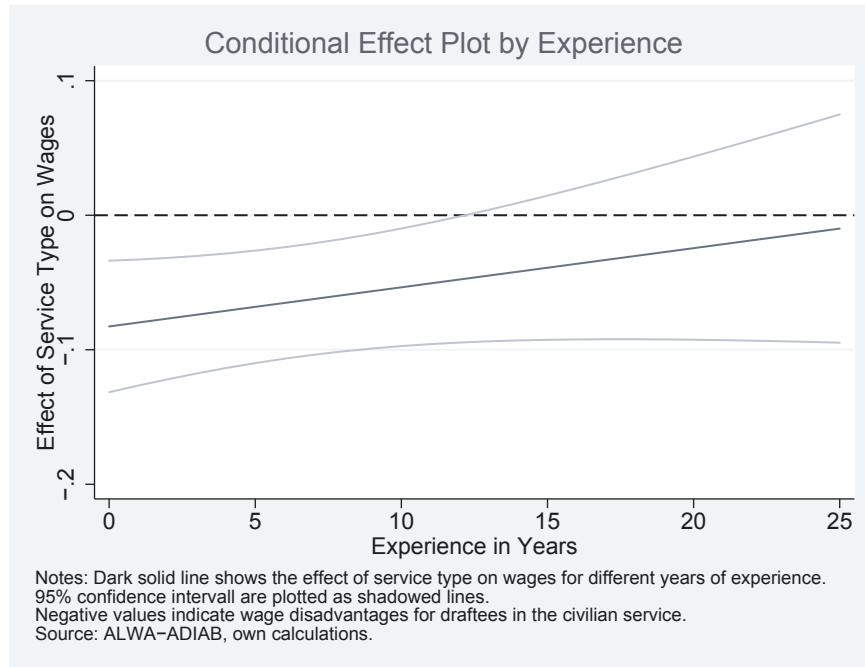
The positive impact, although statistically insignificant, for school graduates with a lower secondary degree is also remarkable. In contrast to both other education levels, the overall share of graduates with the lowest educational attainment who selected the civilian service is approximately 14% and clearly lower than for men with intermediate (31%) or upper secondary degrees (54%). While for the least well educated, it was very uncommon to fulfill the compulsory service outside the armed forces, civilian service was more common for both other education levels. Thus, this small group of young men who take the additional effort to apply as conscientious objectors is highly selective. This sub-group of young men may exhibit greater motivation or a different attitude toward individual self-conscious reflection. The positive aspect of civilian service for school leavers with lower secondary degrees could also be due to a highly positive selection of the small group demonstrating higher potential. Whereas graduates with upper secondary degrees fulfilling the civilian service were penalized, those with lower secondary degrees were rewarded.

4.5. Further heterogeneity and sensitivity analysis

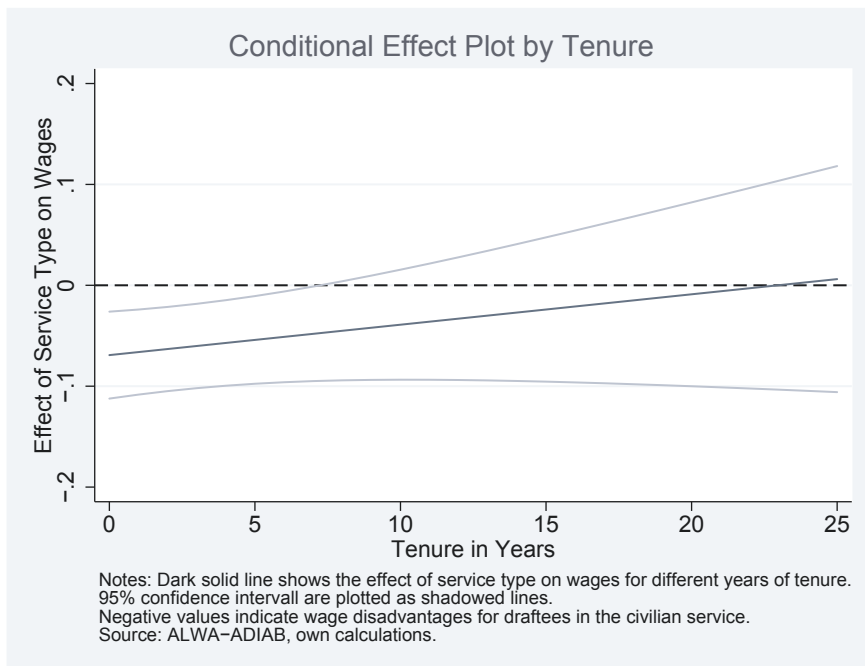
4.5.1. Work experience and employer learning

The model includes an individual's tenure with a given employer. As robustness check, the model is extended to include overall employment experience, including work experience with different employers. The estimations from the baseline models show the same pattern. Draftees in the civilian service receive a general wage penalty, but this gap decreases as they gain additional work experience (Panel A in Figure 4.7).

Panel B shows the impact in model that includes both tenure and overall work experience. Compared to the reduced baseline model, the pattern is similar, but the overall impact decreases from 11% to approximately 6% when working experience is used (instead of tenure).



(a) Plots of Service Type and Experience



(b) Plots of Service Type and Tenure (including experience)

Figure 4.7.: Conditional Effects Plots, Testing Robustness of Employer Learning

As additional check for employer learning, using additional information on employment histories, the sample is divided into different sub-samples. Firstly, the overall working experience is used to create four sub-samples: up to 5 years, 6-10 years, 11 to 20 years and 21 and more years of experience. On the one hand for new labor market entrants less information about productivity are available and the civilian or military service should have a stronger signal and impact. On the other hand for more experienced workers this signal should be weaker or irrelevant. Figure 4.8 confirms these expectations. The negative signal of the civilian service plays only an important role for the two less-experienced samples.

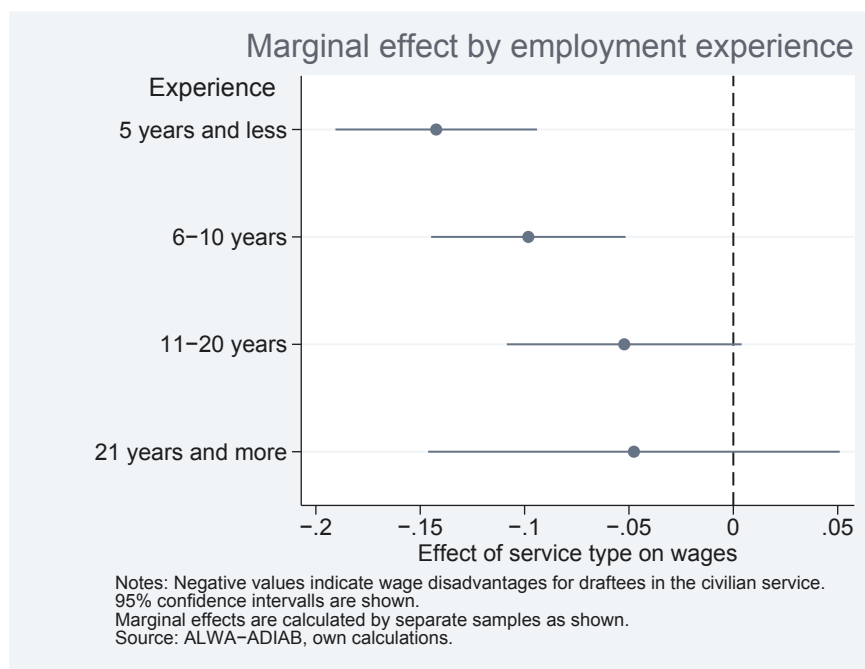


Figure 4.8.: Marginal effects by sub-sample, based on working experiences

Secondly, information about the first employment status before and after the service time is used. Usually, compulsory service begins by the age of 18, i.e., after successful apprenticeship training respectively after graduation from upper secondary school but before entering tracks for higher education. This information is used to divide the observations into three sub-samples: a) persons who worked before the service and returned to the same employer after service, b) persons who worked before service and did not return to the same employer after service and c) persons who did not work before service. Employers have more information about the young men in the first two groups because they had time to assess the men's work personalities during the apprenticeship and employment period before compulsory service. Thus, the additional information should reduce prejudice relative to that experienced by the third group for whom no information is available.

Figure 4.9 uses the first employment episode after completing the compulsory service time and shows the marginal effects for the three different samples. It confirms the picture that employers may have prejudices and discriminated against draftees in the civilian service, but these prejudices reduce with additional information.¹² Serving in the civilian service has a positive (but statistically insignificant) impact for men returning to their old employers. In contrast the impact is negative and substantially larger for both other groups (12% and 8%).

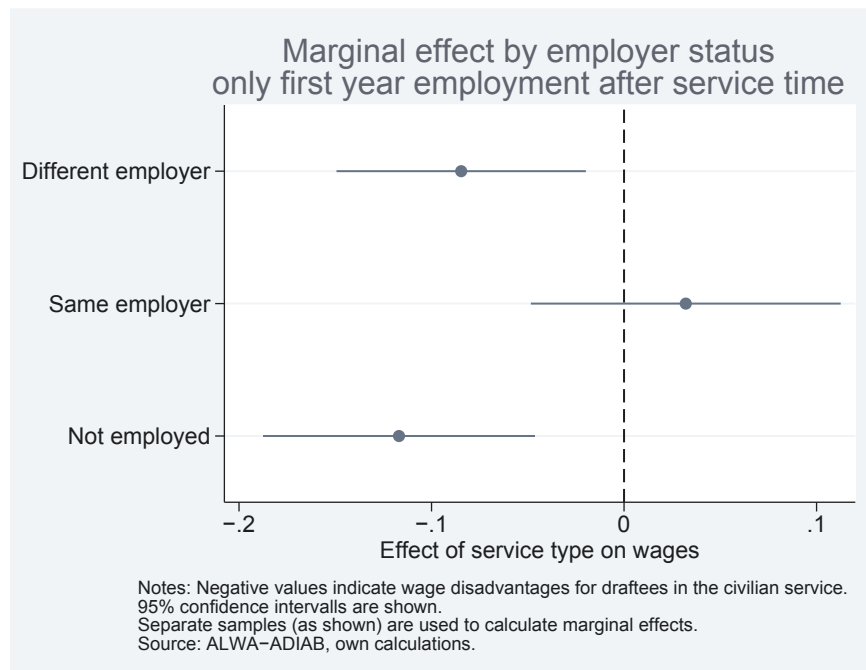


Figure 4.9.: Marginal effects by sub-sample, based on employer status

Thirdly, the article considers only the two groups who worked before compulsory service and includes the last income prior to service as an additional proxy for productivity in additional regressions (not shown). Because higher productivity is correlated with higher wages, this could be another explanation for the wage difference or omitted variable bias. Although the estimations results show that, the wage difference declines from 10% to 6% the results support the prior findings of the wage discrimination against the draftees in the civilian service.

¹²Since there is only one observation for each man the article applies OLS estimations (instead of random effects estimations).

4.5.2. Including job characteristics

The baseline models exclude job characteristics as control variables. Following Angrist and Pischke (2009), the choice of the civilian service may be correlated with job characteristics, for example, occupation or economic sector. Someone who selected the civilian service and fulfilled their duty as a caretaker or childcare worker (possibly as an orientation period or internship) is more likely to subsequently work in a social occupation. Hence, including occupations or economic sectors could produce selection bias. To assess possible selection bias, the article includes additional dummies for occupation (13), economic sector (8) and firm size (small, medium, large).¹³ Table 4.4 reports the corresponding results.

Table 4.4.: Wage differences (RE-GLS estimates): testing heterogeneity with respect to job characteristics

	(1)	(2)	(3)	(4)	(5)
Civilian service	-0.112*** (0.022)	-0.095*** (0.023)	-0.107*** (0.021)	-0.090*** (0.022)	-0.114*** (0.030)
Tenure in years	0.012*** (0.002)	0.013*** (0.002)	0.011*** (0.002)	0.012*** (0.002)	0.012*** (0.002)
Tenure in years [Squared]	-0.000*** (0.000)	-0.000*** (0.000)	-0.000*** (0.000)	-0.000*** (0.000)	-0.000*** (0.000)
Firm size (medium): 50-249 employees			0.049*** (0.013)	0.051*** (0.013)	0.046*** (0.014)
Firm size (large): >249 employees			0.090*** (0.014)	0.093*** (0.014)	0.072*** (0.015)
IA: Civilian service X firm size (medium)					0.022 (0.029)
IA: Civilian service X firm size (large)					0.079** (0.034)
Constant	2.567*** (0.112)	2.585*** (0.111)	2.548*** (0.110)	2.564*** (0.109)	2.603*** (0.110)
Individual controls	yes	yes	yes	yes	yes
Federal states	yes	yes	yes	yes	yes
Regional unemployment rate	yes	yes	yes	yes	yes
Occupations	no	yes	no	yes	yes
Economic branches	no	no	no	no	yes
Year controls	yes	yes	yes	yes	yes

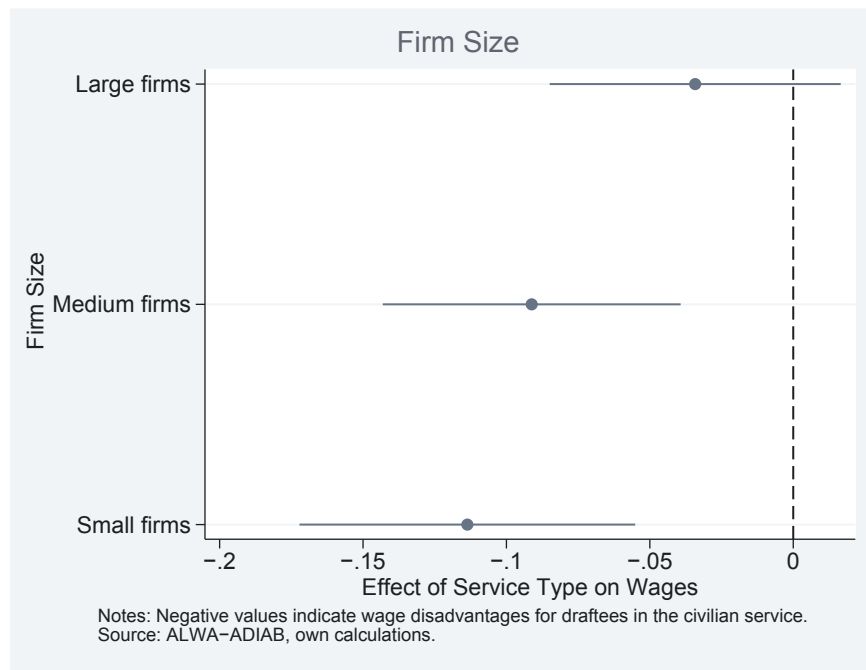
Source: ALWA-ADIAB, own calculations.

Note: The standard errors (in parentheses) are White-Huber standard errors accounting for correlation at the individual level. ***/ **/ * indicates significance at the 1/5/10% level.

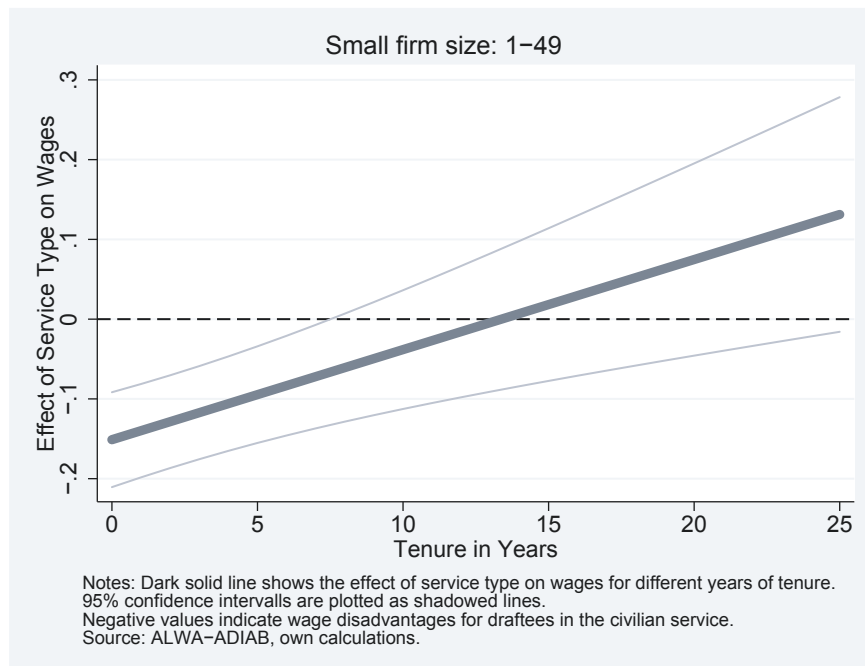
Without reporting on all control variables in detail, after extending the baseline model (column 1) to include only occupational groups (column 2) or only firm size information

¹³Using the administrative data information on the classification systems for occupations ("Klassifikation der Berufe") and economic sectors ("Wirtschaftszweige"), the article summarized this information into meaningful occupations and economic sectors. Different specifications do not generate different patterns.

(column 3) the estimates do not change substantially. The coefficient on the dummy variable for civilian service nevertheless decreases by approximately 2 percentage points (or 20 percent) when occupations and firm size information are included (column 4). The estimations indicates that the dummy variable for civilian service is likely overestimated and that some share of the estimate reflects these job characteristics. This result is maintained when additional interaction terms are included (5). Calculating the effects of service type and firm size shows a positive correlation between firm size and civilian service. Whereas draftees in the civilian service working in smaller firms receive, c.p., a mean wage penalty of 11%, the wage penalty reduces to approximately 9% in medium-sized firms and 3% in large firms (see Panel A in Figure 4.10).

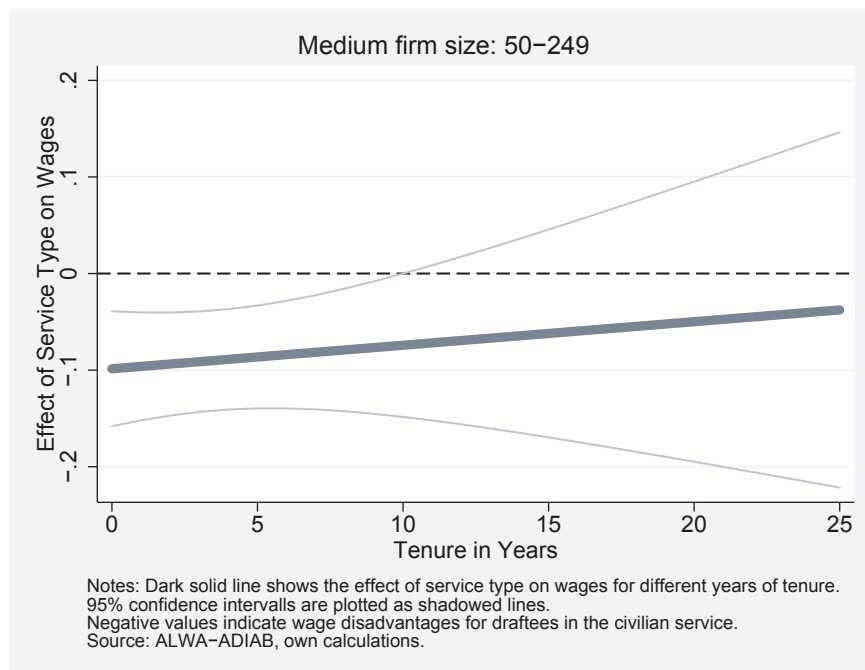


(a) By Firm Size

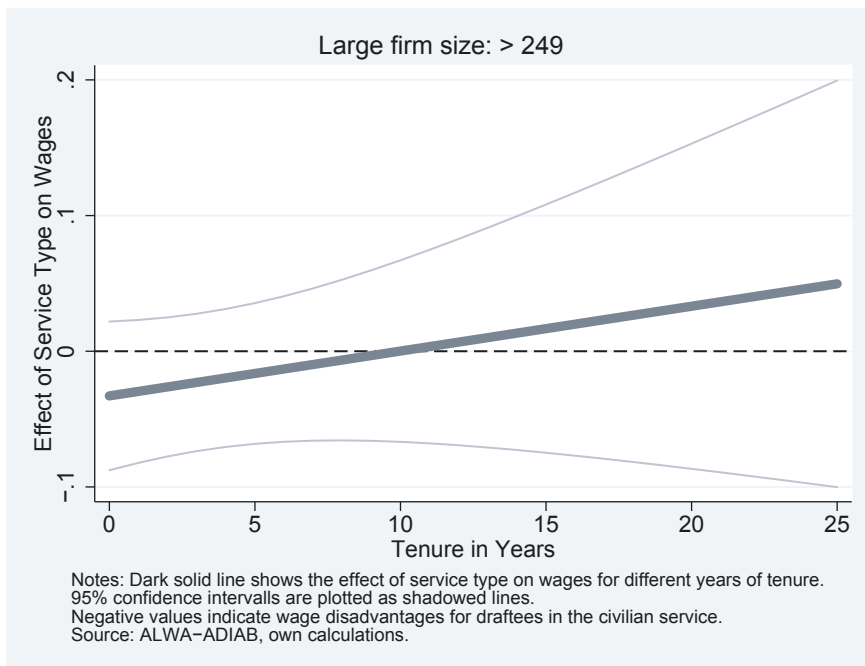


(b) By Tenure in Small Firms

One explanation is that small firms are more traditional, hierarchically oriented and make decisions based on family or ownership preferences. In contrast, larger firms have specialized human resource departments that employ more professional recruitment processes, and individual prejudices are less important in these firms. Panels B, C and D in Figure 4.10 depict the results in greater detail, that is, conditional on tenure in the firm. When entering a new firm, draftees in the civilian service face greater wage disadvan-



(c) By Tenure in Medium Firms



(d) By Tenure in Large Firms

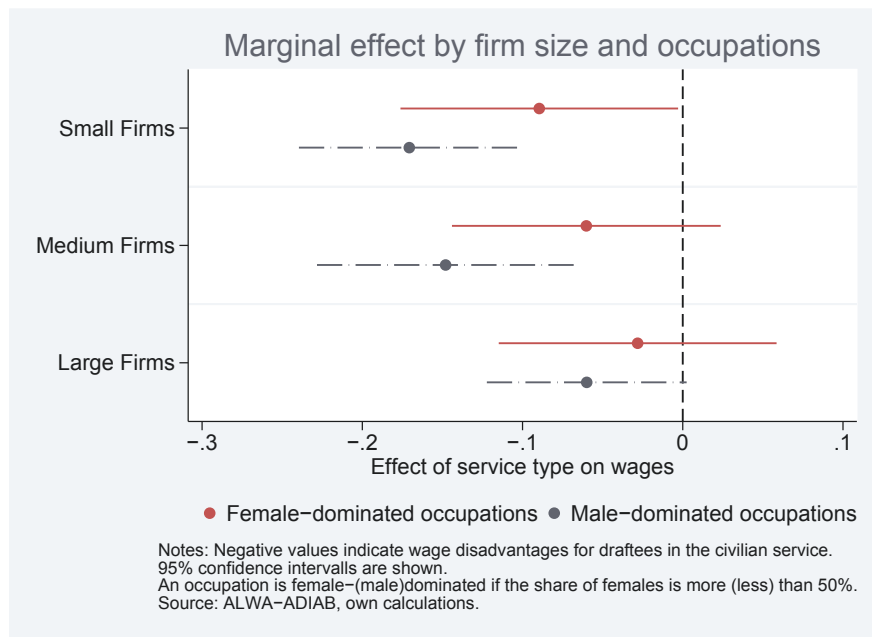
Figure 4.10.: Conditional Effects Plots by firm size and tenure

tages in smaller firms, but these prejudices decrease and become positive (although not statistically significant) after many years. In contrast, in medium firms, the differences are smaller, quite robust and statistically significant for a longer time. In large firms with more professional human resources departments, the wage differences are smaller.

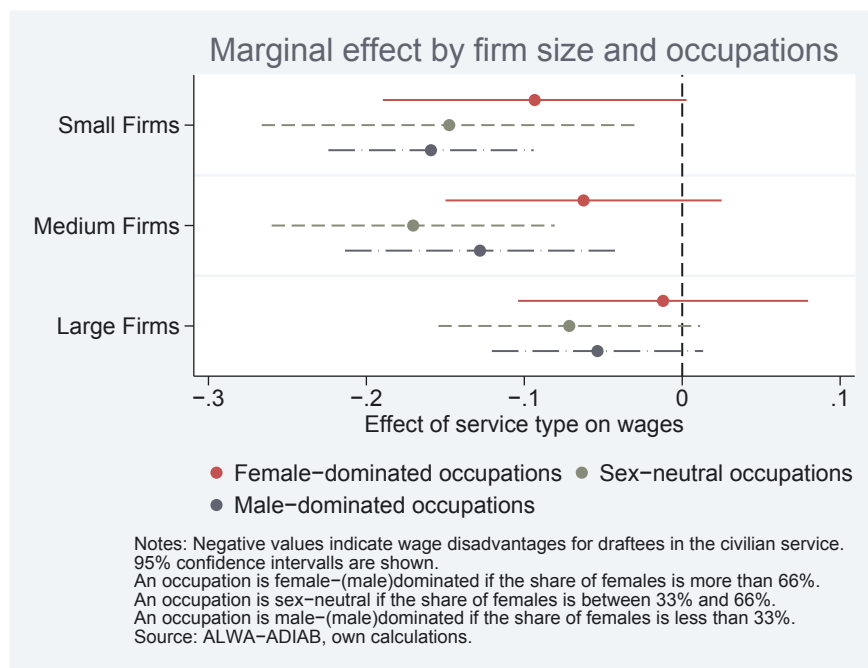
Further estimations exploit heterogeneity with respect to occupations. In social occupations, such as caretaking or child care, young men who opted for civilian service may send a positive signal. It is also possible that young men fostered their human capital and gained experience if prospective medical doctors were able to use their period of civilian service as an "internship". In contrast, in more traditional occupations (e.g., the construction, production or metals), the image of being a slacker is more harmful. The estimations indicate no statistically significant differences for the interaction terms, while the coefficients for the remaining control variables do not change substantially.

As an additional check, a further data set aggregates information on occupational level (Hausmann et al., 2015) and gives information about the share of females for each occupation (3-digit) and year. The image of a slacker should be more harmful in more traditional, male-dominated occupations. Therefore, using different specifications to classify occupations as male or female-dominated, the article extends the baseline model by including these information. Panel A in Figure 4.11 uses a dummy variable whether the share of females is more than 50% or less indicating a "female-dominated" or "male-dominated" occupation. Panel B uses "33%", "33% to 66%" and "66% and more" as thresholds.

On the one hand, the figures show the well-known fact that in both female and male-dominated occupations wage differences reduce with firm size (see also Figure 4.10). On the other hand, the figure shows for all three firm sizes significantly smaller negative effects in female-dominated occupations. The effect is approximately the double in male-dominated occupations. In female-dominated occupations the negative effects of the civilian service is insignificant. Overall, these findings clearly point towards the existence of prejudices against the civilian service as a slacker, at least in a male-dominated occupational environment.



(a) Using two groups classification



(b) Using three groups classification

Figure 4.11.: Conditional effects by firm size and sex-dominated occupations

4.5.3. Sensitivity analysis

First, as outlined, the regressions use the feasible GLS random effects estimator to obtain an estimate of the time-consistent variable of interest. One assumption of this estimator is that the unobserved heterogeneity α_i is a random error component and is uncorrelated with all independent variables. If that assumption does not hold, the estimates might be biased. Although, the model controls for a broad range of variables that affect wages, it is not possible to control for all unobserved factors, such as individual preferences or motivation. Hence, the estimates might not represent a causal effect of the service type but rather correlations. A fixed effects estimator cannot generate estimates for time-consistent variables but only estimates for variables that change over time. As robustness check, the models include interaction terms of tenure and service (as in Table 4.3) and yield estimates of these interaction terms (because they vary). Table 4.5 shows that these estimates do not change and remain statistically significant, which supports the previous finding of the mitigating impact of work experience and employer learning.

Table 4.5.: Wage differences: comparing RE and FE estimates

	RE-I		FE-I	
Civilian service	−0.129***	(0.022)		
Vocational degree	0.069	(0.043)	0.087***	(0.022)
Academic degree	0.368***	(0.047)	0.364***	(0.025)
Age in years	0.071***	(0.006)	0.085***	(0.002)
Age in years [Squared]	−0.001***	(0.000)	−0.001***	(0.000)
Tenure in years	0.011***	(0.002)	0.010***	(0.001)
Tenure in years [Squared]	−0.000***	(0.000)	−0.000***	(0.000)
IA: Civilian service X tenure	0.005**	(0.002)	0.004***	(0.001)
Federal states	yes		yes	
Regional unemployment rate	yes		yes	
Year controls	yes		yes	
Observations	18404		18404	

Source: ALWA-ADIAB, own calculations.

Note: The standard errors (in parentheses) are White-Huber standard errors accounting for correlation at the individual level. ***/ **/ * indicates significance at the 1/5/10% level.

Second, unobserved heterogeneity and potential endogeneity of the service type variable still occurs. Unfortunately, there are no information about the examination results and individuals' reasons to reject the military service. Therefore, the exact selectivity process into military or civilian service remain unknown and could bias the estimates. There

are several potential variables which could influence the decision for rejection. On the one hand, individual motives, familiar background, social environment and networks are relevant factors on individuals' level. On the other hand, macro factors could be important. Opportunity costs such as the duration of the civilian service in contrast to the military service, changing standards on the required number of draftees or political changes may influenced young men's decision to reject military service or not. Considering potential sources, the article identifies and testes available variables in the data set as potential instrumental variables.

In a first step, probit estimations on the probability to choose military service against the civilian service to identify relevant factors (see Table 4.6) are conducted.

Table 4.6.: Probability to choose military service (against civilian service), probit.

	Military service	
Lower secondary school degree	0.118***	(0.029)
Uppers secondary school degree	−0.089***	(0.029)
School performance: German	−0.055***	(0.015)
School performance: Mathematics	0.031***	(0.011)
Birth year	0.018***	(0.007)
Father: Academic degree	−0.111***	(0.043)
Father's birth year	0.001	(0.002)
Year of service start	−0.034***	(0.006)
Ratio of duration of civilian service/military service	0.278**	(0.120)
Religiousness	−0.001	(0.010)
Importance: family and children	0.009	(0.015)
Importance: leisure	0.010	(0.016)
Importance: partner	−0.012	(0.020)
Importance: work and career	−0.041**	(0.016)
Importance: friends	0.008	(0.017)
Federal states	yes	
Regional unemployment rate	yes	

Source: ALWA-ADIAB, own calculations.

Note: ***/ **/ * indicates significance at the 1/5/10% level.

Parental background is measured with father's educational level (academic degree or not) and father's birth year. The year of the service start and the ratio of the durations of civilian and military service control for political and social changes, for example appreciation of the civilian service. Importance in different life aspects controls for man's preferences. The probit results indicate several potential instruments. The younger (and later) the service started the higher the propensity to reject the military service. The higher the duration of the civilian service (in contrast to the military service) the lower

the propensity to reject the military service.

In a second step, these variables are used to estimate several instrumental variable regression models. To brief up, none regression indicate that these variables are good instrument. All statistical tests confirm either weak instruments or an overidentification problem.¹⁴

Third, as described previously, one shortcoming of the administrative data is that earnings are right-censored at the upper earnings limits for the social security contribution. In robustness check, the article estimates the model a) without these observations and b) using the right-censored observations. Since the data cover a period of nearly 30 years, approximately 18 percent of the observations are affected by the upper limit. In brief, the size of the coefficients change, but the main results and patterns remain stable.

4.6. The impact of the civilian service

Thus far, the article indicates discrimination effects and wage disadvantages for draftees in the civilian service. The following section discusses the findings and provides some further explanations.

First, the different skills acquired during the compulsory military service are valued differently in the labor market. That is, only the draftees in the military service learned and received skills that were subsequently rewarded. The jobs of those in the civilian service were mainly in the social sector, for example as care assistants or caretakers, but there were also some in the environmental sector, e.g., public relations or media tasks. However, the largest share of the time spent in military training consisted of military exercises (for example, firing practice, basic instruction, specialized military training). The skills acquired during that period are unlikely needed in a typical labor market. Additionally, soft skills such as teamwork, a sense of duty and punctuality are not specific to military service. While, in some cases, individuals may profit from their military service, it is less plausible that, on average, only draftees in the military service acquired such highly rewarded skills.

Second, basic preferences with respect to labor market outcomes or personality traits could differ between the two groups. Unquestionably, individual attitudes are important determinants of the potential selection into military or civilian service but could also explain the direct impact of service on wages. Due to data limitations, such information at the time of conscription is not available, which is unfortunate because it would be the

¹⁴In addition, the article estimated Hausman-Taylor models. Since the estimates are not robust and very volatile, it is refrained from presenting these results.

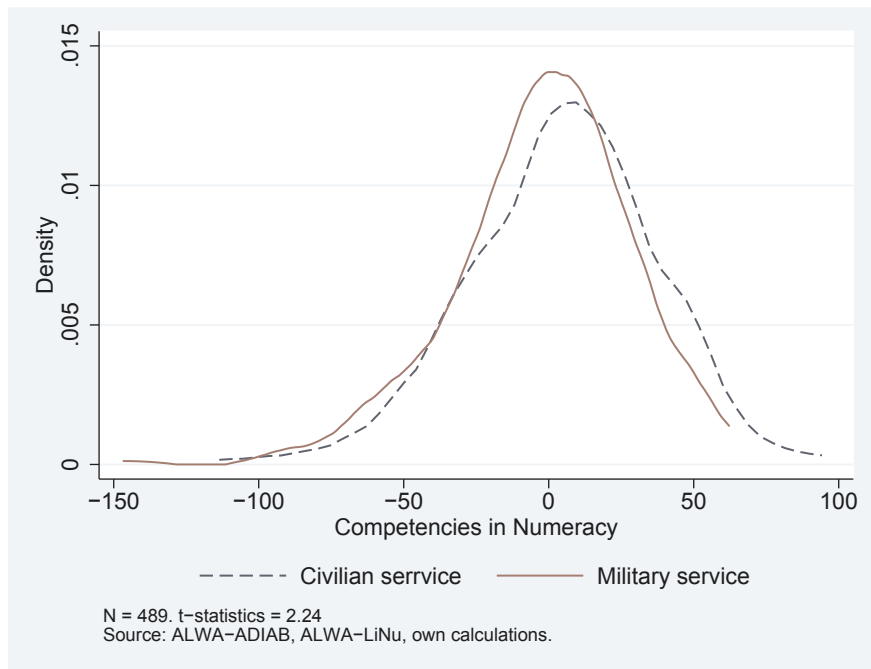
appropriate choice to model the exact process of selecting into civilian or military service. However, using further information at the time of the interview, this channel is examined in more detail.

Respondents were asked (on a 5-point Likert scale) about the importance of the following aspects: a) family and children, b) partnership, c) leisure and recreation, d) friends and acquaintances, e) work and occupation and f) religiosity. Applying χ^2 -tests of differences between the two groups, draftees in the military service value family and children and, particularly, work and occupation significantly more highly and exhibit higher religiosity; by contrast, draftees in the civilian service value friends and acquaintances more highly. The results suggest that the draftees in the military service show an higher propensity to value labor market outcomes. Thus, some part of the remaining wage differences could continue to reflect unobserved attitudes and preferences.

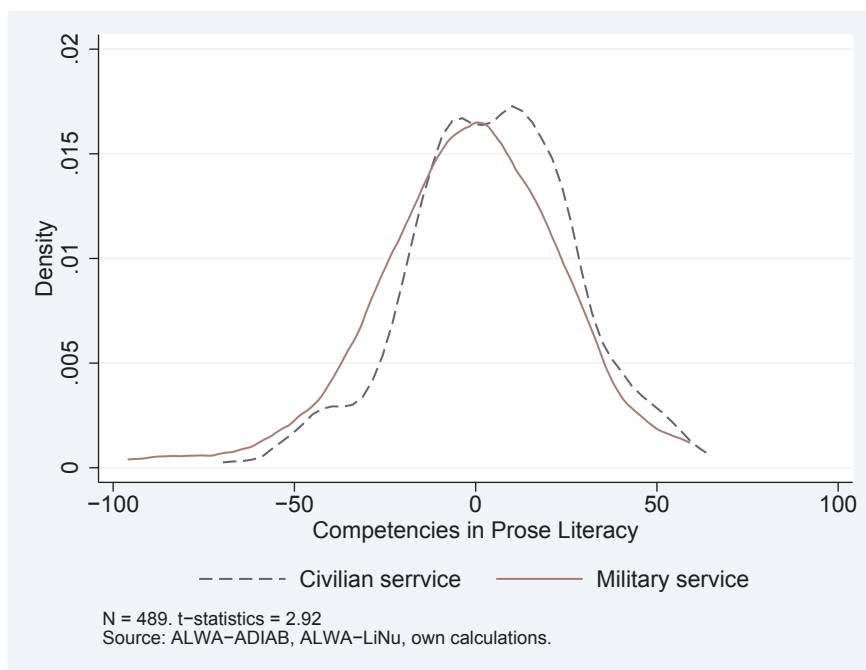
Third, cognitive skills are an additional unobserved factor and represent another explanation for the wage differences. If military service draftees have generally higher cognitive skills this can explain a certain share of the wage difference. Therefore, the prior estimate is likely biased and actually represents the higher skills among military service draftees and not a disadvantage due to civilian service. To test this, a subsample of the respondents (see Kleinert et al., 2012; Wölfel and Kleinert, 2012) that include measures of cognitive competency, i.e., test scores for (prose) literacy and numeracy skills is used. Because the tests were conducted in 2007/2008, the test scores should be influenced by several factors such as age, work experience, education or socio-economic background. In a first step, the cognitive skills are regressed on the following determinants age, experience (and its squared terms), education and parental background to extract these influences and control for interdependencies among these factors. The residuals of this regression are then free from their influences and time consistent.¹⁵ Contrary to the expectation of higher test scores for military draftees, Figure 4.12 shows significantly higher cognitive scores for civilian draftees. Models including the cognitive skills residuals as additional control variables complement these findings.¹⁶ Whereas the skills are statistically significant and show that higher cognitive skills are rewarded with higher wages, the impact of the service variable does not change substantially and remains statistically significant. Therefore, cognitive skills do not explain the wage differences between the two service types.

¹⁵For the approach, see Nyhus and Pons (2005) or Groves (2005).

¹⁶The results are available upon request.



(a) Competencies in Numeracy



(b) Competencies in Prose Literacy

Figure 4.12.: Differences in Competencies

Fourth, signalling and discrimination of the service type affects the wages of the draftees. As mentioned previously, the civilian service was, particularly in the beginning, critically eyed and disregarded (Bernhard, 2005; Lippert, 1989). As shown, firms and individuals transferred these prejudices against the civilian service onto the draftees explaining the wage disadvantage. This explanation is strongly supported by several robustness checks and separate estimations for the different samples (see e.g., Tables 4.9 and 4.11). At the beginning of their employment histories, less information about the true productivity of potential employees is available. Therefore, firms use external options, i.e., the signal of having participated in civilian service, to assess productivity. As a consequence, newly hired individuals without any employment experience receive the highest wage penalty. This picture is complemented by the lack of a wage differential for the sample of men who returned to their employers.

Fifth, the negative signalling effect of participating in the civilian service is more pronounced for students with an upper secondary school degree. Since they typically left school by age 19, students with a upper secondary school degree usually fulfilled their service immediately after graduation, and almost no information about their working productivity is available to potential employers. In contrast, students with the lower and intermediate school degrees who finished their apprenticeship training after graduation usually worked for a few years before entering public service. Using a sample split according to the school diploma received and applying OLS-estimations for the first year after the service time, Figure 4.13 shows these pattern. Whereas for men without an upper secondary degree, the difference is statistically insignificant and small, for high-school graduates, the negative impact is about 13% and statistically significant.

Sixth, since 1961 (the first year of the civilian service) the general attitude against the civilian and military service has substantially changed (Bernhard, 2005) which additionally could transfer into reducing wage differences. But as shown, there is no general time trend as hypothesized. This would indicate that there really are no differences over time and the disadvantage of the civilian service has remained stable over time. However, this seems to be not really realistic.

Firstly, the number of draftees in the civilian service increased substantially and outperformed the number of draftees in the military service since the 2000s (see Figure 4.1). Secondly, social changes and societal acceptance of the civilian service has also changed substantially. In recent times the valuation of both services types, military and civilian service, has been equal, even higher for draftees in the civilian service and differences with respect to birth year should be reasonable. Therefore, the article uses separate samples by birth cohorts in order to test whether the differences remained stable over birth year.

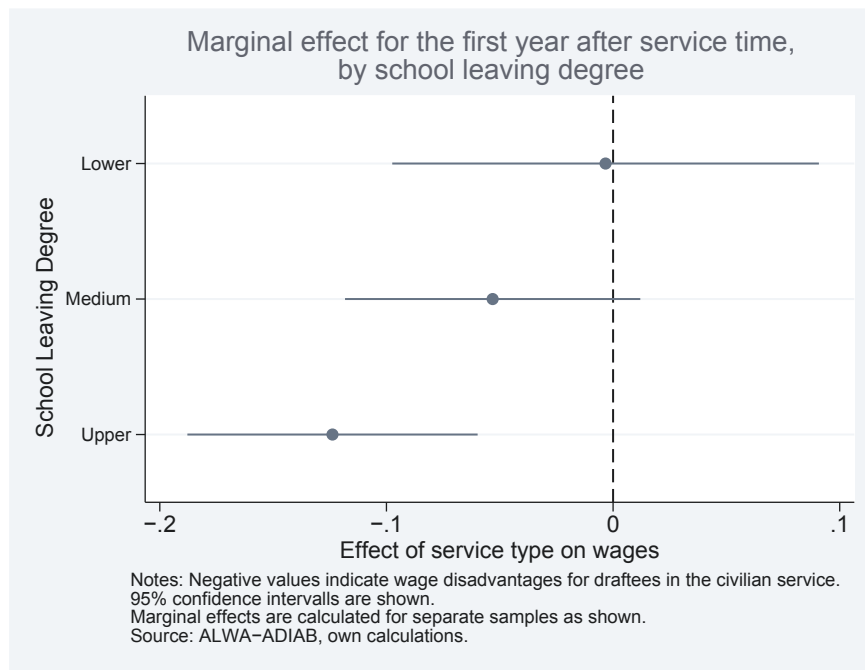


Figure 4.13.: Marginal effects for sub-samples, by educational level

Figure 4.14 clearly shows a birth year changing pattern. Whereas for the youngest cohort the difference is very small and statistically insignificant draftees in the civilian service of the older cohorts have on average statistically strong wage disadvantages.

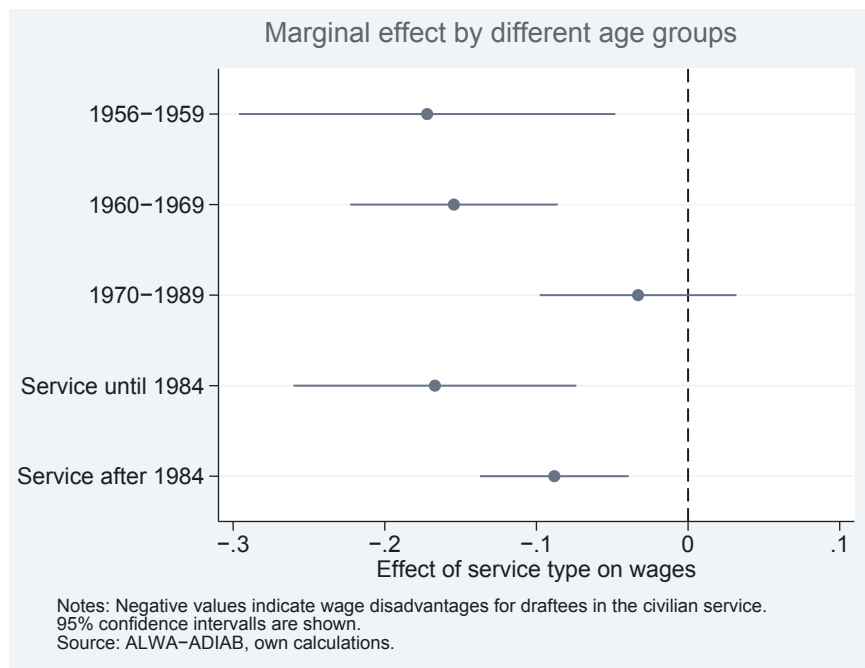


Figure 4.14.: Marginal effects for sub-samples, by groups

The results are in line with expectations that older civilian draftees suffered negative experiences for a long time. The results also show that for younger cohorts the decision for or against the military service had no negative impact at all. In addition, a different specification shows the same picture. The fundamental law change in 1984 divides the sample in two groups. The first group served until 1984, i.e. they had to appear before specialized councils and the conscientious objection was hard. The second group had to write a simple application which afterwards was screened by records and conscientious objection was easier. In the last group, draftees in the civilian service had to serve substantially longer, 20 months against 15 months for draftees in the military service. The willingness to accept these higher opportunity costs (see also Section B.1 in Appendix) may prove young man's sincerity and reduce the prejudice as a slacker which has been predominant. For older draftees the wage disadvantage is more pronounced.

Seventh, occupational sorting is another hypothesis and assumes that men sort into occupations which maximize their individual returns. Comparing the distributions of occupation groups, the article found remarkable differences for two occupations. Whereas draftees in the civilian service show a higher proportion for health-care occupations (18%) and a lower proportion in metal occupations (12%), draftees in the military service show a lower proportion in health-care occupations (3%) and a higher proportion in metal occupations (27%). Comparing sex-dominated occupations reveals that draftees in the civilian service show higher proportion in female-dominated occupations and draftees in military service show higher proportion in male-dominated occupations which complements the different sorting into a given occupation. In additional probit models with the same control variables (results not shown), the article estimates the probability to be employed in a female-dominated occupation respectively a given occupation (see Table 4.7). The results are consistent with the previous findings.

Table 4.7.: Service type and probability to be employed in a given occupation, probit

	Female-dominated	Metal	Technician	Office	Health-Care
Civilian service	0.138*** (0.034)	-0.092*** (0.024)	-0.064*** (0.022)	-0.018 (0.024)	0.148*** (0.029)

Source: ALWA-ADIAB, own calculations.

Note: The standard errors (in parentheses) are White-Huber standard errors accounting for correlation at the individual level. ***/ **/ * indicates significance at the 1/5/10% level.

See Table 4.2 for the list of control variables.

Draftees in the civilian service have a 14% higher propensity to be employed in a female-dominated occupations, are more likely to be employed in health-care occupations and

less likely to be employed in more traditional/male-dominated occupations. Therefore, the correlation between the service type and occupational sorting could be the result of employer preferences and indicate heterogeneity in the value that employer place on draftees in the civilian service. If civilian service had a negative value in certain jobs, than former draftees in the civilian service may have wage disadvantages. Afterwards, through job sorting, draftees in the civilian service switch to jobs that value their civilian service resulting in higher wage growth (and wage surplus for more experienced workers). The stronger negative impact in male-dominated occupations could explain the lower proportion of draftees in the civilian service in a given occupation.

4.7. Conclusion

Using data from West Germany, this study analyzed whether the type of compulsory service, i.e., military service or civilian service, had negative impacts on subsequent labor market outcomes in terms of the gross daily wages of young men employed full-time. This is interesting because since the parliament established the right to refuse any military service in the German constitution in the 1950s, civilian service as alternative to military service has been intensely discussed. Since the beginning of the Federal Republic of Germany, the political and social acceptance of young men who have not served in the armed forces and served instead in the civilian service has also changed. Initially, the latter young men faced the stigma of being considered slackers and reported disadvantages because of their civilian service (Krölls, 1980; Lippert, 1989). This image changed substantially until 2011, when compulsory military service was suspended and civilian service had become an equally accepted alternative.

For the main empirical analyses, the article used a combination of two different data sources. The so-called ALWA-ADIAB combines precise information on earnings with extensive information on individuals' life trajectories. Various panel data regressions were used to the hypothesis that conscripts in the military service had advantages over conscripts in the civilian service and that employers discriminated against former draftees in the civilian service. The results indicate significant differences between the two service types. Employees' individual abilities, productivity and job characteristics are important and decisive determinants of wage setting, but controlling for this broad range of variables the difference reduce, but stills remain statistically and substantially significant.

In line with employer learning theory, the analysis shows a mitigating impact of tenure and work experience on the wage differential. The initial wage differential declines strongly as civilian draftees accumulate work experience. This is interpreted as indicating that

civilian draftees were initially considered less productive but experienced more rapid wage growth, which led to a decrease in the wage differential. The negative effects for the conscripts in the civilian service reduced when more individual and labor-market-relevant information became known about the draftees - i.e., productivity.

While theoretical expectations state to observe patterns that changed over time, the findings reveal only a slowly reducing wage differential but differences across birth cohorts. Whereas in older birth cohorts (before 1969) draftees in the civilian service received a strong wage penalty, there is no wage penalty for younger birth cohorts. Another finding shows different patterns by educational attainment. Whereas students with an upper secondary school degree who participated in civilian service received a penalty, draftees in the civilian service with a lower secondary degree obtained a bonus. One explanation was that the latter were highly selective, whereas the former were more affected by career aspirations because their opportunity costs were higher.

Although several estimations confirm wage disadvantages the true causal effect of civilian service could still be overestimated. The article exploits several channels. One possible explanation for the remaining impact of the civilian service variable may be attributed to some extent to further unobserved differences such as lower motivation or importance of one's professional career. Possibly, the draftees in the civilian service may devote less attention to relevant labor market outcomes, resulting in the wage differences observed at the beginning of their employment careers.

Sorting into a given occupation is another important channel which explains the wage disadvantage and could also reflect employer preferences and prejudices. If draftees in the civilian service had a negative reputation in certain occupations or firms, the draftees started their employment career with wage disadvantages. As a consequence, through job sorting (or firm changes), former draftees in the civilian service searched for better jobs in which the signal of their service type is highly valued, resulting in higher wage growth and wage gains for more experienced workers. Both negative and positive aspects for draftees in the civilian service would be explained by prejudices, in particular for labor market entrants.

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5. Revisiting the gender-specific training gap of part-time and full-time workers^{*}

5.1. Introduction

Although part-time work allows many women (and men) to combine work and care for infants, part-time workers commonly earn lower wages (Bardasi and Gornick, 2008; Fernández-Kranz and Rodríguez-Planas, 2011; Hirsch, 2005; Mumford and Smith, 2008; O'Dorchai et al., 2007) and have worse career perspectives than full-time workers (Connolly and Gregory, 2009; Manning and Petrongolo, 2008; Russo and Hassink, 2008). Some studies argue that part-time workers cannot flourish in their careers, because they receive less employer-provided training than full-time workers (Bassanini et al., 2007). Thus, increasing workplace training for part-time workers may be an effective measure to reduce gender inequality in the labor market. Yet, two recent studies (Backes-Gellner et al., 2014; Picchio and Ours, 2016) can only find a part-time training gap for men but, after accounting for observed and unobserved heterogeneity, not for women. The existing studies explain this paradox by arguing that part-time work is more common among women than among men, such that part-time working women are relatively less likely to be exposed to statistical discrimination and social norms that stigmatize them as low productive and less attached to the labor market.

However, the evidence stems from two countries—Switzerland and the Netherlands—with a relatively unusual structure of part-time employment. First, both countries have a relatively high share of part-time employees, in particular, among women, e.g., in 2016 Switzerland and the Netherlands had the highest part-time employment rates among all OECD countries. Second, in both countries working contracts that amount to 65 or 75 percent of the hours of a regular full-time job are very common. Thus, part-time working women in Switzerland and the Netherlands may experience no part-time training penalty,

^{*}This chapter is joint work with Simon Janssen.

because working time differences between part-time and full-time working women are lower than in other countries. Third, part-time work in the Netherlands is concentrated in the public sector where affirmative action policies may protect women's access to further training. Therefore, whether women experience no part-time training penalty in countries with a more common structure of part-time employment remains unclear.

Our paper revisits the relationship between part-time work and gender-specific training participation with the National Education Panel Survey (NEPS), a new and very unique panel data source from Germany. In Germany, part-time work is less common for both women and men, and part-time work is commonly related to substantial reductions of working hours, i.e., most part-time jobs amount to 50 percent of the regular full-time hours, and 65 or 75 percent jobs rarely exist. Therefore, the nature of part-time work is more comparable to the nature of part-time work in countries such as the U.K. or the U.S. Moreover, our data contains very unique information about workers' social views on gender equality and productivity-relevant traits that are commonly not observable in other data sources. In more detail, we have information about workers' social preferences for stereotype gender roles and information about their ambition, health, and job satisfaction. This information allows us to analyze the mechanism that account for the gender-specific training participation of part-time and full-time workers in more detail than previous studies.

Similar to previous studies, we find that the unconditional part-time training gap is larger for men than for women. However, in contrast to those studies, the women's part-time training gap remains large and significant, even if we account for observed and unobserved heterogeneity on the worker level. Instead, the part-time training gap for men entirely disappears if we account for observed and unobserved heterogeneity. Thus, our results suggest that the magnitude of the conditional female and male part-time training gap is country-specific and most likely depends on the nature and dissemination of part-time work in the respective country. More specifically, part-time work is of lower quality in Germany than in both of the other countries leading to a more persistent part-time training gap for women and strong negative selection of low productive workers among part-time working men.

However, do these results therefore imply that, in Germany, female part-time workers are more exposed to social stigmas than male part-time workers? We argue that our results are still consistent with the main idea of previous studies that part-time working men are more strongly exposed to social stigmas than part-time working women. Indeed, our results appear to be most consistent with a model of Akerlof and Kranton (2000) who incorporate identity-based payoffs in a utility function. The model predicts that individuals

gain utility by behaving according to their assigned social stereotype. According to this model, women should be more likely to accept the negative attributes of part-time jobs—including social stigmas and (statistical) discrimination, because working part-time allows them to follow the common stereotype of a caring housewife. In contrast, men incur negative identity-based utility payoffs from working part-time in addition to the inferior job quality of part-time jobs. Thus, social stigmas should enforce stronger negative self-selection of less productive workers into part-time jobs among men than among women.

This implication is consistent with our regression results. Moreover, in line with the intuition of this model, our analysis reveals that part-time working women are more likely to support stereotype gender role models than full-time working women. Moreover, they appear to be healthier and more satisfied with their jobs than full-time working women. These results are consistent with women having identity-based utility payoffs from working part-time despite having lower access to further training.

In contrast to part-time working women, part-time working men appear to be less healthy and less satisfied with their jobs than full-time working men. These results are consistent with negative self-selection of low productive men into part-time jobs, because they suggest that on average men are more likely to involuntarily work part-time than women. Moreover, part-time and full-time working men appear not to differ in their social views about gender equality. This result is consistent with the argument that on average men violate their own male stereotype by working part-time such that they incur identity-based utility costs.

The remainder of the paper is structured as follows: Section 5.2 describes the difference in the nature of part-time work in Germany in comparison to the Netherlands and Switzerland. Section 5.3 gives details about the data, and section 5.4 presents the methods. Section 5.5 presents our main regression results, and section 5.6 analyses the mechanisms explaining our regression results. Section 5.7 concludes.

5.2. Part-time work in Germany in comparison to the Netherlands

As in the Netherlands and Switzerland, part-time work in Germany is not inferior to full-time work in terms of social security arrangements (e.g., unemployment insurance, disability and pension benefits), but it is inferior in terms of job stability, wages, and career perspectives (Fouarge and Schils, 2009). Indeed, the part-time pay penalty in Germany is even slightly larger than in the Netherlands (Gustafsson et al., 1996), and German women

are more likely to leave the labor force after periods of part-time work than Dutch women (O'Reilly and Bothfeld, 2002).

However, the nature of part-time work in Germany differs in three important aspects from the nature of part-time work in the Netherlands and Switzerland. First, in Germany, part-time work is less common, in particular for women. Figure 5.1 shows the share of part-time workers among all dependent employees in Germany, Switzerland, and the Netherlands.

The Figure reveals that, in the Netherlands, about 60 percent of employed women work part-time and in Switzerland about 45 percent. In contrast, in Germany, fewer than 40 percent of employed women hold a part-time job (panel a). For men, we find that in all three countries part-time is clearly less popular (below than 10 percent) and differences are smaller. Although the share of part-time working men has increased in all of the three observed countries, German men are still less likely to hold a part-time job.

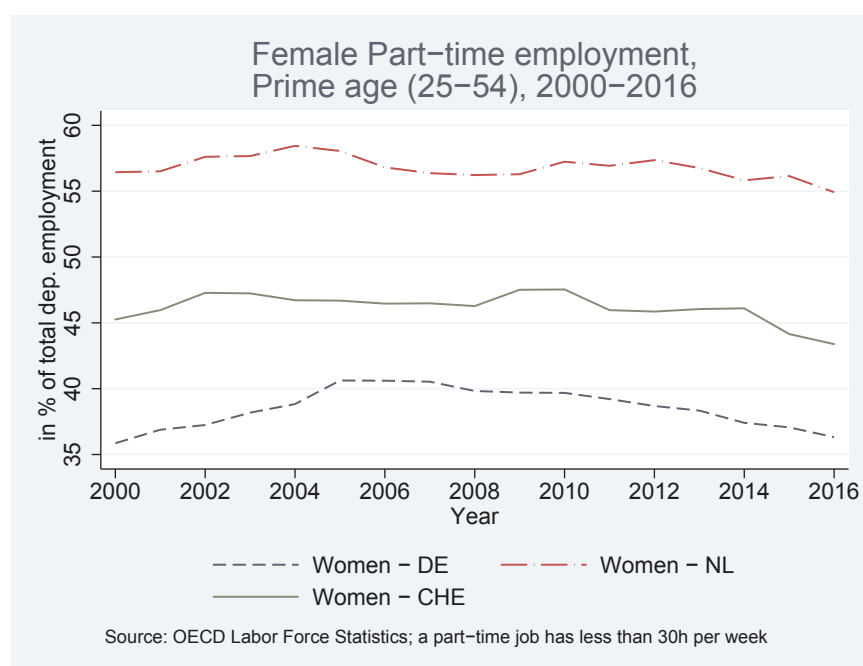
Second, in Germany, part-time work is concentrated in smaller firms of the private sector while, in the Netherlands, part-time work is concentrated in larger firms of the health care and the public sector (Allaart and Bellmann, 2007).

Third, part-time work in Germany is virtually always related to a 50 percent reduction of working hours. In contrast to the Netherlands and Switzerland, 60 or 75 percent contracts are not common. Figure 5.2 shows the distribution of factual weekly working hours and the distribution of contractual weekly working hours separately for women and men. For women's working hours, both Figures reveal a strongly bimodal distribution with two modi at about 20 and 39 working hours. This result stays in sharp contrast to the Netherlands where women's working hours are much more equally distributed over the entire spectrum (see Figure 3, in Picchio and Ours, 2016).

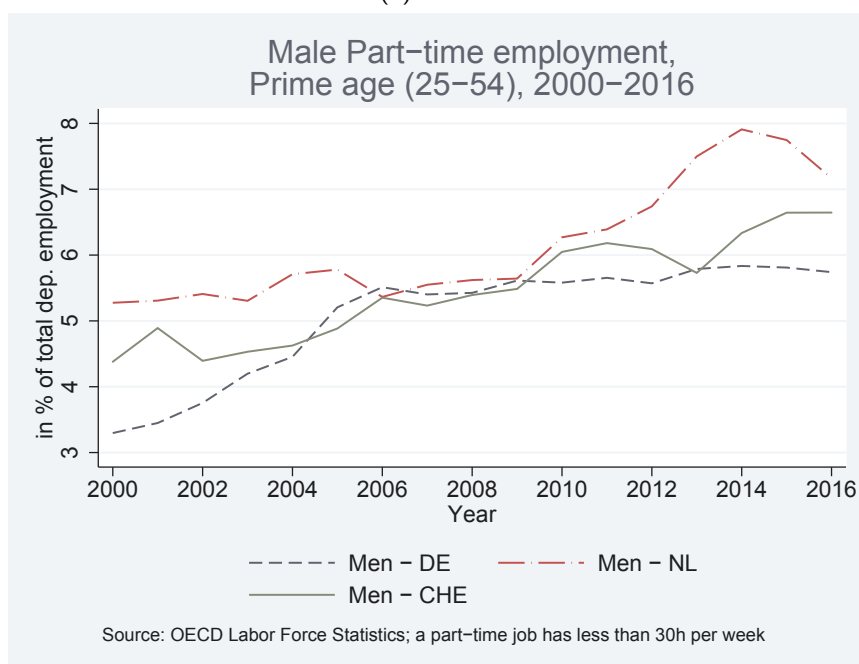
These three important institutional differences are likely to be important determinants of the part-time training penalty in Germany.

5.3. Data

The study uses the adult cohort (SC6) of the National Educational Panel Study (NEPS) (Blossfeld et al., 2011). The SC6 is a representative sample of the German population from the birth cohorts 1944-1986. It contains information over the whole life course on approximately 17,100 individuals (Allmendinger et al., 2011). The data include cross-sectional information on various topics, such as personality traits, attitudes, health or social and political participation which are surveyed with a time lag. Moreover, the data include detailed monthly information on the respondents' entire life courses, e.g.



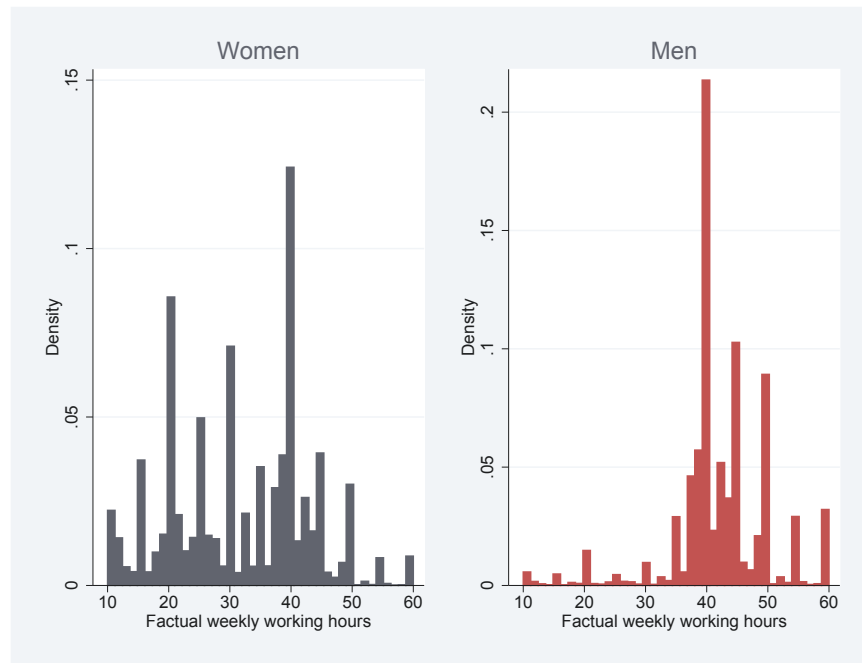
(a) Women



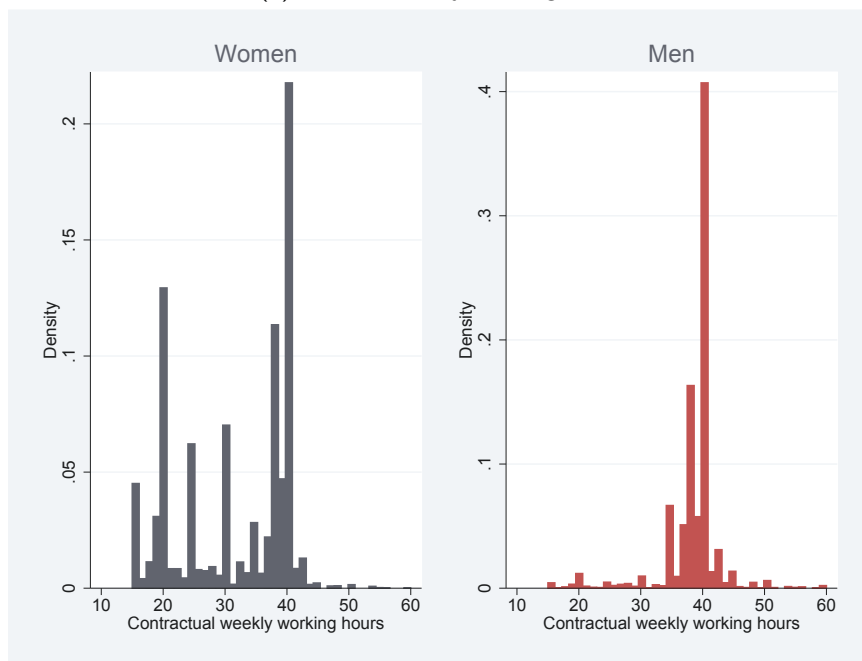
(b) Men

Figure 5.1.: Percentage of part-time employment by gender and countries

school and educational attainment, episodes of apprenticeship training (school-based and firm-based), employment history, episodes of unemployment as well as information about respondents' children and partners. For each employment episode people are asked about their actual working time (at the time of the interview) and whether they attended training



(a) Factual weekly working hours



(b) Contractual weekly working hours

Figure 5.2.: Distributions of weekly working hours by gender

sessions or courses within that activity (since the last interview) which is our indicator for training participation.

For each person-year observation we focus on dependent employees, between 25 and 54 years of age, who factual weekly working time was between 10 and 60 hours. Similar to Picchio and Ours (2016) the data set only consists of employees who participated at least in two consecutive waves in order to estimate models in first differences. This results in an unbalanced panel of 7,861 individuals with 30,849 person-year observation from 2009 to 2015. Table 5.1 presents descriptive statistics for all variables.

About one third of the employees attended at least one work-related training course since the last interview. The proportion of working hours differs between women and men. 40 percent of women work part-time (30 hours or less) against 5 percent of men. The average number of factual weekly working hours is much smaller for women: 32h against 42h of men. The average age is 44 years, the tenure job is about 99 months for men and 89 months for women. The share of singles (30 %) and married persons (60 %) is similar for both sexes. In about 60 percent of all household live at least one child and women have slightly more fixed-term contracts (8 percent against 5 percent). About one fourth (one third) of the women (men) have an university degree. About 66% of the people live in cities (more than 100,000 population). Men are more likely to work in larger firms.

5.4. Methods

Our main interest is to revisit the gender differences in the relationship between weekly working hours—specifically part-time work—and workers' participation in further training for Germany. Therefore, we exactly follow Picchio and Ours (2016) and depart from a simple linear probability model that relates worker i 's probability to participate in a training course y at time t to a function of his or her working hours h_{it} , a set of observable and time variant worker and firm characteristics x_{it} , a time-constant unobserved ability component c_i , and an error term u_{it} with zero mean and constant variance.

As Picchio and Ours (2016) we estimate the following regression equation (5.1) separately for women and men.

$$y_{it} = \alpha + \delta h_{it} + x'_{it}\beta + c_i + u_{it} \quad (5.1)$$

δ denotes the coefficient of main interest and describes the effect of an increase in working hours on the workers' probability to participate in a training course y . In an alternative version of regression equation (5.1) we replace the variable for working hours h_{it} by a

Table 5.1.: Summary statistics by gender

	Women		Men	
	Mean	Std. Dev.	Mean	Std. Dev.
Training participation	0.36	(0.48)	0.33	(0.47)
Factual weekly working hours	31.76	(11.2)	42.15	(8.07)
Part-time ¹	0.40	(0.49)	0.05	(0.22)
Age	44.08	(7.87)	43.46	(8.26)
Single	0.28	(0.45)	0.33	(0.47)
Married	0.62	(0.48)	0.62	(0.49)
Tenure in months	89.36	(86.1)	98.74	(91.4)
Civil servant	0.06	(0.23)	0.06	(0.23)
Temporary contract	0.08	(0.27)	0.05	(0.22)
East-Germany	0.16	(0.37)	0.16	(0.37)
Migration background	0.19	(0.39)	0.17	(0.37)
Children in household	0.61	(0.49)	0.55	(0.50)
Education				
Inter. Secondary without vocat. training	4.55		3.50	
Inter. Secondary with vocat. training	48.37		46.27	
Upper Secondary	22.26		19.41	
University and more	24.82		30.80	
Urban region				
up to 5.000 population	5.04		5.03	
5.000 - to 50.000 population	20.06		19.98	
50.000 - to 100.000 population	8.08		8.89	
100.000 - to 500.000 population	34.30		34.66	
500.000 and more population	32.52		31.44	
Occupation				
Occupation: unknown	24.60		17.78	
Low skilled blue collar	6.31		8.68	
(High) Skilled blue collar	1.33		12.35	
Low skilled white collar	8.86		3.64	
(High) Skilled white collar	58.90		57.55	
Firm size (number of employees)				
Firm size: unknown	26.10		18.58	
Firm size: up to 20	22.75		14.25	
Firm size: 20-200	29.33		31.34	
Firm size: 200-2000	15.96		24.48	
Firm size: 2000 and more	5.86		11.35	
# of observations (# of individuals)	15,267 (3,938)		15,582 (3,923)	

Source: NEPS-SC6, own calculations.

¹ The part-time indicator is based on factual weekly working hours. Part-timers work less than 30 hours per week.

Not shown: economic sectors and year variables.

dummy variable that indicates whether a worker holds a part-time job at time t or not.

Obviously, the estimate of δ in equation (5.1) may be biased as a result of endogeneity or reverse causality, i.e., $cov(h_{it}, c_i) \neq 0$. On one hand, more productive workers may work more hours and may also be more likely to participate in further training. On the other hand, the workers' participation in further training courses may signal employers ambition and productivity so that workers who participate more in further training become more likely to work longer hours. To overcome this problem, we exploit the panel nature of our data and estimate the following first difference version of equation (5.1).

$$\Delta y_{it} = +\delta \Delta h_{it} + \Delta x'_{it} \beta + \Delta u_{it} \quad (5.2)$$

Through the first difference transformation of regression equation (5.2) we remove c_i so that an OLS estimation of equation (5.2) leads to an unbiased estimate of δ under the strict exogeneity assumption.

The precision of the estimate for δ depends on the within individual variation of working hours for women and men. Therefore, Table 5.2 shows the variation of working hours and the part-time indicator, separately, for women and men. The results reveal relatively strong within individual variation of working hours, i.e., about 63 percent of all women and men change their working hours throughout the sample period. In contrast, the within individual variation of the part-time indicator is much lower. Only about 11 percent of all women and about 3 percent of all men in the sample change their part-/full-time status. Thus, the reader must bear in mind that our estimates for working hours are estimated with more precision than our results for the part-time indicator.

5.5. Results

Descriptive results

Table 5.3 presents simple descriptive statistics for the gender-specific training participation of part-time and full-time workers. The Table reveals three results: First, full-time workers participate more in further training than part-time workers. Second, women participate more in training than men. Third, the part-time/full-time training gap is much larger for men than for women, i.e., while the gap is about 9 percentage points for women, it is 17 percentage points for men.

Figure 5.3 provides more details by analyzing the relationship between working hours and workers' training participation. Therefore, we have constructed a categorical variable with six different categories of working hours. The Figure reveals that workers with fewer

Table 5.2.: Variation

	Female		Male		Total	
	N	in %	N	in %	N	in %
Variation in working hours $\Delta h_{it} - h_{it-1}$						
Less than -20	110	1.08	67	0.63	177	0.85
$[-20, -10)$	272	2.66	251	2.36	523	2.51
$[-10, 0)$	2380	23.31	2881	27.11	5261	25.25
0	3797	37.18	3916	36.85	7713	37.01
$(0, 10]$	3185	31.19	3141	29.56	6326	30.36
$(10, 20]$	364	3.56	284	2.67	648	3.11
More than 20	104	1.02	86	0.81	190	0.91
Variation in part-time indicator hours $\Delta part_{it} - part_{it-1}$						
Change to Part-Time	676	6.62	181	1.70	857	4.11
No Change	9051	88.63	10300	96.93	19351	92.86
Change to Full-Time	485	4.75	145	1.36	630	3.02
Observations	10,212		10,627		20,839	

Source: NEPS-SC6, own calculations.

¹ The part-time indicator is based on factual weekly working hours. Part-timers work less than 30 hours per week.

Table 5.3.: Frequencies of employees participating training activities by part-time and gender (absolute frequencies in parentheses).

	Further Training participation during employment					
	No		Yes		Total	
<i>Women</i>						
Fulltime	60.1	(5506)	39.9	(3658)	100.0	(9164)
Part-time	68.7	(4195)	31.3	(1908)	100.0	(6103)
Total	63.5	(9701)	36.5	(5566)	100.0	(15267)
<i>Men</i>						
Fulltime	66.5	(9834)	33.5	(4961)	100.0	(14795)
Part-time	82.3	(648)	17.7	(139)	100.0	(787)
Total	67.3	(10482)	32.7	(5100)	100.0	(15582)

Note: A employee is fulltime employed if (s)he weekly works more or equal than 30 hours.

hours participate less in further training than those with more working hours. However, the ascent in the relationship between working hours and training is much steeper for men than for women, and women generally participate more in further training. For example, about 42 percent of women who work more than 40 hours participate in further training while about 22 percent of women who work between 10 and 20 hours participate. In contrast, about 34 percent of men who work more than 40 hours participate in further training and only 8 percent of those who work between 10 and 20 hours.

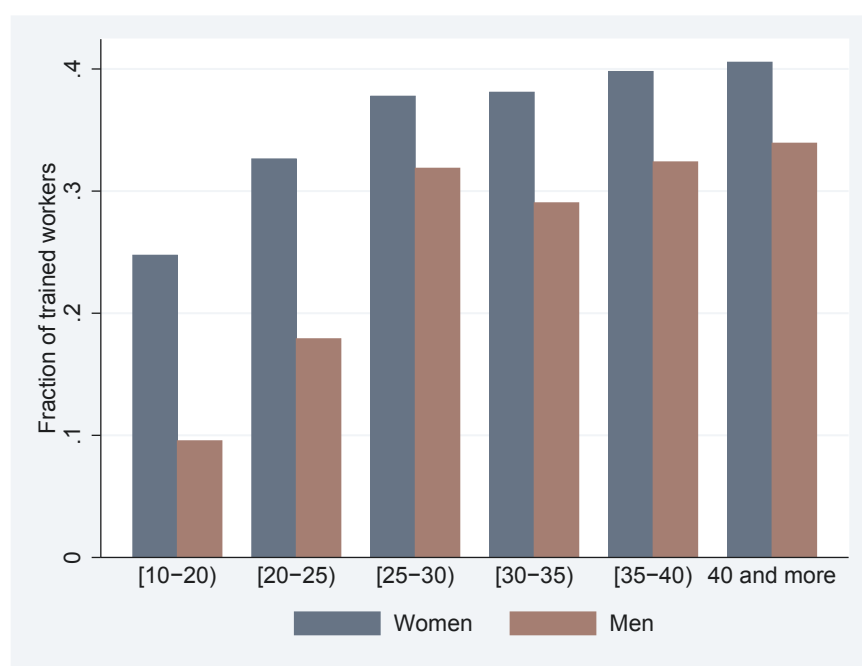


Figure 5.3.: Percentage of workers participating in training by classes of factual weekly working hours and gender

Thus, the descriptive results from Germany are similar to the results from the Netherlands and Switzerland, because we also find that the part-time/full-time training gap is larger for men than for women. To further analyze to which extend observable and unobservable heterogeneity accounts for this gender-specific training gap, the next two subsection will present our regression results. The first subsection presents the results for women. The second subsection presents the results for men.

5.5.1. Main results: women

Table 5.4 shows the results for working hours and Table 5.5 shows the results for the part-time indicator. The first specification of Table 5.4 shows that an increase of one working hour is related to a 0.5 percentage point increase in the likelihood of women to participate

in further training. The effect is precisely estimated at the one percent level and very similar to the results of Picchio and Ours (2016). The second specification adds a large number of worker and firm characteristics. The coefficient estimate remains very similar to the one from the first specification and is still significant at the one percent level. The third specification accounts for unobserved time-constant heterogeneity through our first difference model according to regression equation 5.2. Again, the coefficient estimate does not change in magnitude and remains highly significant at the one percent level.

Table 5.4.: Estimates using the workinghours indicator, women

	OLS		OLS		First Diff	
Working hours	0.005***	(0.000)	0.004***	(0.000)	0.005***	(0.001)
Age			0.017**	(0.007)	0.104***	(0.033)
Age ²			−0.000**	(0.000)	−0.000	(0.000)
Medium sec. degree with VET			0.021	(0.022)	−0.075	(0.176)
Upper sec. degree			0.043*	(0.024)	0.119	(0.316)
Higher education			0.090***	(0.025)	0.181	(0.302)
Tenure in months			0.000**	(0.000)	0.001*	(0.000)
Tenure ²			−0.000	(0.000)	−0.000	(0.000)
Single			0.001	(0.018)	−0.022	(0.048)
Married			0.010	(0.016)	0.028	(0.045)
Number of children			0.005	(0.006)	−0.015	(0.017)
Low skilled blue collar			−0.256***	(0.016)	−0.135**	(0.064)
(High) skilled blue collar			−0.143***	(0.039)	0.072	(0.127)
Low skilled white collar			−0.136***	(0.016)	−0.126**	(0.058)
Civil servant			0.082***	(0.023)	0.153	(0.115)
Temporary contract			−0.027	(0.017)	0.003	(0.032)
Constant	0.208***	(0.014)	−0.173	(0.153)	−0.236***	(0.016)
Firm controls	No		Yes		Yes	
Regional controls	No		Yes		Yes	
Year fixed controls	No		Yes		Yes	
Observations	15,267		15,267		10,212	
R ²	0.013		0.082		0.041	

Source: NEPS-SC6, own calculations.

Note: Significance levels: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Standard errors in parentheses. The part-time indicator is based on factual weekly working hours. Part-timers work less than 30 hours per week.

Table 5.5 analyses the part-time/full-time training gap for women more directly by replacing the variable for working hours with a dichotomous variable that is one if a women works part-time and zero otherwise. The first specification shows a significant negative effect of about seven percentage points. The second specification, which accounts for observable workers and firm characteristics, only marginally reduces the effect size of the part-/full-time training gap, and the effect remains the same once we account for time-constant heterogeneity in the third specification. However, in contrast to the first-difference results for working hours, the standard errors in the first-difference results for the part-time indicator increase quite substantially as this estimate is based on less variation. Nevertheless, the coefficient estimate remains significant at the one percent level.

Table 5.5.: Estimates using the part-time indicator, women

	OLS	OLS	First Diff
Part-time	-0.065*** (0.010)	-0.048*** (0.011)	-0.074*** (0.022)
Age		0.018*** (0.007)	0.106*** (0.033)
Age ²		-0.000** (0.000)	-0.000 (0.000)
Medium sec. degree with VET		0.020 (0.023)	-0.067 (0.174)
Upper sec. degree		0.044* (0.024)	0.110 (0.313)
Higher education		0.095*** (0.025)	0.185 (0.299)
Tenure in months		0.000** (0.000)	0.001* (0.000)
Tenure ²		-0.000 (0.000)	-0.000 (0.000)
Single		-0.001 (0.018)	-0.021 (0.048)
Married		0.001 (0.016)	0.027 (0.045)
Number of children		-0.002 (0.006)	-0.017 (0.017)
Low skilled blue collar		-0.267*** (0.016)	-0.144** (0.064)
(High) skilled blue collar		-0.142*** (0.040)	0.078 (0.127)
Low skilled white collar		-0.144*** (0.016)	-0.130** (0.058)
Civil servant		0.086*** (0.023)	0.150 (0.116)
Temporary contract		-0.029* (0.017)	0.001 (0.032)
Constant	0.399*** (0.007)	-0.034 (0.155)	-0.235*** (0.016)
Firm controls	No	Yes	Yes
Regional controls	No	Yes	Yes
Year fixed controls	No	Yes	Yes
Observations	15,267	15,267	10,212
R ²	0.005	0.077	0.039

Source: NEPS-SC6, own calculations.

Note: Significance levels: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Standard errors in parentheses. The part-time indicator is based on factual weekly working hours. Part-timers work less than 30 hours per week.

Although our descriptive results showing a larger part-time training penalty for men than for women are similar to the previous results from the Netherlands and Switzerland, our regression results stay in contrast to the results from these previous papers. Unlike in the Netherlands, observed differences in worker characteristics and unobserved time-constant ability differences between part-time and full-time working women are unable to explain

the part-time training penalty for women. This result leaves room for the argument that, in Germany, part-time working women are exposed to statistical discrimination or social norm that stigmatize them as low productive or less attached to the labor market. We use the richness of the data to further analyze this argument in the next section.

5.5.2. Main results: men

Table 5.6 shows the results for working hours and Table 5.7 shows the results for the part-time indicator. The first specification of Table 5.6 shows that a one hour increase of working hours is associated with 0.5 percentage points increase in the training participation of men. The effect is precisely estimated at the one percent level. The second column includes observable worker characteristics, such as age, education, and firm size. Although the effect is still precisely estimated at the one percent level, incorporating those observable worker and firm characteristics substantially reduces the effect to about 0.3 percentage points (almost the half).

Table 5.6.: Estimates using the workinghours indicator, men

	OLS	OLS	First Diff
Working hours	0.005*** (0.000)	0.003*** (0.000)	0.001 (0.001)
Age		0.012** (0.006)	0.079*** (0.030)
Age ²		−0.000** (0.000)	−0.000 (0.000)
Medium sec. degree with VET		0.027 (0.022)	0.120 (0.331)
Upper sec. degree		0.057** (0.023)	0.232 (0.348)
Higher education		0.097*** (0.023)	0.258 (0.354)
Tenure in months		0.001*** (0.000)	0.001** (0.000)
Tenure ²		−0.000*** (0.000)	−0.000** (0.000)
Single		−0.025 (0.020)	−0.014 (0.050)
Married		0.002 (0.019)	−0.030 (0.048)
Number of children		0.003 (0.005)	−0.000 (0.014)
Low skilled blue collar		−0.158*** (0.015)	−0.064 (0.049)
(High) skilled blue collar		−0.089*** (0.015)	−0.029 (0.049)
Low skilled white collar		−0.142*** (0.021)	−0.190*** (0.055)
Civil servant		0.074*** (0.022)	0.107 (0.089)
Temporary contract		−0.077*** (0.017)	−0.045 (0.030)
Constant	0.123*** (0.021)	−0.156 (0.128)	−0.249*** (0.016)
Firm controls	No	Yes	Yes
Regional controls	No	Yes	Yes
Year fixed controls	No	Yes	Yes
Observations	15,582	15,582	10,626
R ²	0.007	0.073	0.034

Source: NEPS-SC6, own calculations.

Note: Significance levels: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Standard errors in parentheses. The part-time indicator is based on factual weekly working hours. Part-timers work less than 30 hours per week.

This result suggests that men who work fewer hours differ substantially from those who work more hours in terms of their observable labor market characteristics. If we additionally account for time-constant unobserved heterogeneity (specification 3), the effect shrinks further to almost nil (0.1 percentage points) and turns insignificant. Thus, although our OLS results appear to be consistent with the studies from Switzerland and the Netherlands, our first difference results contradict the previous evidence, because we find that accounting for unobserved heterogeneity removes the entire part-time training penalty for men.

The first column of Table 5.7 shows that men who work part-time are about 15 percentage point less likely to participate in further training than men who work full-time. This is a large effect that is precisely estimated at conventional confidence levels.

Table 5.7.: Estimates using the part-time indicator, men

	OLS	OLS	First Diff
Part-time	-0.151*** (0.017)	-0.092*** (0.017)	-0.046 (0.038)
Age		0.012** (0.006)	0.078*** (0.030)
Age ²		-0.000** (0.000)	-0.000 (0.000)
Medium sec. degree with VET		0.027 (0.022)	0.125 (0.330)
Upper sec. degree		0.059** (0.024)	0.238 (0.347)
Higher education		0.101*** (0.023)	0.263 (0.354)
Tenure in months		0.001*** (0.000)	0.001** (0.000)
Tenure ²		-0.000*** (0.000)	-0.000** (0.000)
Single		-0.025 (0.020)	-0.015 (0.050)
Married		0.003 (0.019)	-0.030 (0.048)
Number of children		0.003 (0.005)	-0.000 (0.014)
Low skilled blue collar		-0.161*** (0.015)	-0.065 (0.049)
(High) skilled blue collar		-0.093*** (0.015)	-0.030 (0.049)
Low skilled white collar		-0.141*** (0.021)	-0.191*** (0.055)
Civil servant		0.071*** (0.022)	0.108 (0.089)
Temporary contract		-0.075*** (0.017)	-0.045 (0.029)
Constant	0.336*** (0.005)	-0.042 (0.127)	-0.248*** (0.016)
Firm controls	No	Yes	Yes
Regional controls	No	Yes	Yes
Year fixed controls	No	Yes	Yes
Observations	15,582	15,582	10,626
R ²	0.006	0.073	0.034

Source: NEPS-SC6, own calculations.

Note: Significance levels: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Standard errors in parentheses. The part-time indicator is based on factual weekly working hours. Part-timers work less than 30 hours per week.

The second column includes observable worker characteristics. Although the effect is still precisely estimated at the one percent level, incorporating those observable worker and firm characteristics substantially reduces the effect to about 9 percentage points. If we additionally account for time-constant unobserved heterogeneity in our third specification,

the effect shrinks to about five percentage points and turns insignificant.

5.6. Can social stereotypes still explain the gender-specific part-time training penalty?

Previous studies from Switzerland and the Netherlands have argued that social norms stigmatizing part-time working men as less male and low productive can explain why they find a larger part-time training penalty for men than for women—even after accounting for unobserved heterogeneity. In contrast to these studies, we find that unobserved heterogeneity accounts for the entire part-time training penalty of men but not for that of women. Do our results therefore suggest that, in Germany, social norms stigmatize part-time working women more than part-time working men, while part-time working men are simply less productive than full-time working men?

Analyzing this argument within an identity framework similar to Akerlof and Kranton (2000) is useful. In this framework individuals receive utility from behaving according to their assigned social stereotype. In our specific case, women would gain utility from working part-time, because part-time work allows them to spend more time for household work and caring—two activities that most societies consider as feminine. In contrast, men would lose utility, because working part-time violates their stereotype identity of being the main breadwinner. Following Akerlof and Kranton (2000) individuals receive two types of utility payoffs from acting according to their assigned social stereotype. First, they gain utility because acting according to their assigned social stereotype is self-ensuring. Second, individuals gain utility, because others are more comfortable interacting with individuals that match their expected social stereotype.

Considering identity-based utility payoffs allows us to formulate the following simple utility function:

$$U(w(h), h, I(h)) \quad (5.3)$$

Equation (5.3) is a simplified version of Akerlof and Kranton's utility function where w stands for the quality of a job that includes workers' access to further training, but may also include other job characteristics such as wages. h represents working hours and I describes the utility that workers gain from their identity. Taking the total derivative of (5.3) with respect to h leads to

$$\frac{\Delta U}{\Delta h} = \frac{\delta U}{\delta w} \frac{\delta w}{\delta h} + \frac{\delta U}{\delta h} + \frac{\delta U}{\delta I} \frac{\delta I}{\delta h} \quad (5.4)$$

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Virtually all studies show that the quality of part-time jobs, including workers's access to further training, is lower than the quality of full-time jobs, and we can plausibly assume that individuals prefer higher quality jobs over lower quality jobs. Therefore, $\frac{\delta U}{\delta w} \frac{\delta w}{\delta h}$ is positive. $\frac{\delta U}{\delta h}$ is negative, because workers commonly receive dis-utility from working more hours. $\frac{\delta U}{\delta I} \frac{\delta I}{\delta h}$ represents the marginal utility that workers receive from their identity by working more hours. In the world of Akerlof and Kranton (2000) the term $\frac{\delta I}{\delta h}$ is positive for men who confirm their masculinity by working more hours and negative for women who violate their stereotype as caring housewife and mother if they work more hours. Thus, $\frac{\delta U}{\delta I} \frac{\delta I}{\delta h}$ is gender-specific.

According to this simple framework both, women and men, should be less likely to accept part-time jobs if the job quality of part-time jobs is lower. However, women should be more likely than men to accept reductions in their job quality by working fewer hours, because they receive additional identity-based pay-offs from reducing their working time while men receive additional identity-based costs. This result is in line with the results from our first-difference estimations for which we found that women accept a significant part-time training penalty, while we find no such gap for men after accounting for unobserved heterogeneity. However, whether we can relate this outcome to the existence of gender-specific social norms or stigmas remains an open question.

Analyzing the gender-specific family structure of part- and full-time workers is an intuitive first step to uncover whether female part-time workers are more likely to follow the stereotype role model of the caring housewife and whether male full-time workers are more likely to be the main breadwinners.

Moreover, Table 5.8 uncovers that part-time working women are much more likely to have children than full-time working women. More-so, part-time working women have more children than those who work full-time. For example, 52 percent of full-time working women have no children while only about 19 percent of part-time working women have no children. These results are consistent with the argument that women hold part-time jobs to fulfill their stereotype role model as caring housewives and mothers. Dieckhoff et al. (2016) show that women are more likely to leave full-time employment once young children live in their households.

The results differ for men. On average part-time working men are less likely to have children than full-time working men, and part-time working men have slightly less children than those who work full-time. Thus, men are on average less likely to work part-time for family-related reasons than women. One plausible reason is that part-time working men are more restricted in their job choice than those men who work full-time. As a result, negative selection of low productive men into part-time jobs should arise.

5.6. Can social stereotypes still explain the gender-specific part-time training penalty?

Table 5.8.: Number of children by employment and gender (in column percentages)

	Full-Time			Part-Time		
	Women	Men	Total	Women	Men	Total
No children	51.87	43.93	46.96	18.73	56.47	23.04
One child	26.66	22.37	24.01	28.07	16.24	26.72
Two children	17.49	26.54	23.08	41.16	19.16	38.64
Three children	3.44	6.00	5.02	10.18	6.85	9.80
Four and more children	0.55	1.18	0.93	1.87	1.27	1.80
Observations	9,164	14,795	23,959	6,103	788	6,891

Source: NEPS-SC6, own calculations.

We further analyze this argument with a variety of “soft” variables that allow us to provide some suggestive evidence for the relationship between identity-based payoffs and workers’ selection into part- and full-time jobs. First, we have subjective information about workers’ job satisfaction that can serve as proxies for their overall job utility. Second, we have information about workers’ attitudes towards gender-equality in the labor market, i.e., we have information about workers’ subjective beliefs about traditional gender role models. Third, we have information about workers’ career aspirations, i.e., we know how important workers regard their status and the advancement of their careers. The NEPS provides all these information as Lickert scales.

Table 5.9 shows the OLS estimation results for those characteristics on working hours controlling for a broad range of observable individual and firm level characteristics. The upper panel shows the results for women and the lower panel those for men.

The first row of columns one and two show that women who work more hours regard their career advancement and the maintenance of their status as more important than women who work less hours. The differences are large and highly significant. The second rows of both panels confirm these results with a specification for which we have replaced the variable for working hours by a part-time indicator. Columns three and four show that women who work more hours are less satisfied with their jobs and less healthy than women who work less hours. This result is consistent with the existing literature (see for example, Bender et al., 2005; Booth and Van Ours, 2008; Clark, 1997).

However, we find no significant effects for the part-time indicator. One potential reason for the insignificant effects may be that we have not enough variation within single cells to appropriately estimate the part-time effect. Columns five and six show that women who work more hours are on average much more supportive of an equal division of labor between women and men in the workplace and the household, and they are less supportive for stereotype gender roles than women who work less hours. Overall, these results are consistent with the argument that women receive positive identity-based utility payoffs

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Table 5.9.: OLS-estimates on subjective attitudes

Women						
	Career	Status	Satisfaction	Health	Duties	Role division
Working hours	0.014*** (0.001)	0.005*** (0.001)	-0.002** (0.001)	-0.004*** (0.001)	0.009*** (0.001)	-0.010*** (0.001)
Part-Time	-0.279*** (0.021)	-0.095*** (0.022)	-0.029 (0.019)	0.021 (0.018)	-0.136*** (0.019)	0.105*** (0.019)
Individual controls	Yes	Yes	Yes	Yes	Yes	Yes
Firm controls	Yes	Yes	Yes	Yes	Yes	Yes
Regional controls	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed controls	Yes	Yes	Yes	Yes	Yes	Yes

Men						
	Career	Status	Satisfaction	Health	Duties	Role division
Working hours	0.022*** (0.001)	0.007*** (0.001)	0.006*** (0.001)	0.003*** (0.001)	-0.003*** (0.001)	0.001 (0.001)
Part-time	-0.401*** (0.047)	-0.136*** (0.042)	-0.160*** (0.036)	-0.123*** (0.034)	0.033 (0.041)	-0.144*** (0.039)
Individual controls	Yes	Yes	Yes	Yes	Yes	Yes
Firm controls	Yes	Yes	Yes	Yes	Yes	Yes
Regional controls	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed controls	Yes	Yes	Yes	Yes	Yes	Yes

Source: NEPS-SC6, own calculations.

Note: Regression coefficients on the following variables are shown:

Career: How important is it for you to advance in a career: very unimportant [1] - very important [5]

Status: How important is it to you to continue to have a job which is at least as good as your current one: very unimportant [1] - very important [5]

Satisfaction: How satisfied are you with your work? Completely dissatisfied [0] - Completely satisfied [10]

Health: How would you generally describe your state of health? very poor [1] - very good [5]

Duties: Girls and boys should have the same duties in the home: completely disagree [1] - completely agree [4]

Role division: It's the man's job to earn money and the woman's job to take care of the household and family: completely disagree [1] - completely agree [4]

Same control variables on individuals' and firm level as in the main estimations.

Significance level: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

from working less hours.

Columns one and two of the second panel show a) that men who work more hours consider career advancement and the maintenance of their status as more important than men who work less hours and b) that the effects are even slightly larger than those for women. However, in contrast to women, men who work more hours are more satisfied with their jobs and more healthy. Thus, overall these results are consistent with the argument that specifically the lower productive men select themselves in part-time jobs. However, the results for men's gender-specific social views are less consistent. We either find no effects or effects that are inconsistent depending on whether we use our variable for working hours or our part-time dummy. Thus, the effects appear not to be robust to

changes of the specification and refrain from an interpretation.

Sensitivity analysis

First, in contrast to Picchio and Ours (2016) who define training participation as work-related training courses which are *firm-sponsored* we only use information whether a person took part in a course during employment or not. Since in-depth information whether training course are employer-sponsored are not part of the core questionnaire, we implicitly assume that all courses which are attended during employment are also work-related. Nevertheless, the data provide more information for a random sub-sample of all attended courses, which also include courses outside the employment, for example during parental leave or unemployment as well as privately motivated courses. Detailed information on motives, finance and structure on up to two randomly selected courses are available. We use these information for robustness checks and restrict us on courses which took place during employment and which are explicitly *employer-sponsored*, i.e., if the employer took over the costs of the course.

The cross tabulation of both variables shows that 93 percent of all courses during employment are also employer-sponsored, i.e., the difference is rather small and should be negligible for estimations. Nevertheless, using the employer-sponsored training variable we re-estimate equations (5.1) and (5.2). Table 5.10 shows these results.

The results show hardly any differences. We still find robust and significant effects, i.e., a part-time training penalty for women that is hardly effected by the inclusion of observable characteristics and unobserved time-constant heterogeneity. Also for men the results remain qualitatively similar. However, for men, we now find a positive effect of working hours, even after accounting for time-constant heterogeneity. However, the effect of the first-difference estimation is only weakly significant at the 10 percent level and much smaller than the effect of the OLS specification. Thus, the results still suggest low-productive men self-select into part-time jobs.

Second, unobserved heterogeneity at firm level could bias the estimated effects of part-time work on the probability of participating in training course. On the one hand, first-differencing models takes out time-constant unobservables at individual level, on the other hand it cannot get rid of time-constant unobservables at firm levels if employees changed firms between two survey times. Unobserved heterogeneity on firm level, such as management practices and firm strategies, could influence part-time employment as well as firms' training behavior. This seems to be problematic if gender and firms unobservable factors might be correlated (see also, Picchio and Ours, 2016). Hence, as robustness analysis, we use only firm stayers between two survey times. Using firm stayers first-

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Table 5.10.: Regression estimates using the employer-sponsored training variable

	Women		
	OLS	OLS	First Diff
Working hours	0.005*** (0.000)	0.004*** (0.000)	0.004*** (0.001)
Part-time	-0.060*** (0.010)	-0.044*** (0.010)	-0.060*** (0.021)
Individual controls	No	Yes	Yes
Firm controls	No	Yes	Yes
Regional controls	No	Yes	Yes
Year fixed controls	No	Yes	Yes

	Men		
	OLS	OLS	First Diff
Working hours	0.005*** (0.000)	0.003*** (0.000)	0.002* (0.001)
Part-time	-0.167*** (0.015)	-0.114*** (0.015)	-0.058 (0.039)
Individual controls	No	Yes	Yes
Firm controls	No	Yes	Yes
Regional controls	No	Yes	Yes
Year fixed controls	No	Yes	Yes

Source: NEPS-SC6, own calculations.

Note: Significance levels: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Standard errors in parentheses. The part-time indicator is based on factual weekly working hours. Part-timers work less than 30 hours per week. Models include all control variables as in the baseline models. For the full list of control variables see Tables C.1 to C.4 in Appendix.

difference estimations eliminates unobservables both at employees and firm level.

Table 5.11 shows the estimation (first difference models) results for the full sample and the firm stayer sample. The first two columns show that for women there are virtually no differences between both samples. The estimates effects for both variables working hours as well as the part-time indicator do not change and confirm the prior results. Reducing the amount of working hours significantly reduces women's probability of work-related training courses. The last two columns show the results for men. When the part-time indicator is used, the impact substantially reduces by almost 50 percent (from -0.045 to -0.024), but remains statistically insignificant. Overall, this suggest that unobservables

on firm level might not bias the estimations results.

Table 5.11.: First-difference estimates, sensitivity analysis for firm stayers

	Women		Men	
	Full sample	Firm stayers	Full sample	Firm stayers
Working hours	0.005*** (0.001)	0.005*** (0.001)	0.001 (0.001)	0.001 (0.001)
Part-time	−0.074*** (0.022)	−0.074*** (0.023)	−0.045 (0.038)	−0.024 (0.049)
Further controls	Yes	Yes	Yes	Yes
Observations	10,212	9,824	10,626	10,128

Source: NEPS-SC6, own calculations.

Note: Regression coefficients for separated first-difference model estimations are shown.

5.7. Conclusion

Previous research from the Netherlands and Switzerland (Backes-Gellner et al., 2014; Picchio and Ours, 2016) has shown that women who work part-time are almost as likely to receive employer-provided training as women who work full-time. In contrast, part-time working men are much less likely to receive employer-provided training than full-time working men. In contrast, our results for Germany reveal a persistent and relatively large part-time training gap for women, even after accounting for unobserved heterogeneity. These results suggest that the part-time training gap is related to the nature of part-time work in the respective country. Indeed, in Germany, part-time work is less frequent and working hours differ more between part-time and full-time workers than in both other countries. Moreover, part-time work in Germany is less concentrated in the public services sector. Thus, part-time working women in Germany may be more likely to suffer from social stigmas or statistical discrimination than in both of those other countries. In line with the previous evidence, we also find that part-time working men are less likely to receive further training than full-time working men. However, in contrast to the previous studies, unobserved heterogeneity accounts for the entire part-time training gap of men suggesting that negative selection of low productive workers into part-time job is stronger among men than among women.

Overall, our results are consistent with identity-based utility framework of Akerlof and Kranton (2000) in which individuals receive identity-based utility payoffs if they behave according to their assigned stereotypes but suffer utility cost if they violate their assigned

stereotypes. Following the theory, working part-time enables women to follow the common stereotype of a caring housewife and hence, they are more likely to accept part-time jobs – including the inferior image such as social stigmas and (statistical) discrimination. Contrary, men incur negative identity-based utility payoffs from working part-time in addition to the inferior job quality of part-time jobs. Thus, social stigmas should enforce stronger negative self-selection of less productive workers into part-time jobs among men than among women.

Analyzing the mechanisms, show that part-time working women are more healthy and satisfied with their jobs than full-time working women. This is consistent with literature showing that preferences and values determine women's employment decision (Hakim, 2002; Matějů et al., 2017). Part-time employment may have negative attributes, but it allows women to follow their own preferences and combine work and child care. In contrast, part-time working men appear to be less healthy and less satisfied with their jobs than full-time working men. The findings suggest that men are on average more likely to unintentionally work part-time than women and a negative self-selection of low productive men into part-time jobs took place. Following Akerlof and Kranton (2000) this explains why part-time working men suffer identity-based utility costs violating their own male stereotype ("male breadwinner"). The latter is strongly supported, because full-time and part-time working men appear do not differ in their social views about gender equality.

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6. Summary and conclusions

This dissertation focuses on four important decisions related to educational and career process in the life course. More specifically, the dissertation analyzes (i) the relationship between parental risk preferences and their children's secondary schooling track choice, (ii) the importance of social origin and training firms' motives when deciding the pros and cons of a firm-based apprenticeship, (iii) wage differences between former draftees in the civilian service and those in the military service, and (iv) the relationship between part-time work and gender-specific training participation in Germany. Assuming that individuals largely decide rationally, the first chapter briefly introduces the human capital theory (Becker, 1993) and the rational choice theory of subjective utility (Erikson and Jonsson, 1996). The introduction describes the contexts in which the four articles relate to the theoretical framework.

6.1. Summary and contributions

The first article (Chapter 2) is co-authored with Guido Heineck and examines the relationship between parents' risk preferences and their children's secondary schooling track. In recent years, numerous studies have examined the influence of cognitive and non-cognitive abilities on labor market outcomes (e.g., Borghans et al., 2008b; Heckman et al., 2006; Heineck and Anger, 2010; Nyhus and Pons, 2005). However, almost no research in the economic literature considers whether parental risk attitudes toward education have an impact on their children's secondary schooling (cf., Brown et al., 2012; Leonardi, 2007). This is surprising, as the secondary school track choice is of great importance to further educational and career success in Germany and therefore is an investment in human capital related to uninsurable and nondiversifiable risks; thus, an individual's risk preferences may be relevant (Shaw, 1996).

Contributing to this branch of research, the article uses the SOEP data and builds a sample of adult respondents with children between the ages of 10 and 15. Applying several multinomial logit models, the article estimates the impact of parental risk attitudes on children's secondary school track choice. The overall results demonstrate an inverse

relationship between parental risk aversion and children's secondary school track. The patterns suggest that compared to their risk-neutral counterparts, children of risk-averse mothers are less likely to attend the upper secondary school track and more likely to attend the lower secondary school track. On the contrary, the results for fathers are inconsistent and may suggest that children of risk-averse fathers are less likely to follow the lower secondary school track. The results also indicate that parental risk attitudes play a larger role for daughters than for sons. The article suggests that a factor beyond social origin, e.g., parental education, is important for children's educational attainment (cf., e.g., Heineck and Riphahn, 2009) and that parental non-cognitive skills and attitudes are relevant of children's education.

The second article (Chapter 3) has been written with Hans Dietrich. The article uses the ALWA-ADIAB data and applies sequential logit models and simulations. Contributing to the recent status attainment research, the article examines the impact of social origin and training firm's role within the German apprenticeship training system. Although enrollment rates into the apprenticeship system differ with the level of secondary school education, firm-based apprenticeship training is attractive to graduates of all levels of secondary school education. Specifically, the article investigates the decision to transition from secondary school into apprenticeship training and the decision to proceed from successful apprenticeship training into the labor market. Introducing the firm as independent actor (Kerckhoff, 1995; Soskice, 1994), the article theoretically extends the status attainment model (Blau and Duncan, 1967).

In line with existing literature (e.g., Glaesser and Cooper, 2011; Jacob and Tieben, 2009), the results show differences with respect to secondary school track. First, for graduates of lower secondary education ("Hauptschulabschluss"), the findings indicate an important impact of school performance and social origin. Apprenticeship graduates with below-average school performance are more likely to enter the labor market than to pursue further higher education. Fathers' higher educational level increases the probability of further higher education. Second, for graduates of middle secondary education ("Mittlere Reife" and "Fachoberschulabschluss"), social origin and school performance appear to be less relevant. Third, for graduates of upper secondary education ("Abitur"), the findings strongly indicate that social origin and individual's school performance influence the choice between apprenticeship training and university study. Social origin, i.e., a father's higher educational level, pushes toward higher education and against apprenticeship training. Fourth, for all three types of graduates and in addition to social origin, the training firm's investment strategy (Soskice, 1994; Stevens, 1994) appears to be important to the labor market decision made after apprenticeship training. Training firms' quality, measured

as the last apprenticeship wage, increases the probability of entering the labor market instead of continuing education. The findings suggest various institutional mechanisms with respect to school leaving degree. While investment-oriented training firms are more attractive, support a smooth transition into the labor market and provide a better access to a successful labor market career, a higher level of social origin favors the continuation of (higher) education.

The third article (Chapter 4) considers wage differences between the two main types of conscripts in Germany, draftees in the military service (“Wehrdienstleistende”) and those in the civilian service (“Zivildienstleistende”). For a long time, draftees in the civilian service had a negative image of “slackers” and reported discrimination in employment and private contexts (Krölls, 1980; Kuhlmann and Lippert, 1991). The article contributes to literature that relates to the consequences and effects of military service. The study is the first to demonstrate discrimination against former draftees in the civilian service that has not been analyzed so far.

Using the ALWA-ADIAB data, the article analyzes in depth the wage differentials during the years 1980-2008 between the two types of draftees. Even after controlling for a broad range of factors, on average, the results show wage disadvantages for draftees in the civilian service. The results indicate a strong employer learning effect for new labor market entrants, i.e., that the wage differences are more pronounced in the beginning of the labor market career and decrease as draftees accumulate work experience. The analysis of underlying mechanisms shows that draftees in the civilian service experience larger wage gaps in small-sized firms and male-dominated occupations because of a more “conservative” environment. Consistent with findings that the wage penalty is larger for older birth cohorts and diminishes for younger cohorts, the results show that prejudices and discrimination against the civilian service persist; however, such prejudices diminished over time. Furthermore, the results also may suggest that individual preferences contribute to some extent to the wage gap. Finally, the results also indicate occupational sorting, that may reflect employer preferences. Overall, the article suggests that in addition to the human capital theory (Becker, 1993; Mincer, 1958), discrimination theory (Arrow, 1973; Becker, 1973) and employer learning (Altonji and Pierret, 2001) appear to be helpful for explaining wage differences.

The fourth article (Chapter 5) was written with Simon Janssen and analyzes the relationship between part-time work and gender-specific training participation in Germany. On the one hand, part-time work permits individuals to combine work and care for children. On the other hand, part-time workers frequently earn lower wages (e.g., Fernández-Kranz and Rodríguez-Planas, 2011; Hirsch, 2005) and have worse career prospects than full-time

workers (e.g., Connolly and Gregory, 2009; Manning and Petrongolo, 2008). Therefore, supporting workplace training for part-time workers may be appropriate for reducing gender inequality in the labor market. Nevertheless for the Netherlands and Switzerland, a part-time training gap is observed for men but not for women in the recent literature (Backes-Gellner et al., 2014; Picchio and Ours, 2016). It is argued that part-time work is more prevalent among women than men, so that women working part-time are rarely exposed to statistical discrimination and social norms that stigmatize them as having low productivity and being less engaged in the labor market.

Using unique panel data, i.e., the adult cohort (SC6) of the National Educational Panel Study, the article contributes to the literature and explores this topic for Germany for the first time. Similar to existing studies, the article demonstrates a larger unconditional training gap between men working part-time and those working full-time than between women working part-time and working full-time. Nevertheless, accounting for unobserved heterogeneity at the worker level, the results show that the training gap disappears only for men but not for women. This finding contradicts those of earlier studies, where unobserved heterogeneity accounted for the training gap of women but not of men. The result suggests that the magnitude of the conditional female and male part-time training gap is country-specific and most likely depends on the nature of part-time work in the respective country. In Germany, on average, working part-time is much more common among women. Additionally, an in-depth analysis shows that personality traits such as social views on gender equality, work attitudes and satisfaction may be relevant to explaining the training gap.

Following Akerlof and Kranton (2000) who incorporate a model identity-based payoffs in a utility function, the findings remain consistent with the main idea of previous studies that men working part-time are more strongly exposed to social stigmas than women working part-time: the former suffer identity-based utility costs violating their own male stereotype of a “male breadwinner”. The results show that men working part-time are less healthy and less satisfied with their jobs than those working full-time. Thus, the results suggest that a negative self-selection of men with low productivity into part-time jobs has occurred and men on average are more likely than women to unintentionally work part-time.

6.2. Conclusion

The theoretical starting point of this cumulative dissertation was the assumption of a rational decision-making of the individual. This assumption applies in particular to individual educational decisions, such as the choice of secondary school track, the starting of dual apprenticeship training or studies, and their long-term consequences of educational pathways. Against this theoretical background, the dissertation focused on four important decisions in the course of life. The individual articles not only provide new findings on their own, as described before, but also make an important contribution to explaining individual research gaps. In addition, further important conclusions can be drawn from the final assessment of the main results of all four articles. The dissertation provides four main conclusions from the analyses in Chapters 2-5.

First, in many decisions, not only purely rational or economic reasons, such as better prospects of higher income or prestige, are important. Chapter 2 contributes to the recent psychological and economic literature that focuses on the impact of cognitive and non-cognitive skills on the labor market and socially relevant outcomes. It demonstrates that soft skills such as personal attitudes, values and personality traits help explain a wide variety of behaviors and economic outcomes (cf., e.g., Borghans et al., 2008a,b; Fouarge et al., 2014; Heckman et al., 2006; Heineck and Anger, 2010). Therefore, if investments in human capital and far-reaching educational choices for children depend on parental attitudes and characteristics, it is indispensable to expand the information availability in the educational system to revise a possibly wrong decision based on parental preferences or attitudes.

Second, it is well-known that social background has a significant influence in many areas of labor market-relevant outcomes. Among countless studies in the field of inequality research, there is a broad consensus that social mobility is low (e.g., Heineck and Riphahn, 2009; Shavit and Blossfeld, 1993) and persistent over several generations (e.g. Braun and Stuhler, 2018; Hertel and Groh-Samberg, 2014). Especially in educational and school decisions, social status is predominant. The second article contributes to this literature and shows that social origin also has a major impact on the decision to start a firm-based apprenticeship after secondary education. Even after a successful apprenticeship training, the social origin still has some influence on the choice between entering the labor market and investing in additional (higher) education. Following social class motives (e.g., Breen and Goldthorpe, 1997) and economic reasons, it is rational for children of a lower social class to enter the labor market instead of investing in more education. Although the decision and individual behavior appear rational, especially in the short term, the decision seems to be more problematic in the medium and long term, particularly with regard to

the labor market and income prospects of low-skilled persons. To reduce the educational inequality, thus, it is necessary to limit the impact of social origin on important decisions. It is necessary to support more children from disadvantaged families of lower educational attainment that hampers their educational career.

Third, human capital theory and rational choice approaches are helpful starting points for explaining individual behavior. However, as shown in this dissertation, other factors and mechanisms appear to be at least a similar importance in some decisions. The results of the third and fourth articles show that theories of stereotypes (Akerlof and Kranton, 2000) and discrimination and employer learning (Altonji and Pierret, 2001; Arrow, 1973; Becker, 1973) can provide additional alternative explanations for individual decisions. Approaches in behavioral economics and decision-making theories, e.g., the prospect theory (Kahneman and Tversky, 1979; Tversky and Kahneman, 1992), relax the assumption of a perfect rationality toward a bounded rationality and also may provide fruitful explanations for individual behavior.

Fourth, individual attitudes, including prejudices, and popular, social opinions may limit an individual's factual scope of rational decision-making. While the third article in chapter (4) shows that former draftees in the civilian service (and especially older draftees in the civilian service) are perceived as being inferior to those in the military service, the article in chapter 5 demonstrates men working part-time suffer from the stigma of being unproductive workers. Prejudices and stigmatization based on certain ideas are crucial aspects of a group's disadvantage and discrimination. The individual abilities of affected persons to counteract the disadvantage are limited if stereotypes are very persistent. The recent example of men working part-time is particularly problematic if the role model of the "male breadwinner" is predominant in society. In a recent study, Schröder (2018) shows that men working part-time likely decrease life satisfaction of mothers, fathers and their partners. Considering the desire of politicians and the economy to increase the labor market participation of women, this role model that is apparently a prevailing image in the society contradicts the objective. Discussions, e.g., of improving women's low pensions or reducing social inequality, are therefore likely to be only partially effective if individual and social stereotypes are not critically scrutinized.

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A. Appendix to Chapter 3

A.1. Supplementary Table

Table A.1.: Descriptive summary

Educational level Transition	Lower sec. graduates		Middle sec. graduates		Upper sec. graduates	
	Appren- ticeship	Employ- ment	Appren- ticeship	Employ- ment	Appren- ticeship	Employ- ment
School performance (self-rated)	2.6	2.6	2.5	2.5	2.4	2.6
Father: upper secondary degree	3.10%	2.30%	11.50%	10.50%	34.10%	25.01%
Mother: employed at age 15	48.90%	48.70%	56.00%	53.20%	56.50%	56.80%
Single parents (=broken family)	9.70%	8.40%	5.90%	5.40%	5.00%	6.80%
Male	61.70%	67.10%	42.20%	43.80%	44.70%	38.30%
Foreign household language	15.30%	8.50%	9.10%	5.00%	8.80%	3.10%
Last apprenticeship wage		19.39(€)		22.28(€)		26.52(€)
Observations	798	599	1,640	1,209	1,269	447

Note: Further controls not shown: federal, regional, demographic and year variables.

A.2. Simulations: Further explanation

The basic idea of the simulations is to include unobserved heterogeneity as an artificial variable to capture all unobserved factors. This variable, which represents typically unobserved characteristics, can be interpreted as the weighted sum of all omitted factors, for example, individuals' ability, motivation, preferences or social skills.

This unobserved variable, u , is included as standardized ($\mu = 0, \delta = 1$) normal-distributed type of variable that has an additional impact β_{uj} during each transition j . Alternatively, the unobserved variable can be interpreted as an additional error term or an unstandardized random variable ν_j and its standard deviation is the same β_{uj} . The variables are linked as: $\nu_j = \beta_{uj} * u$ (Buis, 2011, 252).

It is important to stress that β_{uj} can be interpreted as the amount of unobserved heterogeneity. Thus, the higher the standard deviation is, the higher the impact of the heterogeneity. Different scenarios are simulated, and changes on the social background variables (parental education and school performance) are measured. Those robustness and sensitivity tests include different specifications (see Buis, 2011, for more details).

Therefore, the probability of the first transition ($j = 1$), from general school to apprenticeship training, takes the form:

$$P_1 = [y_1 = 1 | x_1^1, x_2^1, \dots, x_k^1; u] = \frac{\exp(\beta_0^1 + \beta_1^1 x_1^1 + \beta_2^1 x_2^1 + \dots + \beta_k^1 x_k^1 + \beta_u^1 u)}{1 + \exp(\beta_0^1 + \beta_1^1 x_1^1 + \beta_2^1 x_2^1 + \dots + \beta_k^1 x_k^1 + \beta_u^1 u)} \quad (\text{A.1})$$

with k different control variables x_k^1 and with u as an additional variable representing the unobserved heterogeneity. Similarly, the second transition ($j = 2$) can also be modelled, but this is conditional on having successfully participated in apprenticeship training, i.e. $y_1 = 1$:

$$P_2 = [y_2 = 1 | x_1^2, x_2^2, \dots, x_k^2; u; y_1 = 1] = \frac{\exp(\beta_0^2 + \beta_1^2 x_1^2 + \beta_2^2 x_2^2 + \dots + \beta_k^2 x_k^2 + \beta_u^2 u)}{1 + \exp(\beta_0^2 + \beta_1^2 x_1^2 + \beta_2^2 x_2^2 + \dots + \beta_k^2 x_k^2 + \beta_u^2 u)} \quad (\text{A.2})$$

The different coefficients β_k^1 and β_k^2 are estimated. Leaving out u , the unobserved heterogeneity, can lead to biased estimates (see Cameron and Heckman, 1998). To overcome that drawback, sensitivity analysis with different plausible scenarios are conducted to assess the consequences of unobserved heterogeneity (Buis, 2011).

What should be reasonable values for β_{uj} in order to get realistic scenarios? Buis suggests orienting towards the effects of standardized variables with assumed effects. The article selects individuals' school performance and social background as variables of key interest and use their standardized effects as anchors. The estimates results in standard-

ized effects up to 0.3 in the models. Therefore, the article uses 0.3 as an orientation to define the upper bounds of unobserved heterogeneity in the simulations.

The article simulates two scenarios, which are each estimated for the three subgroups of population (graduates from lower, middle and upper secondary education) separately. A first scenario fixes different amounts of heterogeneity for each transition j and assesses the impact of the amount of unobserved heterogeneity on the social background variables. In the first scenario, this amount is constant for both decisions. Therefore, $\beta_{uj} = 1.5$ is the upper bound in order to allow also very extreme scenarios that vary β_{uj} between 0 and 1.5, up to five times the standardized effect of social background.

A second scenario allows for changes in the amount of β_{uj} over transitions, that is, β_{uj} reduces or increases from transition 1 to transition 2. The unobserved variable u can be thought as ability or work preparedness. Since effects mostly decrease over transitions (Shavit and Blossfeld, 1993), it seems reasonable that the influence of u also decrease over the transitions. Otherwise, it is also plausible to imagine that those effects increase. Hence, the effect for the first transition, β_{u1} , is fixed at 0.75 and β_{u2} is changed to 0, 0.25, 0.5, 0.75, 1, 1.25, 1.5 simulating both decreasing and increasing impact on the second decision.

Acknowledgements

This study uses the weakly anonymous ALWA survey data linked to administrative data from the IAB (version 1 1979 - 2009), the truly anonymous data from the Study 'Working and Learning in a Changing World' (ALWA).

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B. Appendix to Chapter 4

B.1. Brief overview of legal regulations

By joining NATO in 1955, West Germany agreed to establish the German armed forces (*Bundeswehr*), and in July 1956, the parliament made that agreement law (*Wehrpflichtgesetz*). Under this law, all able-bodied men born after June 30, 1937, had to serve in the army. At age 18, each young man had to undergo physical and psychological examinations to assess his fitness for military service. According to these results, all young men were classified into three different types: males with good enough health were classified as fit for service, males with health restrictions were temporally deferred and males with severe health issues were completely excluded from the service. Among those fit to serve, exceptions applied: students in theology, police cadets, Federal Border Guards or Peace Corps members and convicts. Additional exceptions included small groups of young men who committed to serve at least ten years in a voluntary substitute service (*Surrogatdienste*), e.g., civil protection or aid organizations.¹ Every able-bodied male had to complete his compulsory military service.

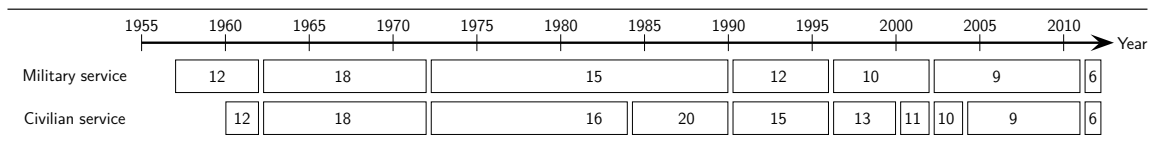
However, males classified as fit for service but who did not want to serve in the military forces could file for conscientious objection. Given Germany's history under the Third Reich, this right of conscientious objection was established in 1949 in the German Constitution (*Grundgesetz*) as fundamental right: No one could be forced to use a weapon against his will, including military service (*Grundgesetz*, (4), §§ 1,3). This basic right has priority over the principle of compulsory military service. However, conscientious objection must be justified by religious and/or veritable beliefs, not by political or situational reasoning (see Kuhlmann and Lippert, 1991, and the literature and court decisions mentioned therein). After filing for conscientious objection, a young man had to appear before an examination board (until 1984) to prove his sincerity. As politicians initially feared a high number of refusals, the main objective was to depoliticize the fundamental right of conscientious objection (Janning, 1990). Thus, at this point, military service was the default service option (*Grundgesetz* §12a).

The first law for civilian service was passed in 1961 (*Zivildienstgesetz*, ZDG), regulating the domain and employment conditions of civilian-enlisted males. Men in "alternative service" (later renamed "civilian service") had to serve the public good, in domains such as hospitals or mental hospitals, or further socially oriented or not-for-profit institutions. By law and political intention, the civilian service was to be as rigorous and physically demanding as military service. The political preference and aim was to guarantee the effective operation of the armed forces over the constitutional right to object (BVerfGE

¹For further exemptions, see WPflG, in particular §§11,13,13a,13b.

69, court ruling 24 April, 1985; see also Finckh, 1990; Werner, 1990). The new law implemented a strict state application procedure to avoid abuse of the new system.

Those applying for alternative service had to write a letter stating their reasons for not wishing to serve in the military. Then they had to appear before specialized councils and prove their conscientious objection. Their testimony was decisive but questionable, as the council (laymen, members of the Department of Defense) were not objective, and the inquiry essentially constituted cross-examination with prejudice (for further information, see Bernhard, 2005). Following growing criticism of the definition of conscientious objection and an increasing number of lawsuits protesting the councils' decisions, in 1984, parliament changed the process. The law changed the procedure and the oral verification was cancelled to simplify the application process. From then until the suspension of the compulsory military service system in 2011, a new office for civilian service screened the written applications (curriculum vitae, certificate of police clearance, letter stating reasons) for plausibility and conformity with the legal requirements. The law also changed the duration of civilian and military service (see Figure B.1). The change from oral hearings to decisions based on records produced a faster application process.



Note: There were some additional laws which changed the duration period, but, which lasted only for a short period. In 1977, for example, a legal change has been overruled by the Federal Administrative Court. The figure shows the main durations. For description in more detail see Beher et al., 2002; Kuhlmann and Lippert, 1991.

Source: WPfIG; ZDG; Beher et al., 2002; Kuhlmann and Lippert, 1991.

Figure B.1.: Simplified illustration of duration of compulsory military service

Interviews were still allowed for disputed cases but were less common. In the following years, both service durations were further reduced. In the 2000s, intense political discussions on the justice and funding of the conscription system emerged and ultimately led to the suspension of compulsory military service in 2011.

B.2. A brief history of civilian service in Germany

In the first years after WWII (the 1950s and early 1960s), conscientious objection was a minor phenomenon. In these first birth cohorts (1938-1947), conscientious objection showed only "pattern of social deviance" (Räder, 1994, 3f.) with an annual mean of approximately 3,900 objectors, which translates to a proportion of accepted applications of less than 2 percent Beher et al. (2002, 86f.).² Serving in the military forces was socially expected and part of becoming an adult. The following birth cohorts, 1948-1950, were the first protagonists of a growing conscientious objection movement. Political change, i.e., the student movement and the Vietnam War, led to an increasing number of conscientious objectors in the birth cohorts 1948-1958 (the late 1960s and 1970s). Figure B.2 shows the patterns of enlisted men in the civilian service for the period from 1960 to 2008.

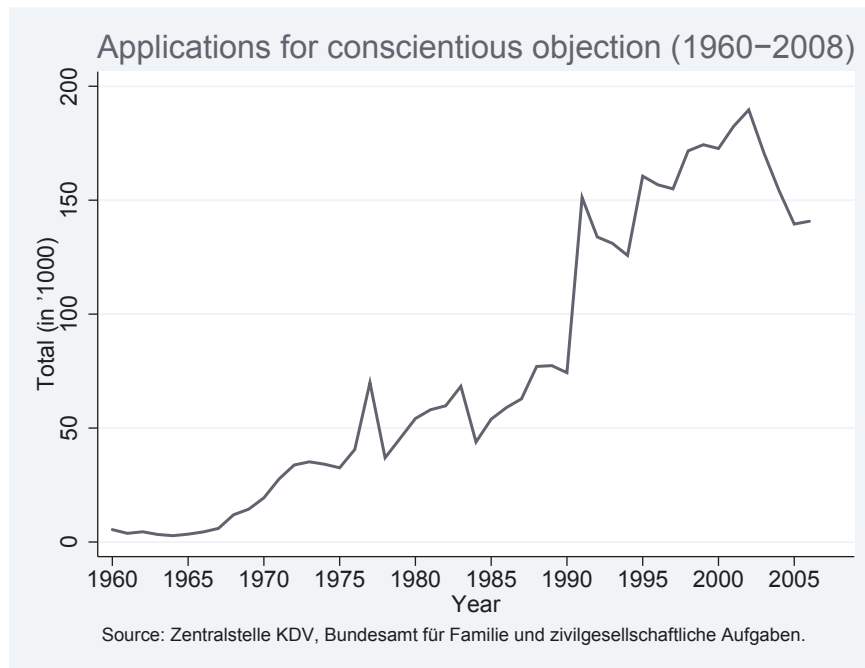


Figure B.2.: Applications for conscientious objection 1960 to 2008

The growth was almost linear and reached a level of 45,000 in 1979 (see Figure B.2). As can be seen by the peak in 1977, young men responded to political and legal changes. The peak of applications in 1977 shows the result of the failed postcard episode, in which a simple letter replaced the time-consuming council hearings. After the decision of the Federal Administrative Court, the number of applications returned to the baseline level. For the following birth cohorts, 1959-1965, this trend continued and can be described

²For a more detailed description, see Haberhauer and Maneval (2000), Kuhlmann and Lippert (1991), and Räder (1994) and in particular Beher et al. (2002).

as period of stabilization in conscientious objection as a social phenomenon. During this period, new laws governing compulsory military service and alternative civilian service were passed that led to new institutional settings (e.g., a special federal office of civilian service). Consequently, the development of places for civilian enlisted men kept pace and became a social relevant dimension, although the absolute level remained comparatively small.

In the 1980s, conscientious objection stabilized and became established as a mass, socially normal phenomenon (Beher et al., 2002; Räder, 1994). The increasing numbers can be partially explained by the baby boomers and the increasing number of young men who had to fulfill their service. An additional reason was the reduction in the duration of service and eased institutional regulations, that is, the change to a simple decision based on file information, leading to a real choice between military and civilian service. In addition, a more political youth and the peace movement, as well as developments in the Cold War and discussions of military expansion (Pershing II missiles should be based in West Germany), boosted the demand for conscientious objections (Kuhlmann and Lippert, 1991). This trend continued into the 1990s and did not change after German reunification. The Gulf War, the Yugoslav Wars and further legal amendments in favor of a normalization of civilian service supported the process. Ultimately, the character of negative perception of alternative service was transformed into a widely socially accepted alternative. Beginning in the late 1990, there were more draftees in the civilian service than in the military service, which contradicted the law that the civilian service should be the exemption.³

B.3. International literature overview

The international literature on returns to wages can be classified into three branches: war experience, conscription and regular military work experience (Baert and Balcaen, 2013). The results are rather First, early studies (in the 1970s and 1980s) analyzed the effects of fighting in a war on subsequent income (Browning et al., 1973; De Tray, 1982; Fredland and Little, 1980; Little and Fredland, 1979; Lopreato and Poston, 1977; Martindale and Poston, 1979; Teachman, 2004). The empirical results predominantly show positive effects for non-white minority veterans of World War II and the Korean War, with more pronounced effects for blacks and less-educated veterans (Teachman and Tedrow, 2004). In contrast, later studies analyzing effects of the Vietnam War show mostly negative

³In 1998, the first time, there were more applications for conscientious objection than draftees in the military service (Zoll, 2002).

outcomes (Angrist, 1990; Angrist et al., 2011; Angrist and Krueger, 1994; Rosen and Taubman, 1982; Schwartz, 1986; Villemez and Kasarda, 1976) or at most no advantages in subsequent civilian earnings (Berger and Hirsch, 1983; Teachman, 2004).

Second, studies that analyze the causal effect of conscription, i.e., the impact of military service on subsequent wage outcomes, provide a mixed picture. Mangum and Ball (1987, 1989), Phillips et al. (1992) and Bryant et al. (1993) find support for the existence of economic advantages of voluntary military service. Angrist (1998) tends toward only a weak long-run increase in civilian wages for non-white men and a decrease for white men. Teachman and Tedrow (2007) find strong heterogeneity with respect to race and education. They find positive short-term effects for black and less-educated men and negative effects for white men with at least a high school degree. The results of Jackson et al. (2012) indicate a wage penalty for draftees and voluntary enlistees. Estimating propensity scores for military service DellaPosta (2013) reveals economic gains only for young men with the greatest propensity to engage in military service. Using Portuguese data, Card and Cardoso (2012) find positive effects for men with only primary education and no effects for men with higher education. For the Netherlands, Imbens and Klaauw (1995) and Hubers and Webbink (2015) find negative effects of military service. For the UK, Grenet et al. (2011) and Buonanno (2006) used the conscription period 1949-1960. They generally find no long-term effects of conscription with respect to wages. For Sweden, Grönqvist and Lindqvist (2016) find long-term effects of officer training on the probability of being employed in a managerial position in subsequent civilian employment.

Third, comparing regular military work experience with similar civilian work experience also produces mixed results that depend on the branch of the armed forces in which an individual served. Overall, Bryant and Wilhite (1990) find a negative impact of military service conscription on subsequent civilian wages, but they also find a positive impact of military training on subsequent civilian wages. They show that serving in the Marines and the Army depresses wages, but the training so obtained has no effect. Serving in the Navy decreases wages, but this loss can be recovered by training. Further, serving in the Air Force yields positive wage returns. Goldberg and Warner (1987) show general advantages of long-lasting military training experience and differences according to an individual's occupational field while in military service.

In summary, the findings overall suggest positive effects for veterans of World War II and the Korean War, whereas veterans of the Vietnam War suffered income losses (Teachman and Call, 1996). It further seems that the effects of military service on economic outcomes vary by subgroup, e.g., by race and educational level. In a more recent contribution, Baert and Balcaen (2013) perform a field experiment in Belgium to assess the impact of military

work experience on subsequent careers in the civilian labor market. Their evidence shows neither advantages nor disadvantages of serving in the armed forces.

In addition to wage or earnings differentials, several studies have investigated, in a range of different countries (the US, Canada, France, Italy), the relationship between military service and educational attainment. Teachman et al. (1993) investigate selection into voluntary military service. While they report evidence of a positive selection of black men, they also report evidence of a negative selection of less-advantaged white men. Bound and Turner (2002) and Smith et al. (2012) show that World War II veterans have educational advantages (and social status gains) relative to non-veterans. Teachman and Call (1996) show that for the All Volunteer Forces, African-American men received less education and that less-advantaged white men benefitted. Results from Angrist and Krueger (1992), Card and Lemieux (2001), Hubers and Webbink (2015) and Maurin and Xenogiani (2007) indicate negative effects of conscription on schooling and investments in further education. Cipollone and Rosolia (2007) use an earthquake in Italy as natural experiment. They report that exempting a specific cohort from military service increased the high school graduation rates of these men by approximately 2 percentage points. In contrast, using the abolition of compulsory military service in Italy, Pietro (2013) reports no overall effects on university enrollment rates but some heterogeneous effects with respect to social background. Keller et al. (2010) conduct a macroeconomic analysis of several OECD countries and analyze the impact of compulsory military service on higher education attendance. They use the duration of military service and the share of the labor force conscripted as measure of enforcement intensity. The results indicate that the intensity of enforcement has a substantially negative effect on higher education participation.

Acknowledgements

This study uses the weakly anonymous ALWA survey data linked to administrative data from the IAB (version 1 1975 - 2009), the truly anonymous data from the Study 'Working and Learning in a Changing World' (ALWA), data on the literacy and numeracy tests (ALWA LiNu) and absolute anonymous data from the Occupational Panel 1976-2010 (OccPan).

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C. Appendix to Chapter 5

Table C.1.: Estimates using the workinghours indicator and employer-sponsored variable, women

	OLS	OLS	First Diff
Working hours	0.005*** (0.000)	0.004*** (0.000)	0.004*** (0.001)
Age		0.016** (0.007)	0.085*** (0.033)
Age ²		−0.000** (0.000)	−0.000 (0.000)
Medium sec. degree with VET		0.016 (0.021)	0.101*** (0.010)
Upper sec. degree		0.033 (0.023)	0.388 (0.275)
Higher education		0.055** (0.023)	0.441* (0.258)
Tenure [with same job] in months		0.000 (0.000)	0.001 (0.000)
Tenure ²		−0.000 (0.000)	−0.000 (0.000)
Single		0.009 (0.018)	0.009 (0.049)
Married		0.019 (0.016)	0.038 (0.046)
Number of children		0.003 (0.005)	−0.011 (0.017)
Low skilled blue collar		−0.227*** (0.015)	−0.129** (0.060)
(High) skilled blue collar		−0.173*** (0.030)	0.059 (0.114)
Low skilled white collar		−0.112*** (0.016)	−0.081 (0.056)
Civil servant		0.041* (0.025)	−0.074 (0.161)
Temporary contract		−0.041** (0.016)	−0.010 (0.033)
Constant	0.152*** (0.014)	−0.124 (0.155)	−0.147*** (0.016)
Firm controls	No	Yes	Yes
Regional controls	No	Yes	Yes
Year fixed controls	No	Yes	Yes
Observations	14486	14486	9398
R ²	0.013	0.068	0.025

Source: NEPS-SC6, own calculations.

Note: Significance levels: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Standard errors in parentheses.

Table C.2.: Estimates using the part-time indicator and employer-sponsored variable, women

	OLS	OLS	First Diff
Part-time	−0.060*** (0.010)	−0.044*** (0.010)	−0.060*** (0.021)
Age		0.017** (0.007)	0.086*** (0.033)
Age ²		−0.000** (0.000)	−0.000 (0.000)
Medium sec. degree with VET		0.015 (0.021)	0.095*** (0.011)
Upper sec. degree		0.033 (0.023)	0.371 (0.273)
Higher education		0.061** (0.024)	0.435* (0.255)
Tenure [with same job] in months		0.000 (0.000)	0.001 (0.000)
Tenure ²		−0.000 (0.000)	−0.000 (0.000)
Single		0.006 (0.018)	0.009 (0.049)
Married		0.010 (0.016)	0.036 (0.047)
Number of children		−0.004 (0.005)	−0.013 (0.017)
Low skilled blue collar		−0.238*** (0.015)	−0.141*** (0.060)
(High) skilled blue collar		−0.172*** (0.030)	0.068 (0.112)
Low skilled white collar		−0.120*** (0.016)	−0.086 (0.056)
Civil servant		0.044* (0.025)	−0.078 (0.162)
Temporary contract		−0.044*** (0.016)	−0.011 (0.033)
Constant	0.330*** (0.007)	0.009 (0.157)	−0.147*** (0.016)
Firm controls	No	Yes	Yes
Regional controls	No	Yes	Yes
Year fixed controls	No	Yes	Yes
Observations	14486	14486	9398
R ²	0.004	0.063	0.024

Source: NEPS-SC6, own calculations.

Note: Significance levels: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Standard errors in parentheses. The part-time indicator is based on factual weekly working hours. Part-timers work less than 30 hours per week.

Table C.3.: Estimates using the workinghours indicator and employer-sponsored variable, men

	OLS	OLS	First Diff
Working hours	0.005*** (0.000)	0.003*** (0.000)	0.002* (0.001)
Age		0.004 (0.006)	0.081*** (0.029)
Age ²		−0.000 (0.000)	−0.000 (0.000)
Medium sec. degree with VET		0.008 (0.021)	0.082 (0.373)
Upper sec. degree		0.039* (0.023)	0.207 (0.388)
Higher education		0.068*** (0.023)	0.284 (0.394)
Tenure [with same job] in months		0.001*** (0.000)	0.000 (0.000)
Tenure ²		−0.000*** (0.000)	−0.000 (0.000)
Single		−0.027 (0.019)	−0.009 (0.049)
Married		0.001 (0.018)	−0.005 (0.048)
Number of children		0.004 (0.005)	0.009 (0.015)
Low skilled blue collar		−0.150*** (0.014)	−0.082* (0.043)
(High) skilled blue collar		−0.089*** (0.015)	−0.039 (0.047)
Low skilled white collar		−0.132*** (0.021)	−0.177*** (0.053)
Civil servant		0.067*** (0.023)	0.061 (0.104)
Temporary contract		−0.075*** (0.016)	−0.040 (0.028)
Constant	0.070*** (0.020)	−0.079 (0.125)	−0.164*** (0.015)
Firm controls	No	Yes	Yes
Regional controls	No	Yes	Yes
Year fixed controls	No	Yes	Yes
Observations	14904	14904	9954
R ²	0.008	0.066	0.024

Source: NEPS-SC6, own calculations.

Note: Significance levels: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Standard errors in parentheses.

Table C.4.: Estimates using the part-time indicator and employer-sponsored variable, men

	OLS	OLS	First Diff
Part-time	-0.167*** (0.015)	-0.114*** (0.015)	-0.058 (0.039)
Age		0.004 (0.006)	0.081*** (0.029)
Age ²		-0.000 (0.000)	-0.000 (0.000)
Medium sec. degree with VET		0.007 (0.021)	0.089 (0.372)
Upper sec. degree		0.042* (0.023)	0.215 (0.388)
Higher education		0.073*** (0.023)	0.291 (0.393)
Tenure [with same job] in months		0.001*** (0.000)	0.000 (0.000)
Tenure ²		-0.000*** (0.000)	-0.000 (0.000)
Single		-0.028 (0.019)	-0.009 (0.049)
Married		0.001 (0.019)	-0.005 (0.048)
Number of children		0.005 (0.005)	0.009 (0.015)
Low skilled blue collar		-0.153*** (0.014)	-0.083* (0.043)
(High) skilled blue collar		-0.094*** (0.015)	-0.041 (0.048)
Low skilled white collar		-0.130*** (0.021)	-0.178*** (0.053)
Civil servant		0.064*** (0.023)	0.062 (0.103)
Temporary contract		-0.072*** (0.016)	-0.040 (0.028)
Constant	0.292*** (0.005)	0.060 (0.124)	-0.163*** (0.015)
Firm controls	No	Yes	Yes
Regional controls	No	Yes	Yes
Year fixed controls	No	Yes	Yes
Observations	14904	14904	9954
R ²	0.008	0.066	0.024

Source: NEPS-SC6, own calculations.

Note: Significance levels: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Standard errors in parentheses. The part-time indicator is based on factual weekly working hours. Part-timers work less than 30 hours per week.

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