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Benjamin Fuchs

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Chapter 1

General Introduction

Becker (1964) and Mincer (1974) initiated the popularity of the human capital theory. Concentrating on schooling and on-the-job training as investments in human capital, they develop models which elaborate the relationship between investments in human capital and earnings. Considering costs and returns of education investments and focusing on skill specification, they suggest a positive correlation between education, skill levels and earnings because higher education leads to an increased productivity on the labor market. Spence (1973) criticizes this approach constructing a counter model in which education in general and school-leaving certificates in particular serve as a signal of workers' productivity to reduce the asymmetric information with respect to workers' abilities and the consequent uncertainty on the labor market.

Existing literature from a variety of disciplines confirms the relevance of character skills for future educational attainment and labor market outcomes. Bowles and Gintis (1976), both economists, and Jencks (1979), as sociologist, started to elaborate on the importance of personality traits and behaviors, in addition to family background and schooling, for the educational attainment and success on the labor market. Psychologists already started decades ago with the revelation and classification of separate primary trait factors within the personality sphere. Allport (1937) as theorist and Cattel (1945) as proponent of multivariate research methods scrutinized and elaborated one of the first personality classifications. James J. Heckman, one of the most prominent economists in the world today, has continued research on the beneficial effect of cognitive and non-cognitive skills on lifetime success. Heckman and Kautz (2013) discuss the effectiveness of various human development strategies preferring the term "skill" rather than "trait" because the latter emphasizes immutability and permanence while research has shown that cognition

and character can be shaped and changed to a certain degree over the life cycle.

Character skills are constructs not directly related to cognitive skills which are the ability to gather and process incoming information and the ability to store and recall them. Among policymakers there has been growing attention on how character and cognitive skills can be shaped, especially in children and adolescents. The Perry Preschool Program since 1962, the Abecedarian Program in 1972, and Project STAR between 1985 and 1989 are the most well-known interventions that aimed to improve cognitive and character skills of young children.[1] The Perry Preschool Program emphasizes the skill development of three to four year old black children from low-income households by administering high quality pre-school interventions on five days per week for two years which targets children's self-control and sociability. The Abecedarian Program in comparison was an even more intensive preschool intervention. It already started six weeks after birth and lasted until grade three targeting disadvantaged black children. It included full-day child care on five days per week with a focus on developing skills in cognition, language, and adaptive behaviors. Project STAR was an educational reform experiment intended to determine the effect of a reduced class size on academic achievement. Students entering the kindergarten were randomly assigned to three different categories of class sizes and remained in a class for the next four years. Each of these three projects had significant positive effects on educational attainment and labor market outcomes. In general, these projects were successful in promoting the development of human capital. Children who attended classes with the smallest size in grades K-3 and children who received high quality preschool interventions were more likely to graduate from college and more likely to be employed in adulthood. As reviewed by Heckman and Kautz (2013) these projects had persistent beneficial effects on character skills while the initial positive effects on cognitive abilities vanished after children had reached puberty.[2]

While research has focused on the empirical evidence for the effect of experimental (pre-)school interventions and the relationship between various non-experimental out-of-school activities of youths and their later labor market outcomes, there is still a lack of evidence on how out-of-school activities are linked to educational attain-

[1] Detailed information on each of these programs can be found at `http://www.highscope.org/content.asp?contentid=219` for the Perry Preschool Program, at `http://abc.fpg.unc.edu/` for the Abecedarian Program, and in James, Jurich, and Estes (2001).

[2] An exception is the Abecedarian Program with lasting effects not only on character but also on cognitive skills. As elaborated by Cunha, Heckman, Lochner, and Masterov (2006), early childhood is a particularly important period in life for the formation of human capital, especially of cognitive abilities. Since the Abecedarian Program already started when children were only six weeks old, the project was able to foster both character and cognitive skills.

ment and labor market outcomes in a non-experimental setting which complicates the evaluation of a causal effect on any outcome of interest. In the absence of a random treatment assignment the estimation of causal treatment effects suffers from systematic differences in observed and unobserved characteristics between treatment and control group that would lead to biased estimates if characteristics which influence jointly the treatment assignment and the outcome variable are not taken into account.

With Heckman and coauthors (2006, 2010) leading the way, research documents that cognitive and character skills are highly malleable during the early years. While cognitive abilities become less malleable as children grow up, character skills are still malleable and not entirely concluded by the time when children enter adolescence. This is in line with findings in neuro-scientific research showing that character skills are located at different areas of the brain and adolescence as a period in which synaptic reorganizations take place and thus a period in which the brain might be more sensitive to inputs. Structured leisure activities performed during adolescence may influence the formation of character skills through this biological channel.[3] Furthermore, structured leisure activities may have a direct positive effect by training and promoting perseverance, self-confidence, a sense of responsibility and motivation which are beneficial for later success in life. If the activity is performed with other people in a group, it may improve social skills and, at least for structured activities, one gets in touch with a positive and productive social environment that supports the adoption of positive intrinsic values. A less direct effect structured activities may have is the reduction of time that is spent with deviant risky leisure activities which might be harmful for later success in the labor market. At last, the engagement in structured leisure activities may only signalize a certain endowment of character skills which is beneficial for later success in life.

This dissertation contributes two empirical studies to research on extracurricular activities and their contribution to the development of character skills. To account for the self-selection into the activities of interest, both studies employ a flexible strategy combining propensity score matching and regression techniques. Both studies benefit from the German Socio-Economic Panel (SOEP) that offers the unique advantage of both a large, representative sample and high quality measures of behavioral outcomes.

In chapter 2 Aderonke Osikominu and myself analyze the effect of performing sports

[3]Structured leisure activities are defined as activities that take place in an organized setting and/or involve goal-directed efforts.

on a regular basis on the formation of character skills. Three quarters of the youths on the academic school track that prepares for the university entry play sports at least once a week. The corresponding number of youths attending the vocational school track is 50%. The athletic engagement and non-engagement is quite stable throughout adolescence and young adulthood. More than 70% of the 17 year old adolescents who play sports at least weekly already played their current sport at age 13 and 60% are still engaged in sports at least weekly at age 21. Further, more than 70% of the 17 year old non-athletes are still not engaged in sports at age 21. Young men favor team sports and especially soccer, young women have more diverse preferences and play more individual sports. The vast majority of the athletes play sports in a club or with others. Thus, sports is generally a social activity. For youths from less advantaged family backgrounds, sports constitutes often the only quality pastime they engage in while for youths from more advantaged family backgrounds sports is only one possible quality pastime besides playing music, singing or being technically active. Parental athletic involvement is highly predictive of the youth's athletic involvement and athletes tend to be positively selected in terms of family background, intelligence, and height. These differences disappear after matching treatment and comparison observations. In particular, the matched treatment and comparison units are balanced with respect to the predetermined human capital measures height and intelligence. This suggests that the matching strategy effectively balances heterogeneity in skills related to genetic factors and early childhood environments. We find beneficial effects of athletic involvement on a broad range of character skills. Especially for youths on the vocational school track the effects are sizeable. In most cases, the impacts go in the same direction for young men and women. In addition, athletes show better educational outcomes than comparable youths who do not play sports. Considering the engagement in other structured leisure activities in the analysis, it turns out that the beneficial effects are largely driven by the sizeable effect among youths who do not engage in any other structured activity. The treatment effect estimates can therefore be interpreted as estimates of the broader effect of having access to an enriched social environment rather than the pure effect of physical exercise. The effects are robust to including family fixed effects. In sum, the results are consistent with the hypothesis that experiences and informal learning activities during adolescence influence the development of nonacademic skills.

In chapter 3 I analyze the effect of working part-time while attending full-time secondary schooling on the formation of character skills and occupational choice strategies. About 40% of male and female adolescents hold a part-time job while

attending full-time schooling. On average, adolescents who work started with their first part-time employment at age 14. While supplementing pocket money is the leading reason for taking the first job for both male and female adolescents, young women are more likely to start their first job because the work interests them. Comparing the type of job adolescents hold, between male and female adolescents differences exist. About 60% of male adolescents hold a delivery job. While young women also favor delivery jobs, in the female sample there is a more heterogeneous pattern. In addition to delivery jobs, service and care jobs are further frequently mentioned types of jobs female adolescents hold. Adolescents who work tend to be positively selected in terms of family background and regional characteristics. Parents' employment history is a good predictor for the employment status of their school-aged children. Children who have never had a job during full-time schooling are more likely to have parents who were non-employed. Adolescents who work during school have parents who are higher educated, who earn significantly more, and who exhibit a higher level of trust. Teenagers with siblings and teens who were recommended by their teacher at the end of grade four to attend the academically oriented secondary school track are more likely to work while in full-time education. These differences disappear after matching treatment and comparison observations signalizing a successful balancing. Adolescents who work spend on average less time with sleep and media use during the week and on weekend days in comparison to students who do not work. In addition, they spend more time with learning activities, less time with sports and more time with relaxing on weekend days. Focusing on the time use of employed adolescents, female adolescents spend more time on the job than young males. The drawback of working part-time while still in school is that adolescents spend less time with academic learning, especially young women on weekdays. Furthermore, they spend significantly less time sleeping, especially on weekends. On the other side, the time female and male adolescents spend in front of a screen is also significantly reduced, especially during the week. Working part-time while still in school has beneficial effects on locus of control, it reduces the uncertainty about own interests and talents and reduces the dependency on parents. The effects are robust to including family fixed effects.

Heckman (1999) emphasizes the importance of investments in cognitive and character skills for economic and social success and the importance of formal academic institutions, families and firms as sources of learning. He portrays the current policies toward skill formation and criticizes the misconception of current policies regarding education and job training. Focusing only on cognitive skills measured by achievement or IQ tests, policies ignore the importance of social skills, self discipline and a

variety of character skills which are known to determine success. For instance, the PISA studies in 2000 immensely affected the education debate in Germany and led to political activism (Blossfeld et.al, 2011, p.23). Another example is the G8 reform. The motivation of this reform was the reduction of the graduation age to accelerate the labor market access of school students by reducing the academic school track tenure by one year.[4] To leave the overall curriculum unchanged, the reform increased the weekly instructional time. Thus, while trying to keep the investments in cognitive skills unchanged, the consequences of this reform on the formation of non-cognitive skills were not at the center of attention. Dahmann and Anger (2014), as one of the few papers which have focused on this topic, found short-term negative effects on the emotional stability of students. Admittedly, formal education institutions play a central role as the main producer of skills required by the modern economy. However, the learning environment at school offers little opportunities for young people to foster other skills than cognitive skills and knowledge. The crucial role of extracurricular and leisure activities as opportunities to form and develop a variety of abilities except cognitive skills to succeed in the modern economy has been widely neglected. As mentioned in Heckman (1999), learning is a lifetime affair and much learning takes place outside of schools. Achievement tests and measures of cognitive skills as indicators of success are misleading. The narrow focus on cognition ignores the full array of socially and economically valuable character skills. Considering the job and wage polarization in the Western world between high- and low-skilled workers, the formation of socially productive skills except cognitive skills may help to increase the supply of skilled workers and to alleviate the growing economic inequality.[5] An early environment of children that misses to stimulate and fails to cultivate skills at early ages leads to a lack of cognitive and non-cognitive skills and is a powerful predictor of adult failure. The results in chapter 2 and 3 support the hypothesis that structured leisure activities positively affect the development of non-cognitive skills.

While in chapter 2 and 3 the effect of structured leisure activities on the formation on skills, which are important for social and economic success and therefore may help to alleviate economic inequalities by fostering valuable skills of young children with a disadvantaged family background is presented, in chapter 4 Bernd Fitzenberger and myself evaluate a policy which aims to protect especially low-income households against rent increases.[6]

[4]The academic school track, Gymnasium, prepares for tertiary education.

[5]OECD (2011) for OECD countries and Fitzenberger, Hübler, and Kraft (2011) for Germany discuss the increasing income inequality and the potential driving forces behind it.

[6]Bundestag (2000) gives a detailed schedule of the reform content.

Germany is one of the European countries with the smallest percentage of the population who lives in owner-occupied houses or apartments. In 2013 about 53% of the German population lived in an owner-occupied home. A predominant percentage of the German population therefore satisfies one of their basic needs by living in a tenancy instead by home-ownership. This illustrates the importance of a functioning tenancy law, socially and economically. In East and South European countries the percentage of the population who lives in owner-occupied housing is considerably larger with about 75%. Different attitudes to home-ownership play a role as well as differences in the tax burden regarding home-ownership. For instance, in the Netherlands, Spain, and Italy home-ownership is publicly subsidized to promote owner-occupied housing financed by mortgages or housing loans. In contrast, landlords in Germany face a high level of regulation regarding rent control and tenant protection against eviction in comparison to the OECD average.

Until the 1990s, Germany was characterized by fairly liberal rent laws. Because of housing shortages and a strong rent increase in the 1990s, there was a change towards more regulation in order to protect sitting tenants. Since then the legal framework has been adjusted several times in favor of sitting tenants. In chapter 4 we analyze the impact of the Tenancy Law Reform Act implemented in 2001 on the level of rents as well as on the residency discount. Covering all tenancies starting on September 1, 2001 or later, the two substantial changes were first, the reduction of the maximum rent increases for sitting tenants from 30% to 20% over the course of three years and second, the reduction of the minimum notice period until the termination of a tenancy by the tenant to three months while the protection of the tenant against eviction by the landlord remained unchanged. While the target of the first modification is to protect low-income families against rent increases, especially in metropolitan areas, the second modification accounts for the growing geographic mobility of workers. The objective of this chapter is to estimate the effect of the tenancy law reform in 2001 on the level of actually paid rents and the length of residency discount over the distribution of rents.

The length of residency discount is a front loaded rent payment schedule, where landlords would ask for higher rents at the beginning of a tenancy to compensate for the strong rent control during tenancy. This could result in rental payments that decrease with the length of residency for sitting tenants relative to rents for new leases for comparable apartments. Further implications of these considerations are that for a given apartment rents increase stronger than market rents for comparable apartments where a new lease starts and therefore landlords have an incentive to evict sitting tenants in order to realize a rent increase with a new lease. On the

other side, Hoffmann and Kurz (2002) interpret the residency discount as a kind of compensation for the diminishing quality of an apartment over time while Schlicht (1983) portrays the discount as a landlord's concession trying to keep good tenants, especially when tenants' preferences change over time and landlords want to avoid turnover costs, e.g. forgone rents and search costs for new tenants.

The results can be summarized as follows. Households whose tenancies started after the reform live in newer and in better equipped rental units. The rent-to-income ratio is significantly larger than for households living in tenancies that started before the reform. Although the rental units are 1.14 sqm per person larger after the reform, the share of tenants who assess the size of their rental unit as being too small, increases after the reform. This suggests that demand for better equipped housing increases over time. The annual residence discount is significant and decreases in absolute value with tenure, which is stronger at the top than at the bottom of the rent distribution, which is stronger early in a tenancy, and which falls with elapsed tenure. The reform shows a significant negative effect on rents altogether and the negative effect becomes stronger over the distribution. Thus, households living in expensive apartments tend to benefit more from the reform than households living in cheaper apartments. The annual residency discount increases with the reform during the first three years of a tenancy, but from the fourth year onwards the annual residency discount vanishes after the reform. The results are robust to including tenancy mean fixed effects. The evidence suggests that the reform was successful in curtailing rent increases especially for expensive apartments. Thus, one may be concerned that the reform may not have been sufficiently targeted. As a consequence, the inequality between low-income tenants who tend to pay lower rents and high-income tenants who are able to live in expensive apartments increases.

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Chapter 2

Quality Leisure Time and Youth Development*

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Abstract:

Parents and policymakers alike worry about what activities may provide valuable learning experiences to youths beyond the domain of schooling. Research on extracurricular and leisure activities documents sizeable positive associations between the engagement in structured activities and measures of skills, educational attainment and labor market outcomes. What are the underlying mechanisms? This chapter first develops a simple model to clarify the potential links between leisure time use and human capital formation. Then we explore empirically what youths do in their leisure. We further focus on sports as a popular activity and estimate its effect on a set of behavioral and economic outcomes. The empirical analysis exploits data from the German Socio-Economic Panel that offers the unique advantage of both a large, representative sample and high quality behavioral measures. We employ a flexible strategy combining propensity score matching and regression techniques to account for self selection into athletic involvement. We assess the plausibility of no-unmeasured confounding using human capital measures that are predetermined with respect to athletic involvement. Our results are consistent with the hypothesis that structured leisure activities like sports contribute to the development of nonacademic skills.

Keywords: human capital, nonacademic skills, leisure activities, sports, youth development, treatment effect
JEL: I 21, J 13, J 24

2.1 Introduction

Parents and policymakers alike worry about what activities may provide valuable learning experiences to youths beyond the domain of schooling. The learning environment at school is tightly structured and offers little opportunities for young people to develop initiative and motivation of their own (Larson, 2000). It centers on knowledge and cognitive skills. Schools may fail to engage students with weaker academic inclinations.[1] Research on extracurricular and out-of-school activities documents sizeable positive associations between the engagement in structured leisure activities on the one hand and various behavioral, educational, and labor market outcomes on the other hand (e.g. Farb and Matjasko, 2012; Postlewaite and Silverman, 2005).[2] While these studies provide valuable descriptions of empirical regularities they do not shed light on the potential mechanisms linking activities and outcomes which complicates the evaluation of the causal effect of an activity of interest. Such evidence would be necessary to inform the public aiming to support youth development.

In this chapter, we propose to study the effects of leisure activities on skill formation based on an economic framework in which youths allocate their time between different types of activities that may contribute to the production of human capital. A key implication of our framework is that, with a production technology that depends on multiple simultaneously determined inputs, the common empirical approach that focuses on modeling the consequences of exogenously assigning a single input of interest does not allow one to quantify the direct causal effect of this input on human capital. In fact, the optimal choice of other inputs may respond to a change in the input of interest, if the production technology exhibits cross effects in the sense that the level of one input affects the productivity of other inputs. Specifically, consider a social experiment that randomly assigns young people to a treatment group that has access to a sports club and a nontreatment group that is denied access to the club.

[1] In the context of remedial education programs for school dropouts, research by Heckman and coauthors for the US suggests that character skills (e.g. self-esteem, conscientiousness) rather than academic skills are the constraining factor explaining the low academic and labor market performance of these people (Heckman, Humphries, and Mader, 2011; Heckman and Rubinstein, 2001).

[2] Persico, Postlewaite, and Silverman (2004) provide tentative evidence suggesting that adolescent experiences may contribute to the development economically relevant nonacademic skills. The authors investigate the causes for the height wage premium, i.e. the fact that taller workers earn more than otherwise equal shorter persons. They show that the height premium is essentially explained by differences in height as a teenager that in turn are positively related with participation in extracurricular activities, in particular high school athletics. Case and Paxson (2008) challenge this view showing that parental socioeconomic status and cognitive skills as a child predict height and growth during adolescence.

A regression of a human capital measure on an indicator for treatment assignment allows one to recover a gross effect that mixes the direct effect of sports and indirect effects triggered by a reallocation of other activities, such as studying and playing music, in response to the randomization into or out of sports. Thus, one cannot use a simple randomization to quantify the direct causal effect of an activity on skills. In the extreme, a positive gross effect may be entirely caused by indirect effects.

Based on these theoretical insights we introduce an econometric potential outcome framework in which the treatment is vector valued. The simultaneously determined inputs of the production technology constitute the elements of the vector valued treatment. If the production technology exhibits cross effects, the elements of the treatment vector depend on each other. We show how one can identify the conditional causal effect of an input of interest under a version of no-unmeasured confounding. Specifically, the idea is to compare the observed outputs obtained with the same allocation of other inputs but a differing use of the input of interest, keeping constant also background characteristics that affect productivity. Economically this means that, by appropriately varying the marginal costs of all inputs, one can find two individuals that have the same background characteristics, the same allocation of other inputs, but a differing allocation of the input of interest. Thus, heterogeneity in the marginal costs of the inputs across individuals provides exogenous variation in the level of the input of interest keeping everything else constant. In a second step, we obtain the average direct effect of the input by integrating the conditional causal effects over the distribution of background characteristics and other inputs. While the assumption of no-unmeasured confounding cannot be tested, we can test its implications. For instance, we can test whether human capital measures that are predetermined with respect to the skill input of interest are conditionally independent of this input.[3] In our empirical application, we devise a number of such specification tests to probe our identifying strategy.

Our approach integrates also behavioral perspectives on the development of skills over the life cycle and the measurement of different types of skills. Behavioral research distinguishes a multiplicity of different skills that have different developmental trajectories. Some skills are potentially susceptible to experiences during youth, whereas others are predetermined with respect to adolescent influences. Motivated by this observation we focus on measures of skills that continue to be malleable throughout adolescence as outcomes, while we use measures of skills that are predetermined with respect to adolescent experiences to test the plausibility of our

[3]In a similar vein, Heckman and Hotz (1989) propose to test whether matched treatment and comparison units differ in their pretreatment outcomes.

empirical strategy.

Two leading examples of skills that are determined already at an early age are height and intelligence. In developed countries, height and growth during adolescence are essentially determined by genes (80%) and the quality of the uterine through early childhood environment (Case and Paxson, 2008; Silventoinen 2003; Visscher, Medland, Ferreira, Morley, Zhu et al., 2006). Thus, height during adolescence evolves independently of adolescent experiences but is correlated with family background and skills. Similarly, somebody's rank in the intelligence distribution is stable after about age six, with genes accounting for the majority (up to 80%) of the variation across adolescents and adults in a given cohort (Cunha, Heckman, Lochner and Masterov, 2006; Neisser et al., 1996; Nisbett et al., 2012).

Other skills continue to be malleable until later ages. Character skills, often assessed through the Big Five personality inventory, continue to develop long into adulthood until they reach a maximum level of stability at age 50-70 (Almlund et al., 2011). Recent neuropsychological research shows that the human brain undergoes significant changes during adolescence, comparable to those taking place during early childhood (Best and Miller, 2010; Best, Miller, and Jones, 2009; Blakemore and Choudhury, 2006; Giedd et al., 1999; Singer, 2006). The restructuring of the brain comes along with developments in the ability to control thoughts and behavior (i.e. executive function) as well as abilities involving social cognition (e.g. self-awareness, perspective taking) and the understanding of social emotions (e.g. fairness).[4]

Character, social and executive function skills are key drivers of economic success. Character skills such as conscientiousness (i.e. the tendency to be organized and hard working) are positively associated with economic outcomes (Almlund et al., 2011). Executive function skills enable future-oriented thinking, e.g. formulating career aspirations and expectations, which motivates and controls future attainment (Beal and Crockett, 2010). Recent theoretical and experimental research in economics demonstrates the importance of social skills in shaping economic interactions and their outcomes (Bowles and Polanía-Reyes, 2012; Brown, Falk, and Fehr, 2004; Fehr, 2009).

In the empirical part of the chapter we investigate the leisure time use of youths as well as the effects of athletic involvement on nonacademic skills and educational attainment. Our focus on sports is motivated by its popularity across socioeco-

[4]See also the experimental studies by Fehr, Bernhard, and Rockenbach (2008), Almås, Cappelen, Sørensen, and Tungodden (2010), and Fehr, Rützler and Sutter (2011) that examine how social preferences develop during childhood and adolescence.

nomic groups and general accessibility. For youths from less advantaged family backgrounds, sports constitutes often the only quality pastime they engage in.[5] The empirical analysis exploits data from the German Socio-Economic Panel (SOEP) that offers the unique advantage of both a large, representative sample and high quality measures of behavioral outcomes. For instance, we have validated measures of intelligence, personality, reciprocity and risk aversion. We focus on youths who are administered a biography questionnaire in the year in which they turn 17, providing details about their current and past educational and leisure activities as well as their attitudes on a number of domains such as their work values. We further add information from the parental surveys. The panel nature of the SOEP allows us to track the youths and their families over time which we exploit to construct a detailed history of family background as well as subsequent behavioral and economic outcomes of the youths.

We take advantage of the richness of the SOEP data to carefully implement our empirical strategy when we estimate the effect of sports on skill formation assuming no-unmeasured confounding. In particular, we consider a rich set of conditioning variables that includes detailed measures of family background and parental behaviors as well as the youth's past academic achievement, and current engagement in educational and other leisure activities. We assess the plausibility of no-unmeasured confounding with human capital measures that are predetermined with respect to athletic status. We exploit that height and intelligence are largely determined by genetic factors and early childhood environments, which means that they are independent of adolescent experiences. Specifically, we show that height and intelligence are balanced in the matched treatment and comparison samples. To estimate the treatment effects we combine propensity score matching with a flexible regression adjustment in the matched sample. This approach allows us to combine the advantages of both methods. The semiparametric matching estimator requires a careful choice of a suitable comparison group for youths playing sports. Thus, we avoid comparisons based on extrapolations that are not supported by the data. The regression adjustment yields consistent and efficient treatment effect estimates if the conditional expectation of the outcome is correctly specified. It can easily be modified to examine effect heterogeneity and to assess the robustness of results. In particular, we verify that our results are robust to including family fixed effects.

[5] A couple of studies investigate the relationship between sports at around age 16-18 and educational and labor market outcomes at later ages, e.g. Barron, Ewing, and Waddell (2000) and Stevenson (2010) for the US as well as Pfeifer and Cornelißen (2010) for Germany. They all document sizeable positive relationships between teenage athletic involvement and later educational and labor market outcomes.

Our main findings are as follows. Three quarters of the youths on the academic school track that prepares for university entry play sports at least once a week. The corresponding number for youths attending the vocational school track is 50%. Athletic engagement and non-engagement largely persists through adolescence and into young adulthood. While young men favor team sports and especially soccer, young women have more diverse preferences and play more individual sports. Regardless of type of sport and gender, the vast majority of the athletes play sports in a club or with others. Thus, sports is generally a social activity. Our results further suggest that young people who regularly play sports spend a higher share of their free time on structured and non-sedentary activities than those who do not. Nevertheless, undirected and passive leisure pursuits clearly dominate among all youths. Parental athletic involvement is highly predictive of the youth's athletic involvement. Athletes tend to be positively selected in terms of family background, intelligence and height. These differences disappear after matching treatment and comparison observations. In particular, the matched treatment and comparison units are balanced with respect to the predetermined human capital measures height and intelligence. This suggests that our matching strategy effectively balances heterogeneity in skills related to genetic factors and early childhood environments.

We find beneficial effects of athletic involvement on a broad range of behavioral outcomes including conscientiousness, reciprocity, and career aspirations and expectations. The effects are sizeable for youths on the vocational track, attaining 10-30% of a standard deviation, whereas they are small and insignificant for youths on the academic track. The magnitude of the effects sometimes differs across gender, too. However, the impacts always go in the same direction for young men and women. Athletes, in particular youths on the vocational track, show better educational outcomes, than comparable youths who do not play sports. We further examine treatment effects conditional on the engagement in other structured leisure activities. It turns out that the sizeable beneficial effects of sports among youths on the vocational track are largely driven by the sizeable effects among youths who do not engage in any other structured activities. This pattern is similar for youths on the academic track. We therefore interpret our treatment effect estimates as estimates of the broader effect of having access to an enriched social environment rather than the pure effect of physical exercise. In a sensitivity analysis, we verify that the effects are robust to including family fixed effects. Overall, the effects of athletic involvement on behavioral outcomes are consistent with the hypothesis that experiences and informal learning activities during adolescence influence the development of nonacademic skills.

The remainder of the chapter is organized as follows. Section 2.2 lays out the analytic framework. Section 2.3 describes the data source and the analysis sample. We present the empirical results in Section 2.4. Section 2.5 concludes. The figures and tables are contained in Appendix I. Appendix II contains further information on the variables used and detailed estimation results.

2.2 Analytic Framework

2.2.1 Conceptual Background

To support our argument we sketch a theoretical model of time use and its relationships with skill formation and labor market outcomes. The framework combines an allocation-of-time model (Becker, 1965) with the approach of Akerlof and Kranton (2000, 2002) that introduces social incentives to the standard economic model of utility maximization. Youths may allocate their daily time between studying at school or working on homework assignments (formal learning) and two types of leisure activities. We distinguish between structured activities that take place in an organized setting and/or involve goal-directed effort like playing sports or music and unstructured activities such as watching TV or meeting with peers. Let $0 \leq e \leq 1$ and $0 \leq s \leq 1$ denote the share of time a teenager spends on formal education and structured leisure activities, respectively.

A teenager's human capital, $H(e, s, x)$, is a function of the time engaged in formal learning and structured activities as well as an index of family background x capturing parental investments and inherited human capital. A higher value of x corresponds to a more advantaged background. We assume that family background positively affects human capital for a given time allocation, i.e. $H_x > 0$, where subscripts on functions denote partial derivatives. Human capital is increasing and strictly concave as a function of formal education e, i.e. $H_e > 0$ and $H_{ee} < 0$. Further, cross effects between formal learning and family background are nonnegative, i.e. $H_{ex} \geq 0$. This captures the idea that youths with a better skill endowment and/or parental support are more productive at studying. We assume further that human capital is nondecreasing and concave with respect to s, i.e. $H_s \geq 0$ and $H_{ss} \leq 0$. Thus, we rule out that engagement in structured activities destroys human capital. Engagement in structured activities also does not harm formal learning, i.e. $H_{es} \geq 0$, and a more advantaged family background does not reduce the effect of structured activities on human capital formation, i.e. $H_{sx} \geq 0$. Let ω denote the net present value of future earnings per unit of human capital. Thus, the economic

reward of studying and engaging in structured activities arises through higher future earnings $\omega H(e, s, x)$.

The teenager trades the future economic reward from formal learning and structured activities off against the immediate nonmonetary utility gains from being idle, $\theta(1-e-s)$, $\theta > 0$, and engaging in structured activities, $I(s, x)$, as well as the immediate costs associated with studying, γe, $\gamma > 0$, and structured leisure activities, κs, $\kappa > 0$. The term $I(s, x)$ represents the net identity utility associated with spending share s of leisure in structured activities for somebody with family background x. We assume that $I_s > 0$ and $I_{ss} < 0$. The identity utility reflects that people's decisions to engage in structured leisure activities may depend on social rather than economic incentives. In particular, the dependence on family background reflects that parents are role models for their children and shape the environment in which the children grow up. We assume that the marginal identity utility of structured leisure activities is nondecreasing in family background, which is motivated by the observation that youths from more advantaged family backgrounds engage to a larger extent in structured leisure activities, i.e. $I_{sx} \geq 0$. In sum, the utility function of the teenager is given by:

$$U(e, s) = \omega H(e, s, x) + \theta(1 - e - s) + I(s, x) - \gamma e - \kappa s\,, \tag{2.1}$$

and the teenager chooses e and s so as to maximize (1).

The two first order conditions form a system of equations that implicitly determines the optimal shares of time spent studying e^* and engaged in structured activities s^* as a function of the parameters ω, x, θ, γ, κ. Comparative static analysis yields the following results for which we provide proofs in Appendix II.

Lemma 1.

(i) $e^*_x \geq 0$ and with strict inequality if $H_{ex} > 0$.

(ii) $s^*_x \geq 0$ and with strict inequality if $I_{sx} > 0$.

Lemma 1 says that, if anything, youths from more advantaged backgrounds engage more in formal learning and structured leisure activities. In the case in which family background positively affects learning ability or marginal identity utility from structured activities a more advantaged family background decreases the amount of time allocated to unstructured leisure activities. Having established how e^* and s^* depend on x, we can work out how human capital, $H^* \equiv H(e^*, s^*, x)$, studying and engagement in structured leisure activities respond to variation in family background.

Proposition 1. A change in x affects H^* , e^*, and s^* in the same direction if $H_{ex} > 0$ and $I_{sx} > 0$.

Proof: Observe that $H_x^* = H_e\, e_x^* + H_s\, s_x^* + H_x$. The result follows from Lemma 1 and the property $H_x > 0$.

From an empirical point of view, Proposition 1 means that, conditional on engagement in formal learning, one tends to find a positive relationship between the engagement in structured leisure activities and measures of human capital, regardless of whether structured activities affect skill formation ($H_s > 0$) or not ($H_s = 0$), if heterogeneity in family background is not taken into account.

Lemma 2.

(i) The optimal amount of time allocated to formal learning, e^*, and structured leisure activities, s^*, depends negatively on their respective unit costs, γ and κ, i.e. $e_\gamma^* < 0$ and $s_\kappa^* < 0$.

(ii) If there are positive cross effects between structured leisure activities and studying on skill formation, i.e. $H_{es} > 0$, e^* also depends negatively on κ and s^* negatively on γ, i.e. then $e_\kappa^* < 0$ and $s_\gamma^* < 0$. Otherwise $e_\kappa^* = s_\gamma^* = 0$.

Proposition 2. If anything, a change in γ or κ changes H^*, e^*, and s^* in the same direction.

Proof: Observe that $H_\gamma^* = H_e\, e_\gamma^* + H_s\, s_\gamma^* < 0$ and $H_\kappa^* = H_e\, e_\kappa^* + H_s\, s_\kappa^* < 0$ by application of Lemma 2.

In particular, if structured leisure activities affect skill formation ($H_s > 0$) and there exist cross effects between formal learning and structured activities ($H_{es} > 0$), a change in the unit cost of one of them affects the optimal choices of both. With positive complementarities between formal learning and structured activities, an increase in the marginal cost of formal education will decrease not only the optimal amount of formal learning but also of structured activities. From an empirical point of view, the potential existence of cross effects makes the use of an instrumental variables framework unattractive for estimation of the ceteris paribus effect of an activity of interest on human capital formation. In the presence of cross effects, the activities are correlated with each other and endogeneity in one of them transmits to the others. This would require to instrument all activities that contribute to human capital formation with their respective cost shifters, which is typically not feasible in practice. Researchers may be tempted to resort to a model that focuses

on a single activity of interest for which they have an instrument and omit the other activities from the structural equation. Such a strategy is questionable because, if there are cross effects between the activity of interest and the omitted activities, the instrument would be correlated with the error term of the structural equation. The reduced form regression of a human capital variable on the instrument would be informative to test for the existence of nonzero causal effects. Under the null hypothesis of a zero effect the instrument is uncorrelated with the error term that contains the omitted activities.[6]

Further, cross-effects between different inputs of human capital also limit the evidence generated by (natural) experiments. Suppose a researcher randomizes access to a single activity of interest. If their exist cross-effects, participants will respond to the randomization of one activity with an adjustment of the allocation of other activities. This means that the treatment effect identified under randomization of a single activity consists of a mixture of the direct effect of the activity on human capital and indirect effects arising through an adjustment of the other activities. In the extreme, a positive gross treatment effect in an experiment may be entirely caused by positive indirect effects rather than a positive direct effect of the activity of interest.

After these theoretical considerations, let us examine how we can recover the ceteris paribus effect of athletic involvement on human capital formation empirically. Consider first the case that $H_s = 0$. Thus, athletic involvement does not itself affect skill formation but confounding factors may cause a spurious relationship between athletic involvement and human capital measures. For instance, athletic involvement and skills are positively correlated if family background affects the marginal identity utility of sports ($I_{sx} > 0$). Similarly if athletic involvement does contribute to the accumulation of skills ($H_s > 0$), its true effect may be misstated when heterogeneity in family background is not taken into account. In our empirical analysis, we therefore take great care to control for family background. Further, if athletic involvement contributes to skill formation ($H_s > 0$), we need to keep the engagement in formal learning and other structured activities fixed. Athletic involvement is correlated with the other activities whose productivity with respect to skill formation interacts with athletic involvement. Heterogeneity in the marginal costs associated with the different activities will provide the necessary exogenous variation in sports

[6]If the activity of interest does not affect skill formation, i.e. the first derivative of human capital with respect to the activity of interest is zero, there can be no cross effects with other activities that affect skills, i.e. the cross derivative of human capital with respect to the activity of interest and the other activity is zero.

participation conditional on family background and engagement in other activities.

2.2.2 Econometric Approach

In order to estimate the ceteris paribus effect of playing sports on the formation of human capital we rely on a version of the potential outcome approach (Neyman, 1923; Roy, 1951; Rubin, 1974) in which the treatment is vector valued. A vector valued treatment arises naturally in the context of a production technology with multiple inputs that are determined simultaneously. Specifically, let $\mathbf{A}$ denote the vector of inputs. The different elements of $\mathbf{A}$ are random variables that potentially depend on each other. If the elements of $\mathbf{A}$ depend on each other, the production technology exhibits cross-effects in the sense that the level of one input affects the productivity of other inputs. In our case, $\mathbf{A}$ corresponds to a string of variables indicating the extent to which somebody engages in different types of educational and leisure activities. To be concrete suppose that $\mathbf{A} \equiv (\mathbf{E}, S, \mathbf{L})$, where $\mathbf{E}$ is a vector of dummy variables measuring the engagement in formal education, S a dummy equal to one if somebody plays sports (the treatment of interest) and $\mathbf{L}$ a vector of dummy variables measuring the engagement in other leisure activities. Denote by the scalar random variable $Y(\mathbf{a})$ the potential output prevailing under input setting $\mathbf{A} = \mathbf{a} = (\mathbf{e}, s, \mathbf{l})$. We use the scalar random variable Y to denote the actual output. It holds that for somebody producing with input setting $\mathbf{a}$ we observe $Y(\mathbf{a})$, while potential outputs associated with alternative input settings $\mathbf{a}' \neq \mathbf{a}$, $Y(\mathbf{a}')$, are counterfactual.

Our goal is to contrast potential outputs associated with input settings that involve sports, i.e. $S = 1$, to potential outputs associated with input settings that do not involve sports, i.e. $S = 0$, keeping the other inputs constant. In particular, we are interested in the average direct effect of sports on those who play sports

$$\Delta_T \equiv \sum_{\mathbf{e}} \sum_{\mathbf{l}} \Pr(\mathbf{E} = \mathbf{e}, \mathbf{L} = \mathbf{l} \,|\, S = 1) \mathrm{E}[Y(\mathbf{e}, 1, \mathbf{l}) - Y(\mathbf{e}, 0, \mathbf{l}) \,|\, S = 1] \,, \tag{2.2}$$

the average direct effect on the untreated

$$\Delta_U \equiv \sum_{\mathbf{e}} \sum_{\mathbf{l}} \Pr(\mathbf{E} = \mathbf{e}, \mathbf{L} = \mathbf{l} \,|\, S = 0) \mathrm{E}[Y(\mathbf{e}, 1, \mathbf{l}) - Y(\mathbf{e}, 0, \mathbf{l}) \,|\, S = 0] \,, \tag{2.3}$$

and the average direct effect in the total population

$$\Delta \equiv \Pr(S = 1)\Delta_T + \Pr(S = 0)\Delta_U \,. \tag{2.4}$$

The expectations $\mathrm{E}[Y(\mathbf{e}, 0, \mathbf{l}) \,|\, S = 1]$ and $\mathrm{E}[Y(\mathbf{e}, 1, \mathbf{l}) \,|\, S = 0]$ are counterfactual. In order to solve the evaluation problem we rely on the conditional independence

assumption (CIA):

$$\begin{aligned} &\mathrm{E}[Y(\mathbf{e}, s, \mathbf{l}) \,|\, \mathbf{X} = \mathbf{x}, \mathbf{E} = \mathbf{e}, S = 1, \mathbf{L} = \mathbf{l}] \\ &= \mathrm{E}[Y(\mathbf{e}, s, \mathbf{l}) \,|\, \mathbf{X} = \mathbf{x}, \mathbf{E} = \mathbf{e}, S = 0, \mathbf{L} = \mathbf{l}]\,, s = 0, 1 \end{aligned} \tag{2.5}$$

with $\mathbf{X}$ a vector of observed background characteristics. According to the CIA the potential outcomes $(Y(\mathbf{e}, 1, \mathbf{l}), Y(\mathbf{e}, 0, \mathbf{l}))$ are mean independent of the athletic status S conditional on the observed covariates $\mathbf{X}$ and engagement in other activities $(\mathbf{E}, \mathbf{L})$. Economically the CIA means that, by appropriately varying the marginal costs of all inputs, $\mathbf{A}$, we can find two individuals that have the same background characteristics $\mathbf{X}$, the same allocation of inputs $\mathbf{E}$ and $\mathbf{L}$, but a differing allocation of S. Thus, heterogeneity in the marginal costs of the inputs across individuals provides exogenous variation in the level of input S conditional on background characteristics $\mathbf{X}$ and keeping constant the allocation of $\mathbf{E}$ and $\mathbf{L}$. We motivate the empirical content of the CIA in our application in Section 2.2.3 below. Under the CIA, the conditional causal effect $\mathrm{E}[Y(\mathbf{e}, 1, \mathbf{l}) - Y(\mathbf{e}, 0, \mathbf{l}) \,|\, \mathbf{X} = \mathbf{x}, \mathbf{E} = \mathbf{e}, \mathbf{L} = \mathbf{l}]$ is identified from the conditional contrast of the actual outcomes:

$$\begin{aligned} &\mathrm{E}[Y(\mathbf{e}, 1, \mathbf{l}) - Y(\mathbf{e}, 0, \mathbf{l}) \,|\, \mathbf{X} = \mathbf{x}, \mathbf{E} = \mathbf{e}, \mathbf{L} = \mathbf{l}] = \\ &\mathrm{E}[Y \,|\, \mathbf{X} = \mathbf{x}, \mathbf{E} = \mathbf{e}, S = 1, \mathbf{L} = \mathbf{l}] - \mathrm{E}[Y \,|\, \mathbf{X} = \mathbf{x}, \mathbf{E} = \mathbf{e}, S = 0, \mathbf{L} = \mathbf{l}]\,. \end{aligned} \tag{2.6}$$

Further, we require that the conditional probability of participating in sports is strictly greater than zero and smaller than one, which gives rise to the following common support assumption:

$$0 < P(\mathbf{x}; \mathbf{e}, \mathbf{l}) < 1\,, \text{ where } P(\mathbf{x}; \mathbf{e}, \mathbf{l}) \equiv \Pr(S = 1 \,|\, \mathbf{X} = \mathbf{x}; \mathbf{E} = \mathbf{e}, \mathbf{L} = \mathbf{l})\,. \tag{2.7}$$

Finally, we assume that potential outcomes are independent across individuals, ruling out general equilibrium effects.

Under the common support assumption, the ATT given $\mathbf{E} = \mathbf{e}$ and $\mathbf{L} = \mathbf{l}$ is identified by integrating the conditional causal effect, equ. (2.6), over the distribution of $\mathbf{X}$ given $\mathbf{E} = \mathbf{e}$, $S = 1$ and $\mathbf{L} = \mathbf{l}$:

$$\begin{aligned} &\Delta_T(\mathbf{e}, \mathbf{l}) \equiv \\ &\int \cdots \int \mathrm{E}[Y(\mathbf{e}, 1, \mathbf{l}) - Y(\mathbf{e}, 0, \mathbf{l}) \,|\, \mathbf{X}, \mathbf{E} = \mathbf{e}, S = 1, \mathbf{L} = \mathbf{l}] dF(\mathbf{X} \,|\, \mathbf{E} = \mathbf{e}, S = 1, \mathbf{L} = \mathbf{l}) \end{aligned} \tag{2.8}$$

because $F(\mathbf{X} \,|\, \mathbf{E} = \mathbf{e}, S = 1, \mathbf{L} = \mathbf{l}) = \dfrac{P(\mathbf{X}; \mathbf{e}, \mathbf{l}) F(\mathbf{X} \,|\, \mathbf{E} = \mathbf{e}, \mathbf{L} = \mathbf{l})}{\Pr(S = 1, \mathbf{E} = \mathbf{e}, \mathbf{L} = \mathbf{l})}$. Finally, we can obtain the grand ATT of activity S by integrating $\Delta_T(\mathbf{e}, \mathbf{l})$ over the distribution of $\mathbf{E}$ and $\mathbf{L}$:

$$\Delta_T = \sum_j \sum_k \Delta_T(\mathbf{e}_j, \mathbf{l}_k) \Pr(\mathbf{E} = \mathbf{e}_j, \mathbf{L} = \mathbf{l}_k \,|\, S = 1)\,, \tag{2.9}$$

where j and k index the possible settings of $\mathbf{E}$ and $\mathbf{L}$, respectively. The grand ATU of S is obtained analogously.

Collect all conditioning variables in a vector denoted by $\mathbf{Z} \equiv (\mathbf{X}, \mathbf{E}, \mathbf{L})$. The estimation proceeds in two steps. In a first step, we apply kernel matching techniques and reweight observations so as to align the distribution of $\mathbf{Z}$ in the treatment and comparison samples. With a large number of elements in $\mathbf{Z}$, it is typically easier to match on a low dimensional balancing score rather than on $\mathbf{Z}$ itself, see Rosenbaum and Rubin (1983).[7] Here, we match on the index of the estimated propensity score. We implement a stratified version of kernel matching in order to align treated and comparison observations exactly by gender and school track. Also we specify separate propensity score models for each of the four subsamples defined by gender and school track.

Then we estimate the average treatment effect on the treated (ATT) by means of the following weighted regression

$$\min_{\{\hat{\alpha},\hat{\beta},\hat{\gamma},\hat{\delta}\}} \sum_n \hat{g}_n \left[Y_n - \hat{\alpha} - \hat{\beta} S_n - \hat{\gamma}\mathbf{Z}_n - \hat{\delta} S_n(\mathbf{Z}_n - \bar{\mathbf{Z}})\right]^2, \tag{2.10}$$

where $n = 1, 2, \ldots$ indexes the observations, $\hat{g}$ is a weight, and $\bar{\mathbf{Z}}$ is the mean of $\mathbf{Z}$ across the treated observations, i.e. $\bar{\mathbf{Z}} = \sum_n \hat{g}_n S_n \mathbf{Z}_n / \sum_n \hat{g}_n S_n$. The coefficient β corresponds to Δ_T, the ATT.[8]

For any treated observation i, $\hat{g}_i$ equals the sampling weight v_i of that observation. For any comparison observation j, $\hat{g}_j$ is given by $\sum_{i \in \{n:S_n=1\}} v_i \hat{w}_{ij}$, where $\hat{w}_{ij}$ is the matching weight that is larger the closer comparison observation j is to treated observation i in terms of the estimated propensity score. In our case of the local linear estimator $\hat{w}_{ij}$ equals

$$(0,1)\left[\sum_j \left((\hat{P}_j - \hat{P}_i), 1\right)' K\left(\frac{\hat{P}_j - \hat{P}_i}{h}\right)\left((\hat{P}_j - \hat{P}_i), 1\right)\right]^{-1} \left((\hat{P}_j - \hat{P}_i), 1\right)' K\left(\frac{\hat{P}_j - \hat{P}_i}{h}\right),$$

where $K(\centerdot)$ is the Gaussian kernel, $\hat{P}$ the fitted balancing score, and h the bandwidth.[9]

[7] To see that the balancing theorem of Rosenbaum and Rubin (1983) holds also in our setting write $\mathrm{E}[S \,|\, Y(\mathbf{e},1,\mathbf{l}), Y(\mathbf{e},0,\mathbf{l}), P(\mathbf{X};\mathbf{e},\mathbf{l})] = \mathrm{E}\{\mathrm{E}[S \,|\, Y(\mathbf{e},1,\mathbf{l}), Y(\mathbf{e},0,\mathbf{l}), P(\mathbf{X};\mathbf{e},\mathbf{l}), \mathbf{X}, \mathbf{E} = \mathbf{e}, \mathbf{L} = \mathbf{l}] \,|\, Y(\mathbf{e},1,\mathbf{l}), Y(\mathbf{e},0,\mathbf{l}), P(\mathbf{X};\mathbf{e},\mathbf{l})\}$ and apply the CIA to the inner expectation.

[8] We obtain the average treatment effect on the nontreated, Δ_U, analogously using an indicator variable for nontreatment status instead of S. The negative of β then corresponds to Δ_U.

[9] We obtain the bandwidth through a crossvalidation procedure suggested in Bergemann, Fitzenberger, and Speckesser (2009). We also implemented the Nadaraya-Watson estimator to examine the sensitivity of our results to the choice of matching estimator. The treatment effect estimates are nearly the same.

Estimating the ATT as in (2.10) with an additional regression adjustment allows us to combine the advantages of both methods, matching and regression. The semiparametric matching estimator requires a careful choice of suitable control observations for each treated observation. Thus, we avoid comparisons based on extrapolations that are not supported by the data. The regression model yields a consistent and efficient treatment effect estimate if the conditional independence assumption, eq. (2.5), holds and if eq. (2.10) correctly models the conditional expectation $\mathrm{E}[Y \mid \mathbf{X}, \mathbf{E}, S, \mathbf{L}]$. Combining matching with an additional regression adjustment has the advantage that the treatment effect estimate is consistent if either the propensity score (and thus w_{ij}) or the outcome regression model is correctly specified (Robins and Ritov, 1997; Imbens, 2004). Put differently, if the treatment status is random in the reweighted sample, the estimated treatment effect should be robust to modifications of the outcome regression model. If the treatment effect estimates obtained with different regression adjustments coincide we interpret this as supporting evidence for our matching model. Finally, we use the regression on the reweighted sample to examine treatment effect heterogeneity.

We obtain standard errors and confidence bands for our estimated treatment effects through bootstrapping based on 250 resamples. We resample families to account for correlation across siblings. In each resample, we recompute the propensity score using a draw from the asymptotic distribution of the coefficients in the propensity score model. This allows us to take account of the estimation error in the propensity score.

2.2.3 Specification of the Propensity Scores and Balancing Tests

Our theoretical framework highlights the importance to control for the youths' family background and time use. We consider detailed information on the youths' involvement in educational and other leisure activities such as television and computer usage, frequency of reading a book, doing cultural and musical activities, volunteering and working part-time to improve pocket money. We control for the youths' migration background, birth order and quarter of birth. As proxies for lagged human capital and cognitive skills we condition on the teacher's recommendation for secondary school type at the end of elementary school as well as an indicator for whether the youth has ever repeated a grade.

At the level of the family, we control for educational attainment of the parents as well

as their average past earnings and standard deviation to capture income variations. We also use information about parental locus of control, measured by the Rotter scale, and personality traits, measured by the Big-Five model.[10] We further take into account parental leisure activities like sports, cultural activities, volunteering as well as their television and computer usage. In addition, we control for the number of years a youth lived with either parent up to the age of 15. We also include indicators on the quality of the relationship between adolescent and parents, e.g. importance of parents, frequency of conflicts. As proxies for the neighborhood and local environment we include indicators for the German federal states, the type of region in which one grew up (e.g. metropolitan area or countryside) and variables measuring local labor market conditions. Further, we consider the composition of the school class, i.e. the share of students with a foreign origin.

We fit the propensity scores separately for each of the subsamples, stratified by gender and school track, and run an extensive specification search. We start with a comprehensive specification and drop variables that are grossly insignificant. This procedure leads to satisfactory specifications in most cases. In the few cases in which the balancing condition fails, we further revise the specification and include additional interactions until we achieve balance. The final specifications are chosen along the following criteria: (i) our theoretical knowledge regarding potentially important drivers of participation and outcomes, (ii) empirical significance, and (iii) balancing of the covariates in the treatment and control samples.

As a first balancing test, we use the regression test suggested in Smith and Todd (2005). We regress each covariate used in a given propensity score specification on a quartic in the estimated propensity score, the treatment dummy and the quartic of the propensity score interacted with the treatment dummy. If the terms involving the treatment dummy are jointly insignificant, the treatment and comparison samples are balanced with respect to the regressor under consideration. As a second balancing test, we apply our matching procedure to a set of important variables (regardless of whether they were finally included in a particular propensity score model) and check whether the means differ across matched treatment and comparison samples.

In the spirit of Heckman and Hotz (1989) we further assess the validity of our matching strategy by testing whether the means of placebo-outcomes are balanced in the treatment and comparison samples after matching. The placebo-outcomes are human capital measures that are predetermined with respect to athletic involvement during late childhood and youth. In particular, we consider measures of height and

[10]Detailed information on the covariates is provided in Section B of Appendix II.

intelligence. In developed countries, height and growth during adolescence are essentially determined by genes (80%) and the quality of the uterine through early childhood environment, see Silventoinen (2003), Visscher, Medland, Ferreira, Morley, Zhu et al. (2006) and the discussion in Case and Paxson (2008). Thus, height during adolescence evolves independently of adolescent experiences such as sports but is correlated with parental socioeconomic background and skills. Similarly, somebody's rank in the intelligence distribution is stable after about age 6, with genes accounting for the majority (up to 80%) of the variation across adolescents and adults in a given cohort (Cunha, Heckman, Lochner and Masterov, 2006; Neisser et al., 1996; Nisbett et al., 2012). Consequently, we apply our matching procedure to measures of height and intelligence. If our matching procedure works well, these predetermined human capital measures should be balanced in the matched treatment and comparison samples.

2.3 Data and Analysis Sample

Our empirical analysis uses data from the German Socio-Economic Panel Study (SOEP), a representative annual household panel covering more than 11,000 households in Germany.[11] In addition to the standard household and person questionnaires, the SOEP devises since 2000 a specific youth biography questionnaire to all young people turning 17 in the corresponding year. It includes detailed information on family background and childhood, past and current involvement in different leisure and educational activities, academic performance, career plans as well as attitudes about different topics. Our main analysis sample consists of all youths who completed this questionnaire in the years 2001 to 2011. We add information from past and current parental questionnaires to construct further variables describing the family background, such as parental earnings and involvement in leisure activities. Using the surveys conducted in subsequent years we collect additional information on behavioral and economic outcomes of the youths until their early twenties.

Our main measures of athletic involvement are based on the following two questions in the youth biography questionnaire: *Do you play a particular sport?* and *How often do you play sports?* We define as athletes all those who play sports at least on a weekly basis. We exclude individuals with missing or ambiguous answers on the two questions as well as disabled adolescents. In some of our analyses, we further

[11] We use the data distribution 1984-2011, `http://dx.doi.org/10.5684/soep.v28`. See Wagner et al. (2007) and Wagner et al. (2008) for further information.

distinguish between different sport intensities (daily, weekly), sport types (team, individual) and social contexts (nonprofit club, commercial facility, unorganized). In most of our analyses, we stratify the sample according to gender and type of secondary school track. In particular, we distinguish between a vocationally and an academically oriented school track. Tracking generally takes place at age 9-10 and depends on academic ability and socioeconomic background, with more advantaged students in terms of ability and family background attending the academic track.[12] We also exclude youths with missing information on school track or attending integrated school types. Overall our sample consists of 3,343 young people (see table 2.1 in Appendix I).

2.4 Empirical Results

2.4.1 Patterns of Athletic Involvement and Leisure Time Use

In our sample of (almost) 17-year olds, about two thirds of the young men and about half of the young women engage in sports at least on a weekly basis, see figure 2.1 in Appendix I. 24% of the young men and 11% of the young women exercise even daily. 36% (21%) of the young men (women) participate in athletic competitions and 37% (20%) of the young men (women) play a team sport. Among male athletes, the by far most popular sport is soccer (42.50%) followed by training in a fitness club (8.27%) and biking (5.08%). The picture is more diverse for female athletes. The top three sports are dancing (13.35%), horseback riding (10.24%) and volleyball (9.89%), see table 2.2.

For the vast majority of young athletes sports is a social activity. Table 2.3 provides a breakdown by sport type and social context. Two thirds of the athletes play sports in a nonprofit club. In Germany there exists a wide network of such clubs, covering also rural areas. They rely on small membership fees[13] and, importantly,

[12]The vocationally oriented school track subsumes the two lower tiers of general secondary schooling in Germany, Hauptschule and Realschule. They last until grade nine and ten, respectively, and prepare for vocational training. The academically oriented school track, Gymnasium, lasts until grade twelve or 13 and prepares for tertiary education. Students on the vocational track with good marks may move on to the academic track after completing the tenth grade. We classify the movers also in the vocational track to ensure that the adolescents in each subsample have a comparable school history.

[13]The median fee for youths is €3.60 per month, Breuer et al. (2005), table 1. About a quarter of the clubs charge small admission fees (the median is €10) and the majority offers reduced family rates.

volunteer work by the members and their relatives. Thus, they provide important opportunities for social engagement beyond exercising a particular sport. The local clubs are part of umbrella associations that set general rules and structures. For instance, the German Football Association (Deutscher Fussball-Bund) regulates the organization of youth teams and leagues, provides training for coaches and referees, and formulates athletic as well as psychosocial goals of youth work.

Figure 2.2 illustrates how the athletic involvement of the 17-year olds evolves with age. Panel (a) shows how many of the young athletes as of age 17 were already exercising their main current sport at a given earlier age denoted on the horizontal axis. 78% of the male athletes and 69% of the female athletes played their current sport already at age 13. Likewise, panel (b) shows how many of the athletes continue to be active during young adulthood. According to panel (b), 67% of the male athletes and 55% of the female athletes continue to exercise at least weekly at age 21. Thus, there is a higher degree of persistence in the athletic involvement over time for males than for females. Figure 2.3 shows that 70% (80%) of the male (female) non-athletes as of age 17 continue to be inactive throughout their early 20s. In sum, these patterns suggest that athletic engagement and non-engagement largely persist throughout adolescence and into young adulthood.

Figure 2.4 provides an overview over how the 17-year olds in our sample allocate their free time. They devote about two thirds of their leisure time to sedentary activities (i.e. reading, listening to music, media use, doing nothing) and more than 80% to unstructured activities (i.e. sedentary activities plus activities with peers). Students on the academic track tend to spend more time in structured activities or reading than those on the vocational track (panels a, b versus c, d). While the general patterns are similar for youths who play sports at least on a weekly basis (panels a, c) and those who do not (panels b, d), athletes spend a higher share of their discretionary time on non-sedentary and structured activities. In particular, young athletes on the vocational track spend 14% and 34% of their free time on structured activities and non-sedentary activities, respectively, whereas non-athletes spend only 8% and 29% on such activities. The corresponding numbers for youths on the academic track are 16% and 34% for athletes versus 12% and 31% for non-athletes. These differences between athletes and non-athletes are statistically significant. Further, the clear dominance of passive, undirected leisure pursuits among all groups suggests that overscheduling is no issue. A similar dominance of passive, undirected leisure activities has also been documented in studies investigating the time use of teenagers in the US (Wight et al., 2009) and other Western countries (Larson and Verma, 1999).

Table 2.4 shows the engagement in other, non-athletic structured leisure activities by athletic status. We consider all non-athletic structured activities (i.e. playing music or singing, acting, technical activities, and volunteering) that are performed at least on a weekly basis. The table reveals interesting differences between youths on the vocational track and youths on the academic track. Among youths on the vocational track, athletes are no less likely to engage in other structured leisure activities than non-athletes. On the contrary, while more than half of the female athletes engage in an additional structured activity, only a third of the female non-athletes engages in a non-athletic structured activity. Among youths on the academic track, the pattern is reversed. Non-athletes show an about 10 percentage point higher probability to engage in non-athletic structured leisure activities than athletes. Overall, these patterns are in line with the evidence in figure 2.4. For youths on the academic track sports seems to be just one of several structured leisure activities. Those youths who do not play sports engage to a larger extent in non-athletic structured activities. Among youths on the vocational track, in contrast, a sizeable share of youths engages in no structured leisure activity (i.e. 20% of the males and 40% of the females, combining the information in tables 2.1 and 2.4) or in just one activity, which is sports in the majority of cases. In this sense, sports can be seen as an entry-level structured activity.

2.4.2 Selectivity of Athletic Involvement

Tables 2.5 and 2.6 show descriptive statistics for a subset of the covariates used in the propensity score estimations and predetermined human capital measures referring to height and intelligence.[14] Most remarkable is the strong positive relationship between parental athletic involvement and the youths' own involvement. The correlation is stronger for youths on the vocational school track and girls as well as between parents and children of the same sex. For instance, athlete girls exhibit a 1.3 to 1.8 times higher share of mothers who play sports than non-athlete girls.

Further, in each school track, athletes tend to be positively selected with respect to socioeconomic background. In both school tracks, this effect is stronger for girls than for boys, who exhibit a higher athletic involvement than girls. For instance, athletes are 4 to 12 percentage points (8-27% of a standard deviation in the full sample) more likely to have a parent with a tertiary education degree. Athletes are also more likely to have grown up with both parents. The parents of female athletes earn (before taxes) between €3,600 and 6,500 more a year than those of non-athletes,

[14]Descriptive statistics of the remaining covariates can be found in Section B of Appendix II.

while there are no clear differences in the male samples. Consistent with research documenting a positive relationship between teen height, socioeconomic background, and extracurricular engagement (Persico et al. 2004, Case and Paxson, 2008), we find differences in height of 1 to 2 cm (0.4-0.9 in, 11-20% of a standard deviation) between athletes and non-athletes. However, the differences in socioeconomic status between athletes and non-athletes within a given school track tend to be much smaller than the differences in socio-economic status between youths on different school tracks. In particular, the parental earnings gap between school tracks is about €20,000 (more than 60% of a standard deviation).

Consistent with the patterns found for socioeconomic background and height, the descriptive statistics suggest moderate differences between athletes and non-athletes with respect to past academic performance and intelligence. While the share of youths who have ever repeated a grade is about equal in the athlete and non-athlete groups, a larger share of the athletes was recommended at the end of grade four to continue on the academic secondary school track (4-13 percentage points, 8-25% of a standard deviation). Athletes also tend to score higher in the three ability tests.[15] For verbal and numerical ability of male students on the academic track and numerical ability of female students on the academic track, the differences are significant at the ten percent level. However, male athletes on the vocational track score significantly lower in verbal ability than non-athletes. Again, the differences in intelligence between athletes and non-athletes within a given school track are much smaller than the differences between youths across school tracks. Finally, regional conditions do not seem to matter much for athletic engagement. There are no systematic patterns for whether someone grew up in a city and only a weakly negative relationship between the regional unemployment rate and athletic involvement.

Similar selectivity patterns emerge, as those apparent in the descriptive statistics, when we fit the propensity scores. The propensity scores rely on a rich set of covariates and we specify separate models for each of the four subsamples.[16] The overlap of the propensity score distributions between athlete and non-athlete groups is all in all satisfactory. We delete only a small fraction of observations that lie outside the common support region (panel a in table 2.7). We achieve excellent balancing of the covariates included in the propensity scores as well as excluded variables. According to panel (b) in table 2.7, for nearly all the covariates included

[15]The three measures of intelligence have been standardized in the full sample. They are based on a validated short version of a standard intelligence test used in German speaking countries, see Amthauer et al. (2001) and Solga et al. (2005).

[16]See Section B in Appendix II for a complete list of the variables used and Section C for the estimation results involving the propensity scores.

in a given propensity score specification the Smith/Todd (2005)-test fails to reject at the five percent level. This suggests that athletic status does not predict the covariate under consideration after conditioning on the propensity score. Panels (c) and (d) in table 2.7 show further that, before matching, between 13% (men, academic track) and 26% (women, academic track) of the covariates had significantly different means in the target and comparison groups. Once the matching weights are applied there are no significant differences anymore.

To further probe our matching strategy we examine the balancing of human capital measures that are determined at an age before children start playing sports. In particular, we consider measures of height and intelligence. Table 2.8 shows that there are indeed significant differences between athletes and non-athletes before matching, especially for youths on the vocational track. However, in the matched samples the p-values from a test of equality of means are large in the vast majority of cases. Only in one case, intelligence for men in the vocational track the p-value after matching is smaller than 0.05. In fact, male athletes on the vocational track score actually worse than non-athletes. This evidence lends support to our matching strategy as there likely remain no unmeasured confounders. From a substantive point of view the findings suggest that our matching strategy effectively balances heterogeneity in skills related to genetic and early childhood environments.

2.4.3 Athletic Involvement and Behavioral Outcomes

Tables 2.9 to 2.20 show the sample means and treatment effect estimates for the behavioral outcome variables that reflect character, social, and executive function skills. The behavioral variables are derived from a series of factor analyses that are documented in Section D in Appendix II. All outcome variables are standardized to allow a comparison of effect sizes across outcomes. The results for youths on the vocational school track and the academic school track are reported in separate tables. Each table reports estimates for men and women separately as well as for the pooled sample. In any case, we match exactly on gender, the estimates differ only in the regression adjustment that is done separately in the male and female samples and jointly in the pooled sample.[17]

We first turn to impact estimates for outcome variables reflecting character skills. In particular, we focus on the Big Five personality inventory and locus of control. The Big Five model distinguishes five dimensions of personality: openness to experience,

[17]The outcome regression model for the pooled sample includes in addition a gender dummy.

conscientiousness (i.e. the tendency to be organized, responsible and hardworking), extraversion, agreeableness (i.e. the tendency to act in a cooperative, unselfish manner) and neuroticism (i.e. the tendency to be emotionally instable and prone to psychological distress), see Almlund et al. (2011) for an overview.[18] Locus of control refers to the extent to which people believe that they can control their life (internal and external locus of control).[19] A growing body of empirical research has started to document the importance of character skills in predicting economic outcomes such as educational attainment and earnings. Almlund et al. (2011) survey evidence showing that, of the Big Five, conscientiousness stands out for its strong positive association with educational and labor market performance. Agreeableness and an internal locus of control have also been found to be positively related with economic outcomes.

Tables 2.9 and 2.10 show the effects of athletic involvement on the Big Five personality dimensions. Girls score higher in each of the personality traits than boys, regardless of the school track. For the vocational track we find in most cases a positive effect of participating in sports on the students' personality traits, except for neuroticism. The effects are in four out of five cases larger for male students and also more often statistically significant. In particular, the average treatment effects (ATE) for conscientiousness and agreeableness are at 28% and 17% of a standard deviation and statistically significant, respectively. The pooled impact estimates for extraversion and openness are at 18-19% of a standard deviation and statistically significant. For youths on the academic track, we find positive (7-15% of a standard deviation) and insignificant effects on extraversion and openness.

Table 2.11 and 2.12 display the effects on locus of control. We find in general similar patterns across gender and school track. Athletic involvement decreases the extent to which youths believe that events in their life are a consequence of luck or destiny (external locus of control) and increases the extent to which they believe that events are a consequence of their own effort (internal locus of control). For youths on the vocational track, the ATEs are in the order of 15-17% of a standard deviation for young men and 15-19% for young women (table 2.11). The effects for youths on the academic track tend to be smaller again and not statistically significant.

Next we turn to impact estimates for outcome variables reflecting social skills and risk preferences. Panels (a) and (b) of table 2.13 and 2.14 show the estimates for

[18]The items for the Big Five personality inventory in the SOEP have been developed and validated by Gerlitz and Schupp (2005). They are included in the questionnaire since 2006.

[19]The items on locus of control in the SOEP are based on the framework by Rotter (1966), see Weinhardt and Schupp (2011).

reciprocity.[20] While positive reciprocity measures the inclination to reward fair and cooperative behavior of another person, negative reciprocity refers to the willingness to punish somebody who behaves unfair or uncooperative. The treatment effect estimates for the vocational track samples suggest that athletic involvement reduces a teenager's willingness to punish unfair or uncooperative behavior, panel (a) of table 2.13. The treatment effects for females are almost twice as large than those for males. For instance, the average treatment effect (ATE) is -24% of a standard deviation for girls as opposed to -11% for boys. Unlike the results on negative reciprocity, the effects on positive reciprocity are generally smaller and insignificant, panel (b) of table 2.13. The patterns for the vocational track samples differ from those for young people on the academic track, where the treatment effect estimates are mostly small and insignificant, panels (a) and (b) of table 2.14. Only positive reciprocity of female students on the academic track increases by 25% of a standard deviation through playing sports. However, the treatment effects are not significant.

Panel (c) of tables 2.13 and 2.14 show the results on willingness to take risks. We find stronger and significant effects for youths on the vocational track, see panel (c) of table 2.13.[21] The average treatment effects (ATE) are 22% for boys and 17% for girls, and statistically significant. The impact estimates for the academic track samples are again insignificant and close to zero, panel (c) of table 2.14.

What are the economic implications of our findings on social skills and risk preferences? Brown et al. (2004), Dohmen et al. (2009) and Kube et al. (2012) show that positive reciprocity is important for sustaining employment relationships in which the employer pays the employee an efficiency wage in order to stipulate a higher effort. Thus, there is a positive relationship between positive reciprocity and wages. Similarly, an employer may find it rational to dismiss an employee rather than to lower the wage in order to avoid a retaliatory response (Bewley, 1998). This argument suggests a positive relationship between negative reciprocity and nonemployment, which is confirmed empirically by Dohmen et al. (2009) and Kube et al. (2013). Further empirical research (see e.g. Bonin et al., 2007, and the references therein) documents a positive association between risk tolerance on the one hand and educational attainment, choice of occupation and earnings on the other. Thus, our findings regarding social and risk preferences may contribute to explaining the positive effects of athletic involvement on educational and labor market outcomes.

[20]The measures of reciprocity in the SOEP are based on the framework of Perugini et al. (2003). Dohmen et al. (2009) document that the SOEP survey responses on reciprocity are consistent with the behavioral patterns generated in experiments.

[21]Dohmen et al. (2011) validate the SOEP risk measure experimentally. They document that the SOEP question reliably predicts risk taking behavior in the experiment.

Next, we discuss the results on job values.[22] In the psychological and sociological literature job values play a prominent role in describing young people's identity and career aspirations (see e.g. Rosenberg, 1957, Johnson, Kirkpatrick and Mortimer, 2011). They are a key driver of occupational choices and career attainment at later ages. Tables 2.15 and 2.16 display the results on five different work values for the vocational track samples and the academic track samples. Comparing the means across gender, we see that males score lower than females in all but one (i.e. pay and promotion) cases. This pattern suggests that young men have on average less idealistic views about themselves and their future career than young women. For pay and promotion, in contrast, we observe a clear socioeconomic divide. Youths attending the vocational track value pay and promotion much higher than those on the academic track.

The treatment effect estimates for youths on the vocational track are positive and often significant. Their magnitude ranges between 10 and 30% of a standard deviation, with the effects for males often exceeding those for females. Contrary to the general pattern, there is no effect of athletic involvement on how important young men rate work-life balance, while the ATE for females attains 18% and is statistically significant. Importantly, the effects on how important youths rate high pay and good promotion opportunities (panel b of table 2.15) are with around 20% of a standard deviation large and highly significant. Sociological research documents a positive correlation between values reflecting extrinsic orientations, including pay, promotion and security, as well as hours worked and earnings (Johnson, Kirkpatrick and Mortimer, 2011). Unlike for the vocational track samples, the impact estimates for the academic track samples are often small and insignificant, table 2.16.

At this point it is interesting to compare the effects of athletic involvement on the youths' aspirations with those on their expectations about their own future and the determinants of social success more generally. Tables 2.17 and 2.18 show the results for their attitudes about the determinants of social success.[23] We distinguish between three major factors of social success. The first one refers to extrinsic factors, such as gender and family background, the second to positive intrinsic factors, such as achievement and industriousness, and the third to negative intrinsic factors, such as being tough and exploiting others. Athletic involvement clearly appears to have a positive effect on how youths on the vocational track think about moving up in

[22]The theory and measurement of job values go back to Rosenberg (1957). The questions on job values in the SOEP include additional items on work-life balance, see Weinhardt and Schupp (2011).

[23]The battery of items included in the SOEP is originally due to Sandberger (1983), see Weinhardt and Schupp (2011) for further information.

society. Playing sports makes them belief more strongly that success depends on positive intrinsic factors rather than extrinsic or negative intrinsic factors. The effects tend to be larger in absolute value for girls than for boys. In particular, the ATE for young women is -33% of a standard deviation for extrinsic factors, -27% for negative intrinsic factors and 14% for positive intrinsic factors. This suggests that athletic involvement contributes to reinforcing gender differences in beliefs about success. The patterns for the academic track samples in table 2.18 are less clear cut. For young women on the academic track, the point estimates tend to be smaller compared with those for the vocational track and statistically insignificant. In contrast for young men on the academic track, we find sizeable and statistically significant adverse effects of athletic involvement on extrinsic and negative intrinsic factors.

Tables 2.19 and 2.20 display means and impact estimates for outcomes reflecting future expectations. Our expectation measures capture career related as well as family related aspects. The means of all three variables are lower in the vocational track samples than in the academic track samples, which suggests that young people from less advantaged backgrounds have less optimistic expectations. Athletic involvement has a positive effect on career and family expectations. When significant, the treatment effects attain 19 to 30% of a standard deviation in the vocational track samples (table 2.19). The patterns for the academic track samples closely match those for the vocational track samples (table 2.20). For instance, the ATEs on career expectations attain 22-25% of a standard deviation and are statistically significant for boys. The positive treatment effects on career expectations are consistent with the positive effects of athletic involvement on career aspirations. Taken together they support the hypothesis that athletic involvement positively affects educational attainment and labor market outcomes because it raises the teenagers' self-confidence and optimism as well as their aspirations.

2.4.4 Athletic Involvement and Economic Outcomes

As a consistency check on the effects on economically relevant behavioral outcomes, we also investigate the effects of athletic involvement on educational and labor market outcomes. In order to make the impact estimates comparable to those on behavioral outcomes, the outcome variables are again standardized. Tables 2.21 and 2.22 show the treatment effects on educational attainment. Consistent with the effects on behavioral outcomes, the impact estimates in tables 2.21 and 2.22 indicate beneficial effects of athletic involvement on educational attainment. This is remarkable, since we carefully condition on past and current educational activities of the youths at

the time we measure their athletic status. For young men on the vocational track, athletic involvement reduces the probability to leave school without a degree and increases the probability to successfully complete the vocational track. We observe a similar pattern for young women on the vocational track: The probability to continue to and complete the academic track increases, while the probability to leave school with a vocational track certificate is reduced. In addition, we find a positive (but insignificant) effect on the probability to attend university. For the academic track samples there are no statistically significant effects, but the patterns suggest again positive effects on educational attainment.

Tables 2.23 and 2.24 show the results for enrolment in vocational training. Panels (a) and (b) display the effect of participating in sports on the probability of attending vocational training for at least one and two consecutive years, respectively. Panel (c) shows the effect on the probability to successfully complete vocational training. The results for vocational training match those for educational attainment. For the vocational track samples we find a positive and significant effect for boys and a negative (and partially significant) effect for girls. For boys the average treatment effects are sizeable and exceed 20% of a standard deviation. For youths on the academic track, the effects are generally smaller and insignificant. In sum, the results in tables 2.21 to 2.24 suggest interesting gender differences in the effects of athletic involvement on educational and labor market outcomes. While sports increases the probability that young men successfully complete vocationally oriented education, it has a positive effect on enrolling in academically oriented education for young women.

2.4.5 Effect Heterogeneity and Sensitivity Analysis

To examine the heterogeneity of treatment effects we modify the outcome regression model and include different sets of interactions with the treatment dummy. The matching step is performed as in the benchmark scenario. First, we investigate heterogeneity of treatment effects according to whether youths engage in other structured activities besides sports. The results of this exercise are documented in Section E.1 in Appendix II. In the majority of cases, it turns out that treatment effects of sports are stronger among youths who do not engage in any other structured activity (e.g. playing music, volunteering). This pattern holds both for youth on the vocational and on the academic track. For job values we observe the reverse pattern: the treatment effect of playing sports is larger among youths who engage also in other structured activities.

Second, we calculate treatment effects separately by the type of sport and the setting in which youths play sports. As for the vast majority of young people playing sports is a social activity, we investigate whether treatment effects depend on the particular social context (recall table 2.3). We consider the subcategories team sport, individual sport, sports in a club and sports with others in an informal setting. In further analyses, we break treatment effects down by whether or not somebody takes part in athletic competitions and by the frequency of athletic involvement. We do not find systematic patterns of treatment effect heterogeneity.[24] Taken together the patterns found in these two analyses are consistent with the idea that playing sports means being part of a social network. In particular, joining a sports club usually is not limited to playing sport once or twice a week but it means being part of a social community whose members share responsibilities and meet also for activities not directly related to the sport. We therefore interpret our treatment effect estimates as estimates of the broader effect of having access to an enriched social environment rather than the pure effect of physical exercise.

As a sensitivity analysis, we extract a subsample of families in which some of the children play sports while some do not and modify the outcome regression model to include in addition family fixed effects. With the family fixed effects we can examine the sensitivity of our results to potential unobserved confounders that are constant within families. In particular, if the athletic status is random in the reweighted sample using the matching weights, the estimated treatment effects should not be sensitive to how we specify the outcome regression model. In the outcome regression, we pool across gender and school track to obtain a sufficiently large sample of siblings with mixed athletic involvement. The matching step is performed as before at the individual level, with exact matching on gender and school track.

Section E.2 in Appendix II shows the results for selected outcome variables for which we have enough observations. In each table the columns labeled 'Full Sample' show, for comparison, the results for the full sample when pooling across gender and school track. The columns labeled 'Sibling Sample' show the estimates obtained from the sibling subsample without and with family fixed effects, columns 'ATE' and 'ATE (FE)'. Going from the full sample to the sibling subsample we see that the point estimates are in general very close whereas the standard errors are larger by a factor of 1.5 to two in the sibling sample. The similarity of the point estimates in the two samples suggests that the sibling sample is well representative of the full sample. Next comparing the two treatment effect estimates in the sibling sample,

[24]The results of these estimations are available on request.

we see that the point estimates are again in 14 out of 18 cases very similar while the standard errors increase somewhat when using family fixed effects. The high similarity of the treatment effect estimates with and without family fixed effects in the sibling sample suggests that our matching and regression adjustment suffices to remove potential confounders that are constant at the family level. Further refining the adjustment with family fixed effects does not affect the results. This evidence supports the hypothesis that particular experiences during adolescence, i.e. playing sports or not, influence the development of skills and attitudes over and above endowments transmitted through the parents.

2.5 Conclusion

Sports has been singled out as a popular pastime that is positively related with educational and labor market outcomes at later ages. While existing research supports the hypothesis that athletic participation may have a positive effect on educational attainment and labor market outcomes, we know little about the underlying mechanisms. We address this question exploring what youths do in their leisure and whether athletic participation affects behavioral and economic outcomes reflecting character, social and executive function skills. To set the analytic framework of our empirical analysis we develop a simple model linking leisure time use and skill formation of youths. We exploit data from the German Socio-Economic Panel that offers the unique advantage of both a large, representative sample and high quality behavioral measures. We employ a flexible strategy involving propensity score matching and regression to account for selfselection into athletic involvement. We assess the validity of the empirical strategy with various tests.

Our main findings are as follows. The majority of young people play sports and their athletic engagement largely persists during adolescence and into young adulthood. While young men favor team sports and especially soccer, young women have more diverse preferences and play more individual sports. Regardless of type of sport and gender, the vast majority of the athletes play sports in a club or with others. Thus, sports is generally a social activity. Our results further suggest that young people who regularly play sports spend a higher share of their free time on structured and non-sedentary activities than those who do not. Nevertheless, undirected and passive leisure pursuits clearly dominate among all youths. Parental athletic involvement is highly predictive of the youth's athletic involvement. Athletes tend to be positively selected in terms of family background, intelligence and height. These

differences disappear after matching treatment and comparison observations. In particular, the matched treatment and comparison units are balanced with respect to the predetermined human capital measures height and intelligence. This suggests that our matching strategy effectively balances heterogeneity in skills related to genetic factors and early childhood environments.

We find beneficial effects of athletic involvement on a broad range of behavioral outcomes including character skills and career aspirations and expectations. The effects are sizeable for youths on the vocational track, attaining 10-30 % of a standard deviation, whereas they are small and insignificant for youths on the academic track. The magnitude of the effects sometimes differs across gender, too. However, the impacts generally point in the same direction for young men and women. Athletes, in particular youths on the vocational track, show better educational outcomes than comparable youths who do not play sports. We further examine treatment effects conditional on the engagement in other structured leisure activities. It turns out that the sizeable beneficial effects of sports among youths on the vocational track are largely driven by the sizeable effects among youths who do not engage in any other structured activities. This pattern is similar for youths on the academic track. We therefore interpret our treatment effect estimates as estimates of the broader effect of having access to an enriched social environment rather than the pure effect of physical exercise. Overall our results lend support to the hypothesis that structured leisure activities such as sports positively affect the development of nonacademic skills.

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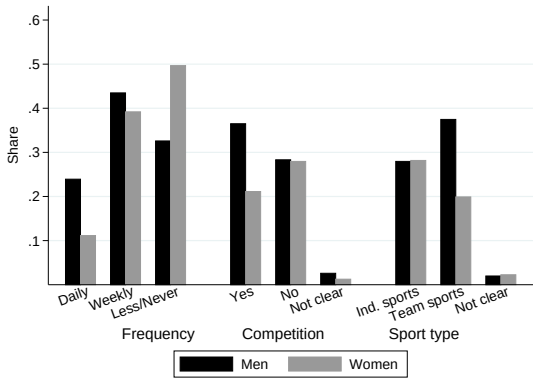
2.7 Appendix I

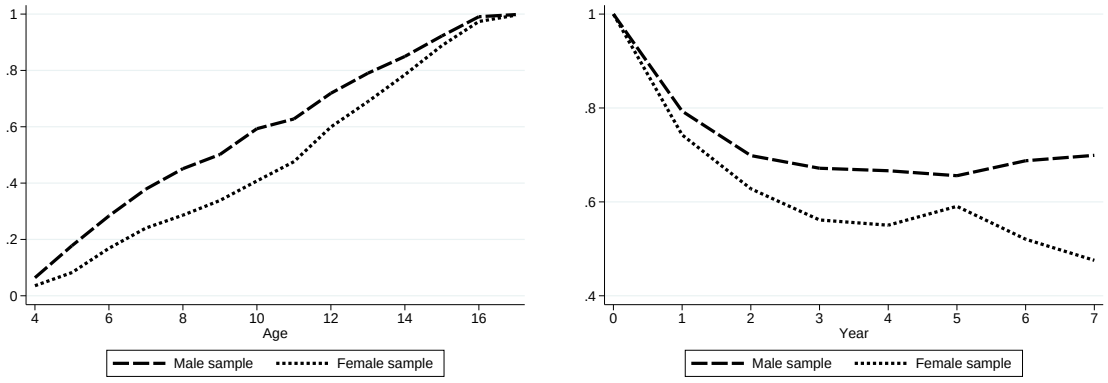
Figures

Figure 2.1: Athletic Involvement of 17-Year Olds



Source: SOEP V28 and authors' calculations. Note: Proportions based on weighted samples.

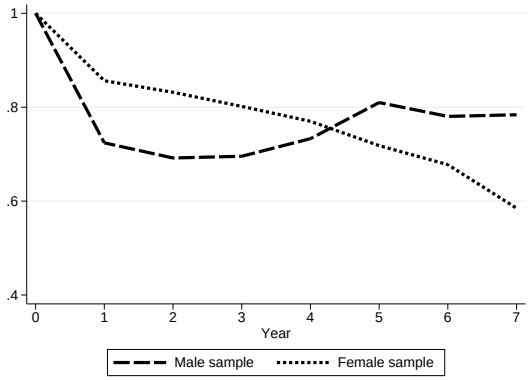
Figure 2.2: Athletic Involvement of Athletes During Childhood and Young Adulthood



(a) Cumulative fraction active (current sport) (b) Cumulative fraction still active (any sport)

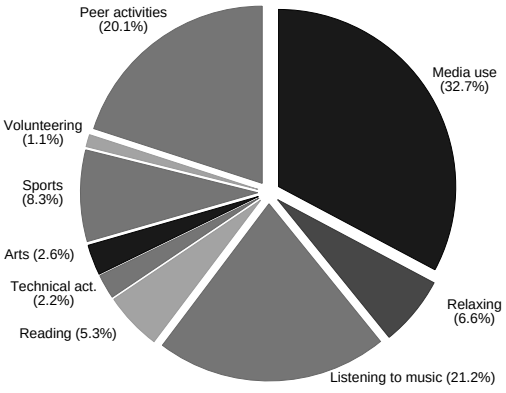
Source: SOEP V28 and authors' calculations. Note: Panel (a) shows the cumulative share of athletes as of age 17 who play their current main sport already at younger ages. Panel (b) shows the share of athletes as of age 17 who play sports at least once a week at later ages. In 2002, 2004, 2006, and 2010, the person questionnaire does not include the question about athletic involvement and its frequency. We impute the information based on the athletic involvement in the adjacent years. Proportions calculated using SOEP sample weights.

Figure 2.3: Athletic Involvement of Non-Athletes During Young Adulthood

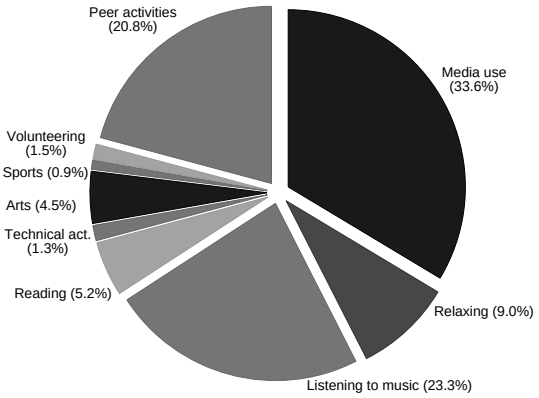


Source: SOEP V28 and authors' calculations. Note: The figure shows the share of non-athletes as of age 17 who do not play sports at all or less than weekly at later ages. In 2002, 2004, 2006, and 2010, the person questionnaire does not include the question about athletic involvement and its frequency. We impute the information based on the athletic involvement in the adjacent years. Proportions calculated using SOEP sample weights.

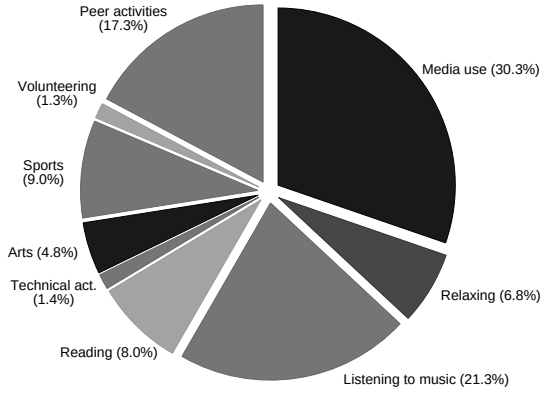
Figure 2.4: Leisure Time Use of 17-Year Olds



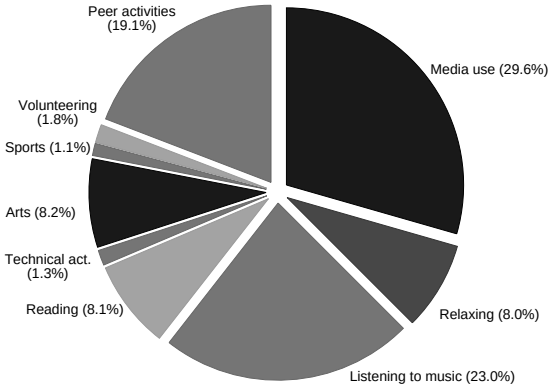
(a) Athletes, vocational track



(b) Non-athletes, vocational track



(c) Athletes, academic track



(d) Non-athletes, academic track

Source: SOEP V28 and authors' calculations. Note: The percentages are derived from a set of questions about how the young people allocate their leisure time. We impute the share of time spent on each activity according to its frequency, i.e. a daily activity is weighted by 30.44, a weekly activity by 4.35, and a monthly activity by 1. Then we average across all youths. The category *media use* comprises *watching television/video*, *playing computer games* and *using the internet*. The activity *volunteering* includes also *attending church/being involved in a religious community*. The activities *spending time with steady/best friend, clique, and in youth clubs* are combined to the category *peer activities*. The category *arts* comprises the activities *performing arts*, *playing music*, and *singing*. The category *technical activities* summarizes *crafting*, *programming* and related activities. Calculations use SOEP sample weights.

Tables

Table 2.1: Sample Sizes

	Vocational school track				Academic school track			
	Men Athlete		Women Athlete		Men Athlete		Women Athlete	
	Yes	No	Yes	No	Yes	No	Yes	No
Observations								
	1,104		977		593		669	
	654	450	405	572	455	138	455	214
Unweighted proportion (%)								
	59.24	40.76	41.45	58.55	76.73	23.27	68.01	31.99
Weighted proportion (%)								
	61.68	38.32	39.45	60.55	80.04	19.96	69.97	30.03

Source: SOEP V28 and authors' calculations. Note: Weighted proportions calculated with SOEP sample weights.

Table 2.2: Most Popular Sports by Gender

	Men		Women	
Rank	Sport type	%	Sport type	%
1.	Soccer	42.50	Dancing	13.35
2.	Fitness, Bodybuilding	8.27	Horseback Riding	10.24
3.	Bike Riding	5.08	Volleyball	9.89
4.	Basketball	4.33	Walking, Jogging	7.24
5.	Handball	3.97	Soccer	7.04

Source: SOEP V28 and authors' calculations. Note: Percentages calculated using SOEP sample weights.

Table 2.3: Type of Sport and Social Context

	Team sport		Individual sport		Total	
	Freq.	%	Freq.	%	Freq.	%
At nonprofit sports club	577.01	81.27	405.26	50.16	1,023.61	65.20
At commercial sports facility	19.03	2.68	101.43	12.55	124.11	7.91
At another organization	4.69	0.66	5.17	0.64	9.82	0.63
With others, not organized	99.92	14.07	138.25	17.11	242.71	15.46
Alone	9.34	1.32	157.89	19.54	169.75	10.81
Total	710	100.00	808	100.00	1,570	100.00

Source: SOEP V28 and authors' calculations. Note: Calculations use SOEP sample weights. The column labeled 'Total' includes in addition observations with unclear or missing type of sport.

Table 2.4: Engagement in Other Structured Leisure Activities Besides Sports

	Men			Women		
	Athlete			Athlete		
	Yes	No	p-Value	Yes	No	p-Value
Vocational track						
Any other activity	0.535	0.514	0.503	0.516	0.365	**0.000**
	(0.499)	(0.500)		(0.500)	(0.482)	
Number of other act.	0.767	0.837	0.222	0.736	0.613	**0.047**
	(0.895)	(0.973)		(0.895)	(0.978)	
Academic track						
Any other activity	0.652	0.772	**0.012**	0.623	0.525	**0.018**
	(0.477)	(0.421)		(0.485)	(0.501)	
Number of other act.	1.038	1.402	**0.001**	0.993	0.874	0.176
	(0.999)	(1.130)		(1.023)	(1.069)	

Source: SOEP V28 and authors' calculations. Note: Calculations use SOEP sample weights. Rows labeled 'Any other activity' show the share of youths who do at least one structured activity except sports on a weekly basis. Rows labeled 'Number of other act.' show the number of structured activities excluding sports that are performed on a weekly basis. Columns labeled 'p-Value' show the p-value from a t-test of equality of means.

Table 2.5: Descriptive Statistics for Key Covariates – Vocational Track

	Men				Women			
		Athlete				Athlete		
	Obs.	Yes	No	p-Value	Obs.	Yes	No	p-Value
Height (cm)	963	178.7	177.5	**0.014**	859	167.5	165.6	**0.000**
		(7.646)	(6.826)			(6.431)	(6.342)	
Verbal ability	519	-0.327	-0.153	**0.034**	425	-0.317	-0.430	0.191
		(0.868)	(1.001)			(0.827)	(0.922)	
Numerical ability	519	-0.039	-0.183	**0.092**	425	-0.289	-0.271	0.861
		(0.946)	(0.990)			(0.968)	(1.062)	
Figural ability	519	-0.191	-0.321	0.134	425	-0.068	-0.117	0.598
		(0.977)	(0.983)			(0.932)	(0.939)	
Ever repeated grade	1,104	0.324	0.338	0.648	977	0.211	0.240	0.284
		(0.468)	(0.473)			(0.408)	(0.427)	
Acad. track recomm.	1,073	0.135	0.099	**0.085**	951	0.212	0.109	**0.000**
		(0.342)	(0.299)			(0.409)	(0.312)	
Migrant background	1,104	0.284	0.213	**0.009**	977	0.276	0.320	0.135
		(0.451)	(0.410)			(0.447)	(0.467)	
Parent with tert. educat.	1,104	0.138	0.102	**0.081**	976	0.134	0.097	**0.073**
		(0.345)	(0.303)			(0.341)	(0.296)	
Parental earnings	1,033	3.595	3.586	0.951	915	3.585	3.469	0.490
(10,000 €)		(2.316)	(2.570)			(2.301)	(2.633)	
Grew up with both	1,104	0.687	0.639	**0.100**	977	0.715	0.668	0.121
parents		(0.464)	(0.481)			(0.452)	(0.471)	
Father athlete	756	0.449	0.384	**0.078**	652	0.440	0.382	0.143
		(0.498)	(0.487)			(0.497)	(0.486)	
Mother athlete	908	0.482	0.463	0.564	800	0.567	0.320	**0.000**
		(0.500)	(0.499)			(0.496)	(0.467)	
Grew up in city	1,100	0.638	0.645	0.821	970	0.571	0.700	**0.000**
		(0.481)	(0.479)			(0.496)	(0.459)	
Local unemployment (%)	1,011	10.99	11.60	**0.038**	906	11.03	11.22	0.557
		(4.504)	(4.638)			(4.469)	(4.912)	

Source: SOEP V28 and authors' calculations. Note: Columns labeled 'Obs.' show the number of observations. Columns labeled 'Yes' and 'No' show the means and standard deviations (in parentheses). Columns labeled 'p-Value' show the p-value from a t-test of equality of means. Calculations use the SOEP sample weights. The cognitive ability measures are only available for cohorts from 2006 onwards. A detailed description of all covariates and additional descriptive statistics are provided in Section B of Appendix II.

Table 2.6: Descriptive Statistics for Key Covariates – Academic Track

	Men				Women			
		Athlete				Athlete		
	Obs.	Yes	No	p-Value	Obs.	Yes	No	p-Value
Height (cm)	531	180.0	180.2	0.838	593	168.1	167.1	**0.073**
		(7.319)	(7.588)			(6.061)	(6.460)	
Verbal ability	290	0.767	0.498	**0.022**	315	0.637	0.580	0.577
		(0.873)	(0.757)			(0.796)	(0.941)	
Numerical ability	290	0.616	0.414	**0.039**	315	0.294	0.092	**0.087**
		(0.697)	(0.736)			(0.902)	(1.097)	
Figural ability	290	0.404	0.206	0.127	315	0.506	0.566	0.557
		(0.903)	(1.060)			(0.849)	(0.775)	
Ever repeated grade	593	0.117	0.130	0.702	669	0.061	0.042	0.327
		(0.322)	(0.337)			(0.240)	(0.201)	
Acad. track recomm.	585	0.834	0.794	0.308	662	0.861	0.739	**0.000**
		(0.373)	(0.406)			(0.346)	(0.440)	
Migrant background	593	0.178	0.151	0.494	669	0.193	0.230	0.279
		(0.383)	(0.359)			(0.395)	(0.422)	
Parent with tert. educat.	593	0.577	0.535	0.412	669	0.493	0.378	**0.006**
		(0.495)	(0.501)			(0.501)	(0.486)	
Parental earnings	564	5.559	5.974	0.260	640	5.293	4.962	0.255
(10,000 €)		(3.562)	(3.374)			(3.447)	(3.261)	
Grew up with both	593	0.750	0.848	**0.023**	669	0.766	0.749	0.641
parents		(0.433)	(0.360)			(0.424)	(0.435)	
Father athlete	418	0.570	0.563	0.906	458	0.592	0.493	**0.049**
		(0.496)	(0.499)			(0.492)	(0.502)	
Mother athlete	464	0.747	0.583	**0.002**	547	0.642	0.490	**0.001**
		(0.435)	(0.495)			(0.480)	(0.501)	
Grew up in city	590	0.722	0.715	0.878	661	0.712	0.645	**0.089**
		(0.449)	(0.453)			(0.453)	(0.480)	
Local unemployment (%)	529	11.16	11.54	0.447	610	11.21	12.78	**0.000**
		(4.500)	(4.966)			(4.751)	(5.598)	

Source: SOEP V28 and authors' calculations. Note: Columns labeled 'Obs.' show the number of observations. Columns labeled 'Yes' and 'No' show the means and standard deviations (in parentheses). Columns labeled 'p-Value' show the p-value from a t-test of equality of means. Calculations use the SOEP sample weights. The cognitive ability measures are only available for cohorts from 2006 onwards. A detailed description of all covariates and additional descriptive statistics are provided in Section B of Appendix II.

Table 2.7: Summary of Common Support and Balancing Tests on Variables Included in the Propensity Score

	Vocational track		Academic track	
	Men	Women	Men	Women
(a) Percent within common support region				
Athlete obs.	99.2	97.1	96.8	95.9
Non-athlete obs.	99.3	96.2	100.0	100.0
(b) Smith/Todd (2005)-test				
p-Value$\leq$ 0.05	2	1	2	1
p-Value$\leq$ 0.10	3	1	3	3
(c) t-Tests of equality of means				
Unmatched	9	7	7	12
ATT-weights	0	0	0	0
ATU-weights	0	0	0	0
(d) Total number of covariates				
	49	40	52	47

Source: SOEP V28 and authors' calculations. Panel (a) shows the percentage of observations that are within the common support region. It is defined as the interval between the minimum propensity score of athletes and the maximum propensity score of non-athletes. Panel (b) shows the number of covariates for which the null of no influence of the athletic status on a given covariate conditional on a polynomial of the propensity score is rejected. The rows in panel (c) show the number of covariates with p-values $\leq$ 0.05 in a t-test of equality of means in the athlete and non-athlete samples before and after matching. Panel (d) shows the total number of covariates considered in the propensity score model. See Section 2.2 for further details on the balancing tests and Section C of Appendix II for the additional results.

Table 2.8: Summary of Balancing Tests on Excluded Variables

	Men			Women		
	Before	ATT-weights	ATU-weights	Before	ATT-weights	ATU-weights
(a) Vocational track						
Height	0.042	0.358	0.376	0.001	0.328	0.143
Intelligence	0.000	0.178	0.010	0.570	0.914	0.978
(b) Academic track						
Height	0.862	0.712	0.658	0.403	0.932	0.790
Intelligence	0.061	0.515	0.255	0.413	0.093	0.496

Source: SOEP V28 and authors' calculations. Note: The table shows the p-values from Hotelling tests of equality of means between the treated and comparison samples. The test for height includes two variables (height and missing dummy), that for intelligence four variables (verbal, figural, and numerical ability and missing dummy). Calculations are based on the complete samples. Missing values in a covariate are imputed with the sample mean and a missing dummy is set to one. See Section 2.2 for further details on the balancing tests and Section C of Appendix II for additional results. All calculations use SOEP sample weights.

Table 2.9: Big Five Personality – Vocational Track

	Obs.	Mean	Raw Diff.	ATT	ATU	ATE
(a) Conscientiousness						
Men	960	−0.035	0.229**	0.299***	0.255***	0.281***
		(0.994)	(0.092)	(0.081)	(0.081)	(0.078)
Women	812	0.178	0.120	0.107	0.116	0.112
		(0.949)	(0.096)	(0.084)	(0.088)	(0.081)
Pooled	1,772	0.061	0.129**	0.281***	0.217***	0.250***
		(0.980)	(0.065)	(0.058)	(0.059)	(0.055)
(b) Extraversion						
Men	960	−0.094	0.110	0.097	0.115	0.104
		(1.020)	(0.116)	(0.083)	(0.081)	(0.079)
Women	812	0.084	0.161	0.165*	0.141	0.151
		(0.990)	(0.102)	(0.099)	(0.110)	(0.100)
Pooled	1,772	−0.014	0.091	0.162**	0.221***	0.191***
		(1.010)	(0.075)	(0.065)	(0.070)	(0.063)
(c) Openness						
Men	960	−0.148	0.076	0.140	0.119	0.131
		(1.025)	(0.108)	(0.089)	(0.091)	(0.087)
Women	812	0.084	0.142	0.162*	0.129	0.143
		(0.992)	(0.101)	(0.095)	(0.100)	(0.093)
Pooled	1,772	−0.044	0.055	0.173**	0.185***	0.179***
		(1.017)	(0.072)	(0.068)	(0.070)	(0.065)
(d) Agreeableness						
Men	960	−0.162	0.087	0.214**	0.108	0.171*
		(1.006)	(0.092)	(0.093)	(0.089)	(0.088)
Women	812	0.208	−0.022	−0.024	−0.154	−0.099
		(1.010)	(0.117)	(0.100)	(0.100)	(0.095)
Pooled	1,772	0.004	−0.039	0.159**	−0.010	0.077
		(1.024)	(0.072)	(0.068)	(0.065)	(0.063)
(e) Neuroticism						
Men	960	−0.228	−0.091	−0.019	0.018	−0.004
		(0.928)	(0.095)	(0.082)	(0.083)	(0.079)
Women	812	0.255	−0.024	0.007	−0.014	−0.005
		(1.030)	(0.103)	(0.098)	(0.104)	(0.096)
Pooled	1,772	−0.010	−0.156**	−0.042	−0.061	−0.051
		(1.004)	(0.071)	(0.065)	(0.070)	(0.063)

Source: SOEP V28 and authors' calculations. Note: All outcome variables are standardized. Calculations use SOEP sample weights. Standard deviations (mean) and standard errors are in parentheses. Standard errors of the treatment effects are bootstrapped with 250 replications and clustered at the family level. *, ** and *** denote significance at the 10%-, 5%- and 1%-level, respectively.

Table 2.10: Big Five Personality – Academic Track

	Obs.	Mean	Raw Diff.	ATT	ATU	ATE
(a) Conscientiousness						
Men	533	−0.304	−0.001	−0.154	−0.135	−0.149
		(0.968)	(0.152)	(0.127)	(0.134)	(0.120)
Women	586	0.061	0.063	0.066	0.094	0.075
		(1.051)	(0.134)	(0.144)	(0.139)	(0.137)
Pooled	1,119	−0.121	−0.010	0.029	0.030	0.029
		(1.027)	(0.101)	(0.099)	(0.091)	(0.092)
(b) Extraversion						
Men	533	−0.026	0.293*	0.112	0.152	0.122
		(0.973)	(0.154)	(0.164)	(0.150)	(0.153)
Women	586	0.074	0.155	0.140	0.092	0.125
		(0.990)	(0.126)	(0.132)	(0.135)	(0.127)
Pooled	1,119	0.024	0.200**	0.176*	0.144	0.167*
		(0.982)	(0.097)	(0.094)	(0.095)	(0.088)
(c) Openness						
Men	533	−0.016	0.177	0.087	0.004	0.067
		(0.939)	(0.135)	(0.146)	(0.144)	(0.136)
Women	586	0.185	0.121	0.103	0.057	0.089
		(0.954)	(0.113)	(0.120)	(0.113)	(0.111)
Pooled	1,119	0.085	0.119	0.114	0.105	0.112
		(0.951)	(0.086)	(0.089)	(0.085)	(0.082)
(d) Agreeableness						
Men	533	−0.126	0.077	−0.045	−0.158	−0.072
		(0.928)	(0.130)	(0.157)	(0.154)	(0.148)
Women	586	0.107	0.080	0.096	0.061	0.085
		(0.964)	(0.116)	(0.114)	(0.119)	(0.110)
Pooled	1,119	−0.009	0.049	0.069	−0.009	0.047
		(0.953)	(0.085)	(0.096)	(0.092)	(0.089)
(e) Neuroticism						
Men	533	−0.197	−0.233	−0.133	−0.064	−0.117
		(0.983)	(0.144)	(0.166)	(0.150)	(0.153)
Women	586	0.206	0.122	0.092	0.120	0.101
		(0.969)	(0.120)	(0.134)	(0.136)	(0.129)
Pooled	1,119	0.006	−0.082	−0.026	0.024	−0.012
		(0.996)	(0.093)	(0.099)	(0.094)	(0.092)

Source: SOEP V28 and authors' calculations. Note: All outcome variables are standardized. Calculations use SOEP sample weights. Standard deviations (mean) and standard errors are in parentheses. Standard errors of the treatment effects are bootstrapped with 250 replications and clustered at the family level. *, ** and *** denote significance at the 10%-, 5%- and 1%-level, respectively.

Table 2.11: Locus of Control – Vocational Track

	Obs.	Mean	Raw Diff.	ATT	ATU	ATE
(a) External locus of control						
Men	952	0.124	−0.281**	−0.092	−0.227**	−0.146*
		(1.081)	(0.123)	(0.088)	(0.091)	(0.085)
Women	800	0.130	−0.231**	−0.235**	−0.149	−0.186*
		(0.983)	(0.100)	(0.101)	(0.106)	(0.096)
Pooled	1,752	0.126	−0.249***	−0.126*	−0.197***	−0.160**
		(1.038)	(0.080)	(0.067)	(0.072)	(0.064)
(b) Internal locus of control						
Men	952	0.065	0.154	0.175*	0.154	0.167*
		(1.084)	(0.117)	(0.100)	(0.103)	(0.097)
Women	800	0.059	0.161*	0.222**	0.100	0.153*
		(0.977)	(0.093)	(0.091)	(0.100)	(0.090)
Pooled	1,752	0.062	0.151**	0.191***	0.088	0.142**
		(1.038)	(0.077)	(0.070)	(0.071)	(0.065)

Source: SOEP V28 and authors' calculations. Note: All outcome variables are standardized. Calculations use SOEP sample weights. Standard deviations (mean) and standard errors are in parentheses. Standard errors of the treatment effects are bootstrapped with 250 replications and clustered at the family level. *, ** and *** denote significance at the 10%-, 5%- and 1%-level, respectively.

Table 2.12: Locus of Control – Academic Track

	Obs.	Mean	Raw Diff.	ATT	ATU	ATE
(a) External locus of control						
Men	529	−0.364	−0.315**	−0.108	−0.115	−0.109
		(0.894)	(0.135)	(0.165)	(0.156)	(0.156)
Women	585	−0.183	−0.170*	−0.108	−0.097	−0.105
		(0.832)	(0.101)	(0.097)	(0.098)	(0.092)
Pooled	1,114	−0.273	−0.255***	−0.083	−0.059	−0.076
		(0.868)	(0.082)	(0.080)	(0.073)	(0.072)
(b) Internal locus of control						
Men	529	−0.134	0.157	0.165	0.225	0.179
		(0.911)	(0.119)	(0.147)	(0.147)	(0.138)
Women	585	−0.140	−0.153	−0.057	−0.026	−0.047
		(0.924)	(0.121)	(0.112)	(0.114)	(0.106)
Pooled	1,114	−0.137	−0.019	0.010	0.103	0.036
		(0.917)	(0.086)	(0.092)	(0.088)	(0.086)

Source: SOEP V28 and authors' calculations. Note: All outcome variables are standardized. Calculations use SOEP sample weights. Standard deviations (mean) and standard errors are in parentheses. Standard errors of the treatment effects are bootstrapped with 250 replications and clustered at the family level. *, ** and *** denote significance at the 10%-, 5%- and 1%-level, respectively.

Table 2.13: Social Skills and Risk Preferences – Vocational Track

	Obs.	Mean	Raw Diff.	ATT	ATU	ATE
(a) Negative reciprocity						
Men	730	0.260	−0.145	−0.072	−0.163	−0.110
		(0.981)	(0.106)	(0.100)	(0.104)	(0.097)
Women	609	−0.133	−0.233	−0.257**	−0.228	−0.240*
		(1.065)	(0.164)	(0.121)	(0.141)	(0.125)
Pooled	1,339	0.078	−0.101	−0.136*	−0.150*	−0.143*
		(1.040)	(0.101)	(0.080)	(0.084)	(0.076)
(b) Positive reciprocity						
Men	730	−0.081	0.003	0.063	0.037	0.052
		(1.038)	(0.112)	(0.099)	(0.106)	(0.096)
Women	609	0.144	−0.003	−0.064	−0.023	−0.040
		(0.942)	(0.133)	(0.109)	(0.113)	(0.104)
Pooled	1,339	0.023	−0.044	0.056	0.009	0.033
		(1.000)	(0.090)	(0.072)	(0.081)	(0.070)
(c) Willingness to take risks						
Men	1,000	0.142	0.157*	0.233***	0.209**	0.224***
		(1.011)	(0.094)	(0.080)	(0.091)	(0.080)
Women	863	−0.162	0.191*	0.192**	0.155	0.171*
		(1.027)	(0.102)	(0.093)	(0.101)	(0.093)
Pooled	1,863	0.003	0.230***	0.211***	0.205***	0.208***
		(1.029)	(0.068)	(0.063)	(0.072)	(0.063)

Source: SOEP V28 and authors' calculations. Note: All outcome variables are standardized. Calculations use SOEP sample weights. Standard deviations (mean) and standard errors are in parentheses. Standard errors of the treatment effects are bootstrapped with 250 replications and clustered at the family level. *, ** and *** denote significance at the 10%-, 5%- and 1%-level, respectively.

Table 2.14: Social Skills and Risk Preferences – Academic Track

	Obs.	Mean	Raw Diff.	ATT	ATU	ATE
(a) Negative reciprocity						
Men	394	0.023	−0.248*	0.028	0.017	0.025
		(0.869)	(0.142)	(0.172)	(0.161)	(0.163)
Women	448	−0.280	0.043	0.090	0.120	0.099
		(0.905)	(0.135)	(0.162)	(0.169)	(0.157)
Pooled	842	−0.137	−0.018	0.085	0.023	0.067
		(0.901)	(0.096)	(0.102)	(0.104)	(0.096)
(b) Positive reciprocity						
Men	394	−0.055	0.002	−0.171	0.051	−0.121
		(1.023)	(0.145)	(0.179)	(0.171)	(0.168)
Women	448	−0.046	0.300*	0.269	0.198	0.246
		(1.017)	(0.160)	(0.172)	(0.165)	(0.160)
Pooled	842	−0.050	0.179	0.106	0.173	0.125
		(1.019)	(0.111)	(0.117)	(0.108)	(0.108)
		(0.897)	(0.101)	(0.103)	(0.108)	(0.098)
(c) Willingness to take risks						
Men	551	0.065	0.025	−0.035	0.070	−0.011
		(1.009)	(0.150)	(0.162)	(0.162)	(0.154)
Women	597	−0.060	0.038	0.034	−0.002	0.022
		(0.825)	(0.093)	(0.106)	(0.100)	(0.098)
Pooled	1,148	0.003	0.049	0.028	0.051	0.035
		(0.924)	(0.084)	(0.096)	(0.088)	(0.087)

Source: SOEP V28 and authors' calculations. Note: All outcome variables are standardized. Calculations use SOEP sample weights. Standard deviations (mean) and standard errors are in parentheses. Standard errors of the treatment effects are bootstrapped with 250 replications and clustered at the family level. *, ** and *** denote significance at the 10%-, 5%- and 1%-level, respectively.

Table 2.15: Job Values – Vocational Track

	Obs.	Mean	Raw Diff.	ATT	ATU	ATE
(a) Interaction, recognition						
Men	1,075	−0.189	0.337***	0.367***	0.327***	0.351***
		(1.032)	(0.084)	(0.081)	(0.082)	(0.077)
Women	932	0.340	0.019	0.107	0.118	0.113
		(0.959)	(0.089)	(0.077)	(0.084)	(0.076)
Pooled	2,007	0.049	0.066	0.255***	0.199***	0.228***
		(1.034)	(0.061)	(0.062)	(0.062)	(0.057)
(b) Pay, promotion						
Men	1,075	0.102	0.281***	0.230***	0.257***	0.241***
		(0.994)	(0.083)	(0.079)	(0.080)	(0.075)
Women	932	0.044	0.111	0.163*	0.156*	0.159**
		(1.015)	(0.086)	(0.084)	(0.082)	(0.078)
Pooled	2,007	0.075	0.207***	0.197***	0.207***	0.202***
		(1.004)	(0.059)	(0.063)	(0.063)	(0.059)
(c) Personal development						
Men	1,075	−0.113	0.216**	0.224**	0.211**	0.219**
		(1.081)	(0.098)	(0.100)	(0.096)	(0.093)
Women	932	0.135	0.146*	0.113	0.159**	0.140*
		(0.965)	(0.082)	(0.072)	(0.078)	(0.072)
Pooled	2,007	−0.001	0.120*	0.190***	0.192***	0.191***
		(1.038)	(0.064)	(0.071)	(0.066)	(0.064)
(d) Security, safety						
Men	1,075	−0.071	0.267***	0.212***	0.262***	0.232***
		(1.048)	(0.087)	(0.076)	(0.085)	(0.074)
Women	932	0.136	−0.002	0.069	0.130*	0.105
		(0.934)	(0.082)	(0.075)	(0.078)	(0.072)
Pooled	2,007	0.022	0.092	0.159***	0.193***	0.176***
		(1.003)	(0.059)	(0.060)	(0.058)	(0.054)
(e) Work-life balance						
Men	1,075	−0.023	0.027	0.031	0.021	0.027
		(1.039)	(0.084)	(0.091)	(0.091)	(0.085)
Women	932	−0.008	0.127	0.146	0.197**	0.176**
		(0.997)	(0.087)	(0.090)	(0.092)	(0.086)
Pooled	2,007	−0.017	0.066	0.056	0.116*	0.085
		(1.020)	(0.059)	(0.065)	(0.063)	(0.058)

Source: SOEP V28 and authors' calculations. Note: All outcome variables are standardized. Calculations use SOEP sample weights. Standard deviations (mean) and standard errors are in parentheses. Standard errors of the treatment effects are bootstrapped with 250 replications and clustered at the family level. *, ** and *** denote significance at the 10%-, 5%- and 1%-level, respectively.

Table 2.16: Job Values – Academic Track

	Obs.	Mean	Raw Diff.	ATT	ATU	ATE
(a) Interaction, recognition						
Men	577	−0.248	0.153	0.043	0.053	0.045
		(0.946)	(0.115)	(0.137)	(0.149)	(0.133)
Women	646	0.034	0.229**	0.109	0.176*	0.131
		(0.927)	(0.109)	(0.110)	(0.100)	(0.103)
Pooled	1,223	−0.105	0.152*	0.128	0.161**	0.137*
		(0.947)	(0.080)	(0.083)	(0.080)	(0.076)
(b) Pay, promotion						
Men	577	−0.113	0.152	0.075	0.172	0.098
		(0.983)	(0.127)	(0.143)	(0.145)	(0.136)
Women	646	−0.196	0.063	0.096	0.058	0.083
		(0.987)	(0.126)	(0.115)	(0.108)	(0.108)
Pooled	1,223	−0.155	0.111	0.138	0.107	0.130
		(0.986)	(0.091)	(0.090)	(0.085)	(0.083)
(c) Personal development						
Men	577	−0.125	−0.010	−0.032	0.009	−0.022
		(0.964)	(0.121)	(0.124)	(0.144)	(0.121)
Women	646	0.140	0.051	−0.001	−0.003	−0.002
		(0.888)	(0.106)	(0.111)	(0.115)	(0.107)
Pooled	1,223	0.010	−0.015	−0.020	0.004	−0.013
		(0.935)	(0.081)	(0.077)	(0.079)	(0.072)
(d) Security, safety						
Men	577	−0.155	0.173	0.034	0.116	0.053
		(1.027)	(0.143)	(0.128)	(0.140)	(0.122)
Women	646	0.039	0.062	0.059	0.087	0.068
		(0.976)	(0.109)	(0.119)	(0.109)	(0.109)
Pooled	1,223	−0.057	0.077	0.063	0.137*	0.084
		(1.006)	(0.087)	(0.085)	(0.083)	(0.078)
(e) Work-Life balance						
Men	577	0.034	0.063	0.072	0.119	0.083
		(0.949)	(0.119)	(0.153)	(0.162)	(0.148)
Women	646	0.038	0.064	0.065	0.127	0.085
		(0.950)	(0.103)	(0.113)	(0.109)	(0.105)
Pooled	1,223	0.036	0.062	0.107	0.106	0.107
		(0.950)	(0.078)	(0.094)	(0.089)	(0.086)

Source: SOEP V28 and authors' calculations. Note: All outcome variables are standardized. Calculations use SOEP sample weights. Standard deviations (mean) and standard errors are in parentheses. Standard errors of the treatment effects are bootstrapped with 250 replications and clustered at the family level. *, ** and *** denote significance at the 10%-, 5%- and 1%-level, respectively.

Table 2.17: Attitudes about Social Success – Vocational Track

	Obs.	Mean	Raw Diff.	ATT	ATU	ATE
(a) Extrinsic factors ("family background")						
Men	1,042	0.050	−0.132	−0.089	−0.167*	−0.121
		(1.003)	(0.087)	(0.092)	(0.097)	(0.091)
Women	912	−0.161	−0.337***	−0.349***	−0.317***	−0.330***
		(1.035)	(0.090)	(0.089)	(0.099)	(0.090)
Pooled	1,954	−0.047	−0.169***	−0.158**	−0.252***	−0.204***
		(1.023)	(0.064)	(0.064)	(0.063)	(0.060)
(b) Positive intrinsic factors ("achievement")						
Men	1,042	−0.030	0.075	0.172**	0.111	0.147**
		(1.014)	(0.084)	(0.075)	(0.076)	(0.072)
Women	912	−0.060	0.260***	0.097	0.167*	0.138
		(1.049)	(0.097)	(0.088)	(0.098)	(0.089)
Pooled	1,954	−0.044	0.159**	0.151**	0.134**	0.143**
		(1.030)	(0.069)	(0.059)	(0.063)	(0.056)
(c) Negative intrinsic factors ("toughness")						
Men	1,042	0.057	−0.161**	−0.066	−0.151*	−0.100
		(0.986)	(0.082)	(0.084)	(0.089)	(0.083)
Women	912	−0.254	−0.362***	−0.329***	−0.233**	−0.273***
		(0.941)	(0.078)	(0.085)	(0.094)	(0.086)
Pooled	1,954	−0.086	−0.172***	−0.160***	−0.209***	−0.184***
		(0.978)	(0.059)	(0.058)	(0.062)	(0.056)

Source: SOEP V28 and authors' calculations. Note: All outcome variables are standardized. Calculations use SOEP sample weights. Standard deviations (mean) and standard errors are in parentheses. Standard errors of the treatment effects are bootstrapped with 250 replications and clustered at the family level. *, ** and *** denote significance at the 10%-, 5%- and 1%-level, respectively.

Table 2.18: Attitudes about Social Success – Academic Track

	Obs.	Mean	Raw Diff.	ATT	ATU	ATE
(a) Extrinsic factors ("family background")						
Men	570	0.143	0.135	0.283**	0.312**	0.290**
		(0.978)	(0.128)	(0.138)	(0.123)	(0.127)
Women	644	0.026	−0.154	−0.031	−0.040	−0.034
		(0.916)	(0.110)	(0.098)	(0.112)	(0.095)
Pooled	1,214	0.083	−0.016	0.122	0.130	0.124*
		(0.948)	(0.085)	(0.080)	(0.079)	(0.073)
(b) Positive intrinsic factors ("achievement")						
Men	570	−0.033	−0.050	0.054	−0.007	0.039
		(0.962)	(0.129)	(0.136)	(0.136)	(0.128)
Women	644	0.181	−0.070	−0.086	−0.104	−0.092
		(0.919)	(0.115)	(0.109)	(0.108)	(0.101)
Pooled	1,214	0.077	−0.089	−0.008	−0.024	−0.013
		(0.946)	(0.087)	(0.088)	(0.082)	(0.079)
(c) Negative intrinsic factors ("toughness")						
Men	570	0.314	0.259*	0.346**	0.367***	0.351***
		(1.049)	(0.145)	(0.143)	(0.126)	(0.131)
Women	644	0.034	−0.127	−0.022	−0.054	−0.032
		(0.961)	(0.123)	(0.106)	(0.112)	(0.100)
Pooled	1,214	0.170	0.072	0.169**	0.148*	0.163**
		(1.015)	(0.095)	(0.081)	(0.080)	(0.073)

Source: SOEP V28 and authors' calculations. Note: All outcome variables are standardized. Calculations use SOEP sample weights. Standard deviations (mean) and standard errors are in parentheses. Standard errors of the treatment effects are bootstrapped with 250 replications and clustered at the family level. *, ** and *** denote significance at the 10%-, 5%- and 1%-level, respectively.

Table 2.19: Beliefs about the Future – Vocational Track

	Obs.	Mean	Raw Diff.	ATT	ATU	ATE
(a) Successful career						
Men	1,028	0.004	0.316***	0.296***	0.276***	0.288***
		(1.060)	(0.094)	(0.091)	(0.089)	(0.088)
Women	896	−0.043	0.164*	0.114	0.154*	0.137
		(1.034)	(0.088)	(0.088)	(0.093)	(0.086)
Pooled	1,924	−0.017	0.247***	0.241***	0.224***	0.233***
		(1.049)	(0.065)	(0.065)	(0.064)	(0.061)
(b) Fulfilling career						
Men	1,028	−0.130	0.139	0.098	0.051	0.079
		(0.999)	(0.086)	(0.087)	(0.083)	(0.082)
Women	896	−0.174	0.302***	0.087	0.101	0.095
		(1.047)	(0.097)	(0.093)	(0.091)	(0.088)
Pooled	1,924	−0.150	0.213***	0.099	0.119*	0.109*
		(1.021)	(0.064)	(0.063)	(0.062)	(0.059)
(c) Fulfilling family life						
Men	1,028	−0.190	0.221**	0.196**	0.183**	0.191**
		(1.008)	(0.088)	(0.089)	(0.086)	(0.085)
Women	896	0.072	0.186*	0.141	0.228**	0.192**
		(1.050)	(0.102)	(0.091)	(0.100)	(0.093)
Pooled	1,924	−0.072	0.142**	0.189***	0.228***	0.208***
		(1.035)	(0.067)	(0.068)	(0.066)	(0.062)

Source: SOEP V28 and authors' calculations. Note: All outcome variables are standardized. Calculations use SOEP sample weights. Standard deviations (mean) and standard errors are in parentheses. Standard errors of the treatment effects are bootstrapped with 250 replications and clustered at the family level. *, ** and *** denote significance at the 10%-, 5%- and 1%-level, respectively.

Table 2.20: Beliefs about the Future – Academic Track

	Obs.	Mean	Raw Diff.	ATT	ATU	ATE
(a) Successful career						
Men	546	0.160	0.164	0.266**	0.073	0.220*
		(0.878)	(0.150)	(0.131)	(0.137)	(0.126)
Women	630	−0.018	0.237**	0.100	0.091	0.097
		(0.841)	(0.094)	(0.100)	(0.110)	(0.098)
Pooled	1,176	0.068	0.228***	0.195**	0.117	0.173**
		(0.864)	(0.082)	(0.085)	(0.076)	(0.076)
(b) Fulfilling career						
Men	546	0.257	0.145	0.243**	0.281**	0.252**
		(0.885)	(0.111)	(0.122)	(0.130)	(0.118)
Women	630	0.331	0.325***	0.026	0.070	0.040
		(0.896)	(0.106)	(0.115)	(0.115)	(0.108)
Pooled	1,176	0.295	0.236***	0.118	0.181**	0.136*
		(0.891)	(0.077)	(0.079)	(0.080)	(0.073)
(c) Fulfilling family life						
Men	546	0.122	0.181	0.179	0.062	0.151
		(0.938)	(0.124)	(0.128)	(0.141)	(0.123)
Women	630	0.176	0.175*	0.083	−0.007	0.054
		(0.892)	(0.104)	(0.120)	(0.120)	(0.114)
Pooled	1,176	0.150	0.167**	0.188**	0.039	0.145*
		(0.914)	(0.079)	(0.092)	(0.089)	(0.086)

Source: SOEP V28 and authors' calculations. Note: All outcome variables are standardized. Calculations use SOEP sample weights. Standard deviations (mean) and standard errors are in parentheses. Standard errors of the treatment effects are bootstrapped with 250 replications and clustered at the family level. *, ** and *** denote significance at the 10%-, 5%- and 1%-level, respectively.

Table 2.21: Educational Attainment – Vocational Track

	Obs.	Mean	Raw Diff.	ATT	ATU	ATE
(a) No school degree						
Men	594	0.071	−0.292**	−0.128	−0.293*	−0.196
		(1.288)	(0.139)	(0.136)	(0.153)	(0.138)
Women	506	−0.047	−0.093	0.000	−0.012	−0.007
		(0.745)	(0.078)	(0.026)	(0.071)	(0.048)
Pooled	1,100	0.018	−0.162**	−0.077	−0.133*	−0.105
		(1.081)	(0.077)	(0.081)	(0.073)	(0.072)
(b) School degree from vocational track						
Men	594	0.411	−0.025	0.094	0.067	0.083
		(0.768)	(0.079)	(0.093)	(0.085)	(0.087)
Women	506	0.436	−0.368***	−0.289***	−0.259***	−0.271***
		(0.745)	(0.089)	(0.097)	(0.097)	(0.089)
Pooled	1,100	0.422	−0.173***	−0.017	−0.121**	−0.069
		(0.758)	(0.056)	(0.068)	(0.061)	(0.059)
(c) School degree from academic track						
Men	594	−0.429	0.089	−0.066	−0.003	−0.040
		(0.737)	(0.075)	(0.085)	(0.076)	(0.078)
Women	506	−0.429	0.391***	0.291***	0.264***	0.275***
		(0.737)	(0.088)	(0.098)	(0.096)	(0.089)
Pooled	1,100	−0.429	0.209***	0.034	0.151***	0.092*
		(0.736)	(0.054)	(0.063)	(0.058)	(0.056)
(d) Ever attended university						
Men	813	−0.261	0.081	0.048	0.020	0.037
		(0.760)	(0.068)	(0.077)	(0.067)	(0.070)
Women	705	−0.322	0.105	0.112	0.090	0.099
		(0.678)	(0.063)	(0.074)	(0.077)	(0.071)
Pooled	1,518	−0.289	0.101**	0.040	0.062*	0.051
		(0.725)	(0.047)	(0.054)	(0.049)	(0.047)

Source: SOEP V28 and authors' calculations. Note: All outcome variables are standardized. Calculations use SOEP sample weights. Standard deviations (mean) and standard errors are in parentheses. Standard errors of the treatment effects are bootstrapped with 250 replications and clustered at the family level. *, ** and *** denote significance at the 10%-, 5%- and 1%-level, respectively.

Table 2.22: Educational Attainment – Academic Track

	Obs.	Mean	Raw Diff.	ATT	ATU	ATE
(a) School degree from vocational track						
Men	235	−1.059	0.211*	−0.004	−0.192	−0.044
		(0.708)	(0.114)	(0.227)	(0.244)	(0.209)
Women	306	−1.144	−0.069	−0.109	−0.029	−0.079
		(0.604)	(0.105)	(0.109)	(0.128)	(0.110)
Pooled	541	−1.106	0.044	−0.002	−0.023	−0.008
		(0.653)	(0.085)	(0.080)	(0.077)	(0.074)
(b) School degree from academic track						
Men	235	1.090	−0.213*	0.004	0.194	0.045
		(0.713)	(0.115)	(0.229)	(0.246)	(0.210)
Women	306	1.175	0.069	0.110	0.029	0.080
		(0.608)	(0.105)	(0.110)	(0.129)	(0.111)
Pooled	541	1.137	−0.044	0.002	0.023	0.008
		(0.658)	(0.086)	(0.081)	(0.078)	(0.074)
(c) Ever attended university						
Men	395	0.673	−0.047	−0.105	0.090	−0.061
		(1.210)	(0.187)	(0.221)	(0.221)	(0.211)
Women	492	0.543	0.203	0.104	0.186	0.133
		(1.202)	(0.153)	(0.144)	(0.157)	(0.137)
Pooled	887	0.601	0.129	0.052	0.139	0.078
		(1.207)	(0.118)	(0.103)	(0.109)	(0.097)

Source: SOEP V28 and authors' calculations. Note: All outcome variables are standardized. Calculations use SOEP sample weights. Standard deviations (mean) and standard errors are in parentheses. Standard errors of the treatment effects are bootstrapped with 250 replications and clustered at the family level. *, ** and *** denote significance at the 10%-, 5%- and 1%-level, respectively.

Table 2.23: Enrolment in Vocational Training – Vocational Track

	Obs.	Mean	Raw Diff.	ATT	ATU	ATE
(a) At least one year of vocational training						
Men	813	0.323	0.151*	0.226***	0.193**	0.212***
		(0.863)	(0.088)	(0.080)	(0.079)	(0.077)
Women	705	0.370	−0.195**	−0.042	−0.183**	−0.127*
		(0.831)	(0.087)	(0.083)	(0.081)	(0.076)
Pooled	1,518	0.344	−0.014	0.126**	−0.043	0.042
		(0.849)	(0.060)	(0.059)	(0.055)	(0.052)
(b) At least two consecutive years of vocational training						
Men	813	0.294	0.143	0.237***	0.234***	0.236***
		(0.977)	(0.093)	(0.091)	(0.089)	(0.087)
Women	705	0.282	−0.251**	−0.104	−0.306***	−0.225**
		(0.980)	(0.100)	(0.103)	(0.115)	(0.104)
Pooled	1,518	0.289	−0.028	0.092	−0.097	−0.001
		(0.978)	(0.067)	(0.069)	(0.077)	(0.068)
(c) Vocational training successfully completed						
Men	813	0.177	0.158*	0.266***	0.243***	0.257***
		(1.073)	(0.093)	(0.090)	(0.092)	(0.088)
Women	705	0.177	−0.010	−0.002	−0.085	−0.051
		(1.073)	(0.107)	(0.111)	(0.113)	(0.107)
Pooled	1,518	0.177	0.078	0.167**	0.036	0.102
		(1.073)	(0.070)	(0.070)	(0.078)	(0.069)

Source: SOEP V28 and authors' calculations. Note: All outcome variables are standardized. Calculations use SOEP sample weights. Standard deviations (mean) and standard errors are in parentheses. Standard errors of the treatment effects are bootstrapped with 250 replications and clustered at the family level. *, ** and *** denote significance at the 10%-, 5%- and 1%-level, respectively.

Table 2.24: Enrolment in Vocational Training – Academic Track

	Obs.	Mean	Raw Diff.	ATT	ATU	ATE
(a) At least one year of vocational training						
Men	395	−0.692	0.017	0.080	0.084	0.081
		(0.920)	(0.147)	(0.167)	(0.171)	(0.164)
Women	492	−0.663	−0.209*	−0.155	−0.192	−0.168
		(0.934)	(0.125)	(0.112)	(0.126)	(0.110)
Pooled	887	−0.676	−0.127	−0.048	−0.043	−0.047
		(0.927)	(0.097)	(0.081)	(0.089)	(0.076)
(b) At least two subsequent years of vocational training						
Men	395	−0.619	0.061	0.087	0.064	0.082
		(0.731)	(0.098)	(0.154)	(0.156)	(0.147)
Women	492	−0.519	−0.259**	−0.232**	−0.211*	−0.224**
		(0.813)	(0.114)	(0.103)	(0.122)	(0.104)
Pooled	887	−0.564	−0.153*	−0.089	−0.092	−0.090
		(0.778)	(0.083)	(0.073)	(0.081)	(0.069)
(c) Vocational training successfully completed						
Men	395	−0.402	0.048	−0.055	−0.056	−0.055
		(0.652)	(0.082)	(0.134)	(0.127)	(0.125)
Women	492	−0.310	−0.100	−0.065	0.007	−0.039
		(0.766)	(0.095)	(0.129)	(0.152)	(0.131)
Pooled	887	−0.351	−0.059	−0.062	0.016	−0.039
		(0.718)	(0.066)	(0.082)	(0.095)	(0.080)

Source: SOEP V28 and authors' calculations. Note: All outcome variables are standardized. Calculations use SOEP sample weights. Standard deviations (mean) and standard errors are in parentheses. Standard errors of the treatment effects are bootstrapped with 250 replications and clustered at the family level. *, ** and *** denote significance at the 10%-, 5%- and 1%-level, respectively.

2.8 Appendix II

A Proofs for Section 2.2.1

The teenager's utility function is given by:

$$U = \omega H(e, s, x) + \theta(1 - e - s) + I(s, x) - \gamma e - \kappa s\,, \tag{1}$$

with arguments as defined in Section 2.1 in the main text. Maximization of (1) with respect to e and s yields the following first order conditions:

$$\frac{\partial U(e,s)}{\partial e} = \omega H_e(e, s, x) - \theta - \gamma = 0 \equiv F(e, s; \omega, x, \theta, \gamma) \tag{2}$$

and

$$\frac{\partial U(e,s)}{\partial s} = \omega H_s(e, s, x) - \theta + I_s(s, x) - \kappa = 0 \equiv G(e, s; \omega, x, \theta, \kappa)\,. \tag{3}$$

Conditions (2) and (3) form a system of equations that implicitly determines the optimal shares of time spent studying e^* and engaged in structured activities s^*. We can apply Cramer's rule to differentiate the system with respect to the parameters ω, x, θ, γ, κ. Denoting by $\text{sgn}(r)$, $r \in \mathbb{R}$, the sign function we obtain the following comparative static results:

Proof of Lemma 1

$$\text{sgn}\left(\frac{\partial e^*}{\partial x}\right) = -\text{sgn}\left(F_x G_s - F_s G_x\right) = 1 \tag{4}$$

if $H_{ex} > 0$, $H_{es} \geq 0$, and $\omega H_{sx} + I_{sx} \geq 0$,

$$\text{sgn}\left(\frac{\partial s^*}{\partial x}\right) = -\text{sgn}\left(F_e G_x - F_x G_e\right) = 1 \tag{5}$$

if $\omega H_{sx} + I_{sx} > 0$ and $H_{ex} \geq 0$ or if $\omega H_{sx} + I_{sx} = 0$ and $H_{es} > 0$ and $H_{ex} > 0$,

Proof of Lemma 2

$$\text{sgn}\left(\frac{\partial e^*}{\partial \gamma}\right) = -\text{sgn}\left(F_\gamma G_s\right) = -1\,, \tag{6}$$

$$\text{sgn}\left(\frac{\partial s^*}{\partial \gamma}\right) = \text{sgn}\left(F_\gamma G_e\right) = -1 \text{ if } H_{es} > 0, \text{ else } 0\,, \tag{7}$$

$$\text{sgn}\left(\frac{\partial e^*}{\partial \kappa}\right) = \text{sgn}\left(F_s G_\kappa\right) = -1 \text{ if } H_{es} > 0, \text{ else } 0\,, \tag{8}$$

$$\text{sgn}\left(\frac{\partial s^*}{\partial \kappa}\right) = -\text{sgn}\left(F_e G_\kappa\right) = -1\,. \tag{9}$$

B Information on Covariates Used

B.1 List of Covariates

Table B1: Variable Definitions

Name	Definition
track	= 1 if youth have attended Hauptschule (Hauptschule offers Lower Secondary Education, Level 2 according to ISCED)
p_educ	= 1 if at least one parent has a higher education entrance qualification
p_acadqual	= 1 if at least one parent has an academic degree
p_mincy10	Parents' income averaged over past years
p_sincy10	Standard deviation of parents' income of past years
p_height	Average of father's and mother's body height
p_miss	= 1 if information on at least one parents covariate is missing
f_agey	Father's age when youth is 17 years old
f_ageyed	Interaction between f_agey and p_educ
m_agey	Mother's age when youth is 17 years old
f_height	Father's body height when youth is 17 years old
m_height	Mother's body height when youth is 17 years old
f_lstv10	= 1 if father watched TV on a daily basis in each of the past years
m_lstv10	= 1 if mother watched TV on a daily basis in each of the past years
f_lspc10	= 1 if father used computer/internet on a daily basis in each of the past years
m_lspc10	= 1 if mother used computer/internet on a daily basis in each of the past years
f_lscomit10	= 1 if father worked voluntarily on a weekly basis in at least one of the past years
m_lscomit10	= 1 if mother worked voluntarily on a weekly basis in at least one of the past years
f_lsculture10	= 1 if father engaged in musical/artistic activities on a weekly basis in at least one of the past years
f_lssport10	= 1 if father engaged in physical activities on a weekly basis in at least one of the past years
f_lssport10_often	= 1 if father engaged in physical activities on a weekly basis in at least 50% of the past years
m_lssport10	= 1 if mother engaged in physical activities on a weekly basis in at least one of the past years
m_lssport10_often	= 1 if mother engaged in physical activities on a weekly basis in at least 50% of the past years

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Table B1: Variable Definitions <continued>

Name	Definition
f_loc1	Father's external locus of control
f_loc2	Father's internal locus of control
f_ffm2	Father's extraversion
f_ffm3	Father's openness
f_ffm4	Father's agreeableness
f_ffm5	Father's neuroticism
m_ffm1	Mother's conscientiousness
m_ffm2	Mother's extraversion
m_ffm3	Mother's openness
m_ffm4	Mother's agreeableness
m_ffm5	Mother's neuroticism
f_rec2	Father's positive reciprocity
m_rec1	Mother's negative reciprocity
m_rec2	Mother's positive reciprocity
f_trust1	Father's general trust
f_trust2	Father's past trusting behavior
f_trust12	Interaction between f_trust1 and f_trust2
f_trust22	Squared value of f_trust2
m_trust1	Mother's general trust
f_nob	Father's number of past observations
m_nob	Mother's number of past observations
f_miss	= 1 if information on at least one father covariate is missing
m_miss	= 1 if information on at least one mother covariate is missing
chldhdgu	= 1 if youth grew up with both parents
f_imp	= 1 if father is (very) important
m_imp	= 1 if mother is (very) important
f_arg	= 1 if arguing with father (very) often
m_arg	= 1 if arguing with mother (very) often
f_sps	Father's supportive parenting scale that measures the quality of the child-father relationship
m_sps	Mother's supportive parenting scale that measures the quality of the child-mother relationship
fy_miss	= 1 if information on at least one father-youth covariate (f_imp, f_arg, f_sps) is missing
my_miss	= 1 if information on at least one mother-youth covariate (m_imp, m_arg, m_sps) is missing
east	= 1 if living in East Germany
chldhdp1	= 1 if youth grew up in a big city
chldhdpa	= 1 if youth grew up in a city and not in the countryside
migration	= 1 if youth has a direct/indirect migration background

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Table B1: Variable Definitions <continued>

Name	Definition
fclass1	= 1 if in the current or last school at least one quarter of students were either foreigners or not born in Germany
lstv	= 1 if watching TV on a daily basis
lsread	= 1 if reading on a daily basis
lsno	= 1 if daydreaming/being idle on a daily basis
lssocial	= 1 if volunteering at least once a week
lsculture	= 1 if engaged in dancing/acting at least once a week or ever involved in school theater/dance group
lsmusic	= 1 if musically active at least once a week or ever involved in school orchestra/chorus
lstech	= 1 if engaged in technical related activities/programming at least once a week
gradm	Grade in mathematics based on the 1-6 scale in last report card
gradg	Grade in German based on the 1-6 scale in last report card
gradf	Grade in first foreign language based on the 1-6 scale in last report card
gradrep	= 1 if ever stayed back a grade at school
schoolrec	= 1 if elementary school recommended youth for academic school track
sgschool	= 1 if youth attended secondary school in the year he/she turned 17
qob2	= 1 if born in the second quarter
y_miss	= 1 if information on at least one youth's leisure or school covariate is missing
d0102	= 1 if youth biography questionnaire completed in 2001 or 2002
d0103	= 1 if youth biography questionnaire completed in 2001, 2002 or 2003
d0103m	Interaction between d0103 and migration
d2003	= 1 if youth biography questionnaire completed in 2003
d0304	= 1 if youth biography questionnaire completed in 2003 or 2004
d0405	= 1 if youth biography questionnaire completed in 2004 or 2005
d0406	= 1 if youth biography questionnaire completed in 2004, 2005 or 2006
d0506	= 1 if youth biography questionnaire completed in 2005 or 2006
d0607	= 1 if youth biography questionnaire completed in 2006 or 2007

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Table B1: Variable Definitions <continued>

Name	Definition
d2008	= 1 if youth biography questionnaire completed in 2008
d0709	= 1 if youth biography questionnaire completed in 2007, 2008 or 2009
d2009	= 1 if youth biography questionnaire completed in 2009
d2010	= 1 if youth biography questionnaire completed in 2010
mn_alq	A three-year moving average of the unemployment rate measured at Raumordnungsregion (aggregated districts) level
mn_youth	A five-year moving average of the percentage of people aged between 6 and 18 measured at Raumordnungsregion level
mn_foreigner	A five-year moving average of the percentage of foreign people measured at Raumordnungsregion level
mn_popden	A five-year moving average of the population density (1,000 inh./km^2) measured at Raumordnungsregion level
inkar_miss	= 1 if information on at least one of the regional characteristics measured at Raumordnungsregion level is missing

B.2 Additional Descriptive Statistics

Table B2: Descriptive Statistics – Vocational Track

	Men				Women			
		Athlete				Athlete		
	Obs.	Yes	No	p-Value	Obs.	Yes	No	p-Value
Youth's characteristics								
Still at secondary school	1,073	0.604	0.541	**0.044**	950	0.705	0.491	**0.000**
		(0.489)	(0.499)			(0.457)	(0.500)	
Lowest sec. school track	1,104	0.411	0.553	**0.000**	977	0.240	0.426	**0.000**
		(0.492)	(0.498)			(0.428)	(0.495)	
Grade in math	1,046	3.020	3.127	**0.083**	930	3.094	3.205	0.101
		(0.966)	(0.998)			(1.067)	(0.976)	
Grade in German	1,046	3.175	3.207	0.527	930	2.740	2.842	**0.049**
		(0.752)	(0.864)			(0.739)	(0.796)	
Grade in foreign language	1,046	3.281	3.254	0.643	930	2.919	3.042	**0.047**
		(0.902)	(0.961)			(0.932)	(0.921)	
$\geq$ 25% foreign students in class	1,104	0.434	0.480	0.136	977	0.374	0.431	**0.077**
		(0.496)	(0.500)			(0.484)	(0.496)	
Daily TV cons.	1,103	0.841	0.846	0.809	976	0.775	0.835	**0.020**
		(0.366)	(0.361)			(0.418)	(0.372)	
Daily computer games/internet	1,101	0.560	0.489	**0.022**	974	0.351	0.268	**0.005**
		(0.497)	(0.500)			(0.478)	(0.443)	
Daily reading	1,099	0.175	0.115	**0.007**	973	0.299	0.245	**0.061**
		(0.380)	(0.319)			(0.458)	(0.430)	

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Table B2: Descriptive Statistics – Vocational Track <continued>

	Men				Women			
		Athlete				Athlete		
	Obs.	Yes	No	$p-$Value	Obs.	Yes	No	$p-$Value
Daily relaxing	1,096	0.264	0.298	0.215	972	0.311	0.360	0.117
		(0.441)	(0.458)			(0.463)	(0.480)	
Weekly volunteering	1,090	0.150	0.174	0.295	961	0.140	0.125	0.516
		(0.358)	(0.380)			(0.347)	(0.331)	
Daily cultural act.	1,104	0.149	0.167	0.431	977	0.388	0.303	**0.006**
		(0.356)	(0.373)			(0.488)	(0.460)	
Active at school	1,102	0.372	0.346	0.391	975	0.439	0.370	**0.031**
		(0.484)	(0.476)			(0.497)	(0.483)	
Weekly musical act.	1,104	0.212	0.322	**0.000**	977	0.370	0.342	0.361
		(0.409)	(0.468)			(0.483)	(0.475)	
Weekly techn. rel. act.	1,095	0.294	0.205	**0.001**	967	0.088	0.068	0.250
		(0.456)	(0.404)			(0.283)	(0.252)	
Daily peer act.	1,100	0.420	0.381	0.204	974	0.405	0.346	**0.062**
		(0.494)	(0.486)			(0.492)	(0.476)	
Born in first quarter of year	971	0.254	0.296	0.155	864	0.261	0.286	0.436
		(0.436)	(0.457)			(0.440)	(0.452)	
Born in second quarter of year	971	0.214	0.270	**0.044**	864	0.232	0.267	0.247
		(0.410)	(0.445)			(0.423)	(0.443)	
Born in third quarter of year	971	0.256	0.213	0.132	864	0.272	0.224	0.109
		(0.437)	(0.410)			(0.446)	(0.417)	
Born in 4th quarter of year	971	0.276	0.221	**0.053**	864	0.234	0.223	0.696
		(0.448)	(0.415)			(0.424)	(0.417)	

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Table B2: Descriptive Statistics – Vocational Track <continued>

	Men				Women			
		Athlete				Athlete		
	Obs.	Yes	No	$p-$Value	Obs.	Yes	No	$p-$Value
Only child	1,030	0.138	0.152	0.527	918	0.150	0.117	0.146
		(0.345)	(0.360)			(0.357)	(0.321)	
Oldest child	1,030	0.379	0.284	**0.002**	918	0.377	0.346	0.341
		(0.486)	(0.451)			(0.485)	(0.476)	
Youngest child	1,030	0.321	0.386	**0.036**	918	0.302	0.297	0.874
		(0.467)	(0.487)			(0.460)	(0.457)	
Relationship with parents								
Father important	1,040	0.897	0.880	0.391	908	0.853	0.827	0.291
		(0.305)	(0.326)			(0.354)	(0.379)	
Mother important	1,091	0.978	0.972	0.565	960	0.974	0.979	0.596
		(0.147)	(0.164)			(0.159)	(0.142)	
Often fights with father	1,022	0.124	0.145	0.344	882	0.153	0.172	0.464
		(0.330)	(0.352)			(0.360)	(0.377)	
Often fights with mother	1,092	0.171	0.167	0.872	962	0.210	0.244	0.225
		(0.377)	(0.373)			(0.408)	(0.430)	
Father's supportive parenting	978	-0.003	-0.094	0.139	857	-0.134	-0.302	**0.033**
		(0.897)	(0.972)			(1.103)	(1.152)	
Mother's supportive parenting	1057	-0.119	-0.220	0.105	943	0.002	-0.120	**0.075**
		(0.964)	(1.029)			(1.045)	(1.031)	

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Table B2: Descriptive Statistics – Vocational Track <continued>

	Men				Women			
		Athlete				Athlete		
	Obs.	Yes	No	$p-$Value	Obs.	Yes	No	$p-$Value
Parental characteristics								
Parent with highest school degree (Abitur)	1,076	0.070	0.054	0.298	955	0.057	0.060	0.833
		(0.255)	(0.226)			(0.232)	(0.238)	
Std. dev. par. earnings	1,033	13.888	13.393	0.537	915	12.255	13.354	0.139
		(12.227)	(12.886)			(9.441)	(11.964)	
Father's characteristics								
Age	870	46.861	47.495	0.145	766	45.761	46.223	0.314
		(6.158)	(6.336)			(5.069)	(6.855)	
Height (cm)	837	177.243	177.576	0.477	748	177.939	175.835	**0.000**
		(6.680)	(6.420)			(6.925)	(7.291)	
Daily TV cons.	672	0.770	0.833	**0.046**	582	0.797	0.801	0.913
		(0.422)	(0.373)			(0.403)	(0.400)	
Daily computer use	704	0.322	0.320	0.962	606	0.292	0.328	0.345
		(0.468)	(0.467)			(0.455)	(0.470)	
Volunteering	756	0.268	0.252	0.620	652	0.230	0.265	0.311
		(0.444)	(0.435)			(0.421)	(0.442)	
Cultural act.	752	0.083	0.138	**0.016**	651	0.143	0.057	**0.000**
		(0.276)	(0.345)			(0.351)	(0.233)	
Sports	756	0.449	0.384	**0.078**	652	0.440	0.382	0.143
		(0.498)	(0.487)			(0.497)	(0.486)	

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Table B2: Descriptive Statistics – Vocational Track <continued>

	Men				Women			
		Athlete				Athlete		
	Obs.	Yes	No	$p-$Value	Obs.	Yes	No	$p-$Value
Ext. locus of control	780	0.184	0.183	0.995	688	0.089	0.013	0.315
		(1.074)	(0.928)			(0.985)	(0.952)	
Int. locus of control	780	0.130	0.038	0.213	688	0.131	0.075	0.464
		(1.032)	(0.941)			(0.968)	(1.005)	
Conscientiousness	779	0.024	-0.037	0.422	678	0.042	0.016	0.743
		(0.998)	(1.099)			(0.907)	(1.094)	
Extraversion	779	-0.016	-0.056	0.597	678	-0.005	0.058	0.402
		(1.026)	(0.984)			(0.936)	(0.955)	
Openness	779	-0.089	-0.003	0.235	678	-0.074	-0.038	0.651
		(1.033)	(0.893)			(0.984)	(1.048)	
Agreeableness	779	0.062	-0.056	0.115	678	0.070	-0.029	0.192
		(0.932)	(1.136)			(0.944)	(0.984)	
Neuroticism	779	0.039	0.178	**0.067**	678	0.095	-0.056	**0.039**
		(1.053)	(0.995)			(0.966)	(0.911)	
Negative reciprocity	784	0.045	0.143	0.179	690	0.057	0.002	0.474
		(0.975)	(0.992)			(1.033)	(0.966)	
Positive reciprocity	784	-0.070	0.009	0.300	690	0.102	-0.026	**0.100**
		(1.035)	(1.023)			(1.011)	(0.995)	
General trust	812	-0.021	-0.144	**0.055**	727	-0.075	-0.264	**0.014**
		(0.893)	(0.882)			(0.974)	(1.043)	
Past trusting beh.	809	0.008	-0.082	0.212	728	-0.014	-0.124	0.166
		(0.973)	(1.034)			(0.969)	(1.092)	

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Table B2: Descriptive Statistics – Vocational Track <continued>

	Men				Women			
		Athlete				Athlete		
	Obs.	Yes	No	$p-$Value	Obs.	Yes	No	$p-$Value
Mother's characteristics								
Age	1,061	43.465	44.383	**0.003**	950	43.314	43.017	0.361
		(4.972)	(4.634)			(4.579)	(5.108)	
Height (cm)	1,018	165.147	165.258	0.781	922	165.990	165.102	**0.031**
		(6.062)	(6.435)			(6.055)	(6.162)	
Daily TV cons.	821	0.779	0.842	**0.028**	711	0.775	0.800	0.421
		(0.415)	(0.365)			(0.418)	(0.400)	
Daily computer use	842	0.189	0.223	0.234	728	0.216	0.231	0.649
		(0.392)	(0.417)			(0.412)	(0.422)	
Volunteering	908	0.159	0.179	0.435	800	0.206	0.184	0.432
		(0.366)	(0.384)			(0.405)	(0.388)	
Cultural act.	907	0.140	0.149	0.719	799	0.150	0.110	**0.092**
		(0.348)	(0.356)			(0.358)	(0.313)	
Sports	908	0.482	0.463	0.564	800	0.567	0.320	**0.000**
		(0.500)	(0.499)			(0.496)	(0.467)	
Ext. locus of control	957	0.171	0.110	0.365	851	-0.043	0.100	**0.041**
		(1.020)	(0.970)			(0.970)	(1.024)	
Int. locus of control	957	0.158	0.033	**0.059**	851	0.042	0.071	0.693
		(0.984)	(1.014)			(0.973)	(1.110)	
Conscientiousness	962	0.012	0.073	0.349	854	0.064	-0.002	0.367
		(0.973)	(0.999)			(1.013)	(1.089)	
Extraversion	962	-0.071	0.013	0.213	854	-0.007	0.025	0.636

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Table B2: Descriptive Statistics – Vocational Track <continued>

	Men				Women			
		Athlete				Athlete		
	Obs.	Yes	No	$p-$Value	Obs.	Yes	No	$p-$Value
		(1.019)	(1.012)			(0.995)	(0.982)	
Openness	962	-0.109	0.031	**0.034**	854	0.005	-0.086	0.183
		(1.011)	(0.972)			(0.924)	(1.027)	
Agreeableness	962	0.018	0.072	0.399	854	0.089	0.028	0.391
		(0.927)	(0.994)			(0.928)	(1.071)	
Neuroticism	962	0.103	0.048	0.396	854	0.053	-0.007	0.378
		(0.955)	(1.013)			(1.041)	(0.929)	
Negative reciprocity	962	0.080	0.093	0.845	854	-0.056	0.088	**0.047**
		(1.014)	(1.010)			(0.986)	(1.085)	
Positive reciprocity	962	-0.023	-0.017	0.924	854	0.070	-0.063	**0.062**
		(1.025)	(0.954)			(0.941)	(1.078)	
General trust	993	-0.106	-0.174	0.270	906	-0.034	-0.215	**0.006**
		(0.945)	(0.953)			(0.897)	(1.005)	
Past trusting beh.	993	-0.040	-0.125	0.189	902	0.084	-0.098	**0.010**
		(0.940)	(1.085)			(1.052)	(1.019)	
Regional characteristics								
East Germany	1,104	0.144	0.168	0.289	977	0.134	0.154	0.375
		(0.351)	(0.374)			(0.341)	(0.362)	
Share of youth pop. (%)	1,011	13.180	13.131	0.556	906	13.127	13.190	0.486
		(1.261)	(1.361)			(1.323)	(1.323)	
Share of foreign pop. (%)	1,011	8.622	8.451	0.538	906	8.577	8.499	0.793

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Table B2: Descriptive Statistics – Vocational Track <continued>

	Men				Women			
		Athlete				Athlete		
	Obs.	Yes	No	$p-$Value	Obs.	Yes	No	$p-$Value
		(4.342)	(4.304)			(4.323)	(4.373)	
Local pop. dens. (1,000 inh./km^2)	1,011	0.490	0.579	**0.076**	906	0.418	0.526	**0.030**
		(0.695)	(0.890)			(0.565)	(0.820)	

Source: SOEP V28 and authors' calculations. Note: Columns labeled 'N' show the number of observations with non-missing values of the corresponding variable. Columns labeled 'Yes' and 'No' show the means and standard deviations (in parentheses) of each variable. The column labeled 'p-Value' shows the p-value from a t-test of equality of means. Calculations use SOEP sample weights.

Table B3: Descriptive Statistics – Academic Track

	Men				Women			
		Athlete				Athlete		
	Obs.	Yes	No	p-Value	Obs.	Yes	No	p-Value
Youth's characteristics								
Still at secondary school	588	1.000	1.000	1.000	662	0.998	0.986	**0.068**
		(0.000)	(0.000)			(0.050)	(0.120)	
Grade in math	588	2.904	2.662	**0.035**	662	2.896	2.870	0.777
		(1.122)	(1.072)			(1.077)	(1.065)	
Grade in German	588	2.925	2.924	0.984	662	2.669	2.573	0.159
		(0.812)	(0.938)			(0.781)	(0.852)	
Grade in foreign language	588	2.879	2.915	0.691	662	2.665	2.682	0.818

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Table B3: Descriptive Statistics – Academic Track <continued>

	Men				Women			
		Athlete				Athlete		
	Obs.	Yes	No	p-Value	Obs.	Yes	No	p-Value
		(0.830)	(1.036)			(0.867)	(0.864)	
$\geq$ 25% foreign students in class	593	0.160	0.122	0.311	669	0.162	0.166	0.889
		(0.367)	(0.329)			(0.369)	(0.373)	
Daily TV cons.	591	0.756	0.759	0.936	668	0.708	0.797	**0.017**
		(0.430)	(0.429)			(0.455)	(0.403)	
Daily computer games/internet	593	0.649	0.584	0.186	667	0.331	0.258	**0.060**
		(0.478)	(0.495)			(0.471)	(0.438)	
Daily reading	592	0.290	0.233	0.216	668	0.402	0.367	0.396
		(0.454)	(0.424)			(0.491)	(0.483)	
Daily relaxing	593	0.255	0.280	0.567	665	0.313	0.361	0.223
		(0.436)	(0.451)			(0.464)	(0.481)	
Weekly volunteering	588	0.182	0.258	**0.063**	657	0.203	0.148	**0.094**
		(0.386)	(0.439)			(0.403)	(0.356)	
Daily cultural act.	593	0.210	0.300	**0.036**	669	0.467	0.314	**0.000**
		(0.407)	(0.460)			(0.499)	(0.465)	
Active at school	592	0.414	0.432	0.715	669	0.479	0.428	0.229
		(0.493)	(0.497)			(0.500)	(0.496)	
Weekly musical act.	593	0.467	0.556	**0.083**	669	0.566	0.562	0.931
		(0.499)	(0.499)			(0.496)	(0.497)	
Weekly techn. rel. act.	590	0.359	0.330	0.560	665	0.074	0.069	0.829
		(0.480)	(0.472)			(0.262)	(0.254)	
Daily peer act.	591	0.402	0.416	0.786	668	0.353	0.366	0.754

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Table B3: Descriptive Statistics – Academic Track <continued>

	Men				Women			
		Athlete				Athlete		
	Obs.	Yes	No	p-Value	Obs.	Yes	No	p-Value
		(0.491)	(0.495)			(0.478)	(0.483)	
Born in first quarter of year	542	0.219	0.236	0.704	593	0.260	0.298	0.344
		(0.414)	(0.426)			(0.439)	(0.459)	
Born in second quarter of year	542	0.264	0.251	0.769	593	0.237	0.257	0.599
		(0.442)	(0.435)			(0.425)	(0.438)	
Born in third quarter of year	542	0.285	0.280	0.917	593	0.272	0.202	**0.073**
		(0.452)	(0.451)			(0.445)	(0.403)	
Born in 4th quarter of year	542	0.232	0.234	0.967	593	0.232	0.243	0.762
		(0.423)	(0.425)			(0.422)	(0.430)	
Only child	560	0.196	0.120	**0.061**	639	0.142	0.187	0.150
		(0.398)	(0.326)			(0.350)	(0.391)	
Oldest child	560	0.349	0.484	**0.008**	639	0.371	0.347	0.563
		(0.477)	(0.502)			(0.484)	(0.477)	
Youngest child	560	0.331	0.314	0.731	639	0.345	0.391	0.266
		(0.471)	(0.466)			(0.476)	(0.489)	
Relationship with parents								
Father important	577	0.910	0.943	0.249	640	0.919	0.851	**0.009**
		(0.286)	(0.233)			(0.273)	(0.357)	
Mother important	590	0.973	0.994	0.175	664	0.981	0.972	0.453
		(0.162)	(0.078)			(0.135)	(0.165)	
Often fights with father	575	0.131	0.161	0.413	639	0.157	0.201	0.173

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Table B3: Descriptive Statistics – Academic Track <continued>

	Men				Women			
		Athlete				Athlete		
	Obs.	Yes	No	p-Value	Obs.	Yes	No	p-Value
		(0.338)	(0.369)			(0.364)	(0.402)	
Often fights with mother	590	0.211	0.170	0.321	665	0.245	0.171	**0.035**
		(0.408)	(0.377)			(0.431)	(0.377)	
Father's supportive parenting	555	0.309	0.353	0.619	623	0.208	0.035	**0.035**
		(0.829)	(0.845)			(0.892)	(1.023)	
Mother's supportive parenting	580	0.186	0.147	0.697	656	0.296	0.205	0.245
		(0.976)	(0.862)			(0.891)	(0.976)	
Parental characteristics								
Parent with highest school degree (Abitur)	588	0.446	0.435	0.827	659	0.414	0.249	**0.000**
		(0.498)	(0.498)			(0.493)	(0.434)	
Std. dev. of par. earnings	564	21.990	20.908	0.562	640	20.128	18.602	0.269
		(18.135)	(16.715)			(16.700)	(14.555)	
Father's characteristics								
Age	507	48.891	48.793	0.879	549	48.766	47.021	**0.001**
		(6.043)	(5.125)			(6.175)	(5.165)	
Height	491	179.167	179.032	0.845	539	179.344	179.129	0.711
		(6.055)	(6.929)			(6.111)	(6.668)	
Daily TV cons.	380	0.777	0.749	0.585	420	0.691	0.774	**0.085**
		(0.417)	(0.436)			(0.463)	(0.420)	

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Table B3: Descriptive Statistics – Academic Track <continued>

	Men				Women			
		Athlete				Athlete		
	Obs.	Yes	No	p-Value	Obs.	Yes	No	p-Value
Daily computer use	414	0.490	0.433	0.344	453	0.563	0.422	**0.006**
		(0.501)	(0.498)			(0.497)	(0.496)	
Volunteering	417	0.322	0.225	**0.085**	459	0.276	0.267	0.840
		(0.468)	(0.420)			(0.448)	(0.444)	
Cultural act.	418	0.207	0.218	0.836	459	0.171	0.138	0.383
		(0.406)	(0.415)			(0.377)	(0.346)	
Sports	418	0.570	0.563	0.906	458	0.592	0.493	**0.049**
		(0.496)	(0.499)			(0.492)	(0.502)	
Ext. locus of control	459	-0.288	-0.051	**0.038**	496	-0.188	-0.200	0.887
		(0.962)	(1.159)			(0.877)	(0.976)	
Int. locus of control	459	-0.253	-0.021	**0.027**	496	-0.168	-0.263	0.332
		(0.947)	(0.866)			(1.014)	(1.011)	
Conscientiousness	461	0.044	-0.014	0.555	497	-0.135	0.011	0.132
		(0.886)	(0.834)			(1.065)	(0.872)	
Extraversion	461	0.156	-0.112	**0.023**	497	-0.042	-0.213	**0.083**
		(1.060)	(0.943)			(1.002)	(1.061)	
Openness	461	0.203	0.146	0.607	497	0.006	-0.008	0.885
		(0.982)	(0.955)			(0.980)	(1.061)	
Agreeableness	461	0.021	-0.043	0.590	497	-0.120	0.063	**0.051**
		(1.078)	(0.881)			(1.024)	(0.876)	
Neuroticism	461	-0.258	0.126	**0.001**	497	-0.067	0.094	0.101
		(0.958)	(1.091)			(0.978)	(1.107)	

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Table B3: Descriptive Statistics – Academic Track <continued>

	Men				Women			
		Athlete				Athlete		
	Obs.	Yes	No	p-Value	Obs.	Yes	No	p-Value
Negative reciprocity	462	-0.176	-0.158	0.868	495	-0.031	-0.100	0.512
		(0.917)	(1.025)			(1.101)	(1.045)	
Positive reciprocity	462	0.026	0.027	0.992	495	-0.042	0.097	0.173
		(0.827)	(0.915)			(1.049)	(1.089)	
General trust	482	0.308	0.304	0.973	524	0.144	0.180	0.719
		(1.017)	(1.006)			(1.131)	(0.946)	
Past trusting beh.	481	0.127	-0.188	**0.002**	523	0.152	0.063	0.343
		(0.881)	(0.990)			(1.043)	(0.877)	
Mother's characteristics								
Age	577	45.843	46.575	0.142	653	45.832	44.865	**0.025**
		(4.672)	(5.029)			(4.728)	(5.847)	
Height	554	166.622	166.873	0.692	632	166.044	165.544	0.288
		(5.884)	(6.280)			(5.387)	(5.603)	
Daily TV cons.	422	0.668	0.788	**0.033**	499	0.649	0.790	**0.002**
		(0.472)	(0.411)			(0.478)	(0.408)	
Daily computer use	445	0.399	0.380	0.740	530	0.424	0.319	**0.023**
		(0.490)	(0.488)			(0.495)	(0.467)	
Volunteering	464	0.277	0.224	0.317	546	0.263	0.214	0.220
		(0.448)	(0.419)			(0.441)	(0.411)	
Cultural act.	463	0.343	0.387	0.445	547	0.336	0.290	0.286
		(0.475)	(0.489)			(0.473)	(0.455)	

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Table B3: Descriptive Statistics – Academic Track <continued>

	Men				Women			
		Athlete				Athlete		
	Obs.	Yes	No	p-Value	Obs.	Yes	No	p-Value
Sports	464	0.747	0.583	**0.002**	547	0.642	0.490	**0.001**
		(0.435)	(0.495)			(0.480)	(0.501)	
Ext. locus of control	513	-0.264	-0.058	**0.061**	587	-0.189	-0.133	0.502
		(0.963)	(1.089)			(0.946)	(0.916)	
Int. locus of control	513	-0.314	-0.194	0.242	587	-0.075	-0.095	0.806
		(0.922)	(0.941)			(0.867)	(0.985)	
Conscientiousness	518	-0.055	-0.089	0.737	590	-0.063	-0.117	0.542
		(0.922)	(0.906)			(1.027)	(0.939)	
Extraversion	518	0.109	-0.077	**0.098**	590	0.019	-0.080	0.250
		(0.988)	(1.140)			(0.926)	(1.062)	
Openness	518	0.132	0.081	0.652	590	0.142	0.009	0.138
		(1.001)	(1.091)			(0.950)	(1.111)	
Agreeableness	518	-0.083	-0.095	0.914	590	-0.078	-0.180	0.266
		(1.047)	(0.994)			(1.060)	(0.964)	
Neuroticism	518	-0.179	-0.047	0.254	590	-0.032	-0.144	0.225
		(1.028)	(1.114)			(1.019)	(1.079)	
Negative reciprocity	516	-0.223	-0.192	0.746	588	-0.003	-0.125	0.163
		(0.855)	(0.930)			(0.983)	(0.970)	
Positive reciprocity	516	0.086	0.087	0.995	588	0.017	-0.091	0.212
		(0.960)	(1.121)			(0.895)	(1.123)	
General trust	543	0.369	0.289	0.487	616	0.283	0.064	**0.011**
		(1.076)	(1.032)			(0.974)	(1.023)	

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Table B3: Descriptive Statistics – Academic Track <continued>

	Men				Women			
		Athlete				Athlete		
	Obs.	Yes	No	p-Value	Obs.	Yes	No	p-Value
Past trusting beh.	545	0.161	0.006	0.145	616	0.158	-0.090	**0.002**
		(0.954)	(1.127)			(0.946)	(0.856)	
Regional characteristics								
East Germany	593	0.142	0.176	0.347	669	0.164	0.279	**0.001**
		(0.349)	(0.382)			(0.371)	(0.450)	
Local unemployment (%)	529	11.158	11.539	0.447	610	11.208	12.777	**0.000**
		(4.500)	(4.966)			(4.751)	(5.598)	
Share youth pop. (%)	529	12.815	12.566	**0.090**	610	12.799	13.113	**0.004**
		(1.341)	(1.383)			(1.220)	(1.318)	
Share foreign pop. (%)	529	9.582	10.314	0.160	610	9.516	7.572	**0.000**
		(4.728)	(4.959)			(4.826)	(4.920)	
Local pop.dens. (1,000 inh./km^2)	529	0.592	0.780	**0.040**	610	0.524	0.472	0.387
		(0.801)	(0.974)			(0.627)	(0.779)	

Source: SOEP V28 and authors' calculations. Note: Columns labeled 'N' show the number of observations with non-missing values of the corresponding variable. Columns labeled 'Yes' and 'No' show the means and standard deviations (in parentheses) of each variable. The column labeled 'p-Value' shows the p-value from a t-test of equality of means. Calculations use SOEP sample weights.

C Propensity Scores and Matching Diagnostics

C.1 Probit Estimates of Propensity Scores

Table C1: Propensity Scores – Vocational Track

	Men		Women	
Variable	Coefficient	(Std. Err.)	Coefficient	(Std. Err.)
track	−0.297**	(0.117)	−0.319**	(0.125)
p_educ	0.075	(0.194)	−0.270	(0.206)
p_acadqual	0.464*	(0.272)		
p_mincy10	−0.009**	(0.004)	0.009**	(0.004)
p_sincy10	0.016**	(0.008)	−0.022**	(0.009)
p_height			0.003	(0.002)
p_miss	−0.234	(0.226)	0.492	(0.331)
f_agey	0.004	(0.008)		
m_agey	−0.013	(0.009)		
f_height	−0.001	(0.002)		
m_height	0.001	(0.002)		
f_lstv10	−0.218	(0.149)		
f_lspc10	0.080	(0.137)		
f_lscomit10	0.067	(0.149)		
m_lscomit10	−0.208	(0.157)		
f_lsculture10	−0.498**	(0.209)		
f_lssport10	0.184	(0.136)		
m_lssport10			0.542***	(0.130)
f_loc1			0.065	(0.075)
f_ffm4	0.019	(0.075)	0.169**	(0.083)
f_ffm5	−0.094	(0.071)	0.204**	(0.085)
m_ffm1	−0.086	(0.086)		
m_ffm2	0.039	(0.068)	−0.047	(0.063)
m_ffm4	−0.004	(0.080)		
m_ffm5	0.067	(0.058)	0.063	(0.066)
m_rec2			0.125**	(0.058)
f_trust1			0.097	(0.068)
m_nob	−0.008	(0.014)	0.022*	(0.012)
f_nob	0.031**	(0.015)	−0.026**	(0.013)
f_miss	0.455*	(0.247)	−0.140	(0.198)
m_miss	−0.552**	(0.240)	0.110	(0.165)
chldhdgu	0.168	(0.144)		
f_imp	0.393*	(0.213)		
m_arg	−0.077	(0.136)	−0.301**	(0.133)
f_sps	−0.094	(0.083)		
m_sps	0.084	(0.066)		
fy_miss	0.385	(0.257)		

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Table C1: Propensity Scores – Vocational Track <continued>

	Men		Women	
Variable	Coefficient	(Std. Err.)	Coefficient	(Std. Err.)
my_miss	−0.273	(0.317)		
east	−0.174	(0.145)	−0.353**	(0.170)
chldhdpa			−0.299**	(0.121)
migration	0.332***	(0.129)	−0.184	(0.135)
fclass1	−0.082	(0.117)		
lstv			−0.266**	(0.133)
lsread	0.317**	(0.148)	0.223*	(0.128)
lssocial	−0.114	(0.151)	−0.182	(0.167)
lsculture			0.239**	(0.117)
lsmusic	−0.377***	(0.119)	−0.093	(0.118)
lstech	0.275**	(0.114)	0.312	(0.213)
gradm	−0.103**	(0.052)		
gradg	−0.017	(0.066)		
gradf	0.072	(0.052)		
gradrep			−0.178	(0.136)
schoolrec	0.206	(0.157)	0.413***	(0.157)
sgschool	0.220**	(0.111)	0.661***	(0.121)
y_miss	0.351*	(0.184)	0.019	(0.185)
d0102			0.415	(0.262)
d0103	−0.265	(0.193)		
d0304			0.417	(0.258)
d0406	−0.549***	(0.185)		
d0506			0.230	(0.261)
d0709	−0.553***	(0.187)	0.321	(0.248)
mn_youth			−0.130**	(0.052)
mn_popden			−0.275***	(0.094)
inkar_miss			−1.440**	(0.732)
Intercept	0.708	(0.494)	0.644	(0.844)
N		1104		977
Log-Likelihood		-2103448		-1668861
Pseudo R^2		0.110		0.169
K		49		40
χ^2_K		104.551		169.166

Source: SOEP V28 and authors' calculations. Note: *, ** and *** denote significance at the 10%-, 5%- and 1%-level, respectively. Calculations use SOEP sample weights.

Table C2: Propensity Scores – Academic Track

Variable	Men		Women	
	Coefficient	(Std. Err.)	Coefficient	(Std. Err.)
p_educ			0.666**	(0.338)
p_mincy10	−0.013***	(0.004)	−0.004*	(0.002)
p_sincy10	0.022***	(0.008)		
p_miss	0.235	(0.494)	0.451**	(0.225)
f_agey	0.009	(0.006)	−0.014**	(0.006)
f_ageyed			−0.003	(0.007)
f_lspc10	0.233	(0.191)	0.528***	(0.176)
m_lstv10	−0.469**	(0.205)	−0.324**	(0.153)
m_lspc10	−0.165	(0.201)		
f_lscomit10	0.533***	(0.199)		
f_lsculture10	−0.361	(0.227)		
f_lssport10_often	0.306	(0.210)		
m_lssport10_often	0.531***	(0.182)	0.227	(0.155)
f_loc2	−0.274**	(0.110)		
f_ffm2	0.174	(0.123)	0.375***	(0.122)
f_ffm3	−0.149	(0.140)	−0.148	(0.129)
f_ffm4			−0.251**	(0.106)
f_ffm5	−0.299***	(0.101)	−0.097	(0.092)
m_ffm1	0.156	(0.103)	−0.098	(0.104)
m_ffm2	0.217*	(0.126)		
m_ffm3	−0.438***	(0.131)		
m_ffm4			0.144	(0.111)
f_rec2			−0.078	(0.092)
m_rec1			0.132	(0.085)
m_rec2	−0.152*	(0.083)	0.061	(0.084)
f_trust1			−0.203**	(0.089)
f_trust12			0.071	(0.056)
f_trust2	0.280***	(0.101)	−0.023	(0.119)
f_trust22			0.170**	(0.078)
m_trust1			0.151*	(0.085)
m_nob	0.024*	(0.015)		
f_nob			0.038***	(0.013)
f_miss	0.894**	(0.359)		
m_miss	−0.613*	(0.361)		
chldhdgu	−0.407	(0.249)	0.464**	(0.205)
f_imp	−0.339	(0.291)		
m_imp	−0.513	(0.508)		
f_arg	−0.409	(0.253)	−0.255	(0.211)
m_arg	0.260	(0.207)	0.202	(0.174)
f_sps	−0.159	(0.145)	0.146*	(0.083)
m_sps	0.212*	(0.120)		

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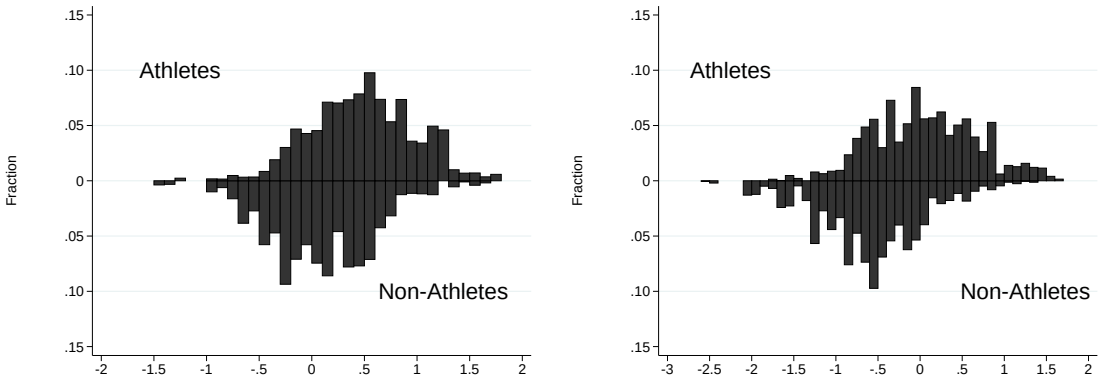
Table C2: Propensity Scores – Academic Track <continued>

	Men		Women	
Variable	Coefficient	(Std. Err.)	Coefficient	(Std. Err.)
east	−0.938***	(0.301)		
chldhdp1	−0.644***	(0.210)		
chldhdpa			0.308**	(0.149)
migration	0.132	(0.238)	−0.295	(0.232)
fclass1	0.195	(0.235)		
lstv	−0.181	(0.181)	−0.208	(0.156)
lspc			0.407**	(0.195)
lsread	0.189	(0.167)		
lsno	−0.216	(0.165)	−0.090	(0.143)
lsculture	−0.255	(0.171)	0.407***	(0.142)
lsmusic	−0.324**	(0.158)	−0.339**	(0.157)
gradm	0.116	(0.072)	0.031	(0.069)
gradg			0.200**	(0.101)
gradf	−0.117	(0.085)	−0.109	(0.093)
gradrep			0.288	(0.298)
schoolrec			0.396**	(0.178)
y_miss	0.237	(0.275)	−0.031	(0.188)
qob2			−0.238	(0.159)
d0102	0.143	(0.573)		
d0103			−0.049	(0.378)
d2003	0.731	(0.633)		
d0103m			−0.323	(0.377)
d0405	0.458	(0.598)		
d0406			0.185	(0.367)
d0607	0.510	(0.590)		
d2008	0.452	(0.627)		
d0709			−0.124	(0.356)
d2009	−0.008	(0.614)		
d2010	−0.253	(0.604)		
mn_alq	0.065**	(0.026)	−0.033**	(0.015)
mn_foreigner	−0.042*	(0.023)		
inkar_miss	0.248	(0.632)	−0.496	(0.383)
Intercept	1.498	(0.953)	−0.206	(0.629)
N		593		669
Log-Likelihood		-621247		-807314
Pseudo R^2		0.227		0.204
K		52		47
χ^2_K		129.377		133.320

Source: SOEP V28 and authors' calculations. Note: *, ** and *** denote significance at the 10%-, 5%- and 1%-level, respectively. Calculations use SOEP sample weights.

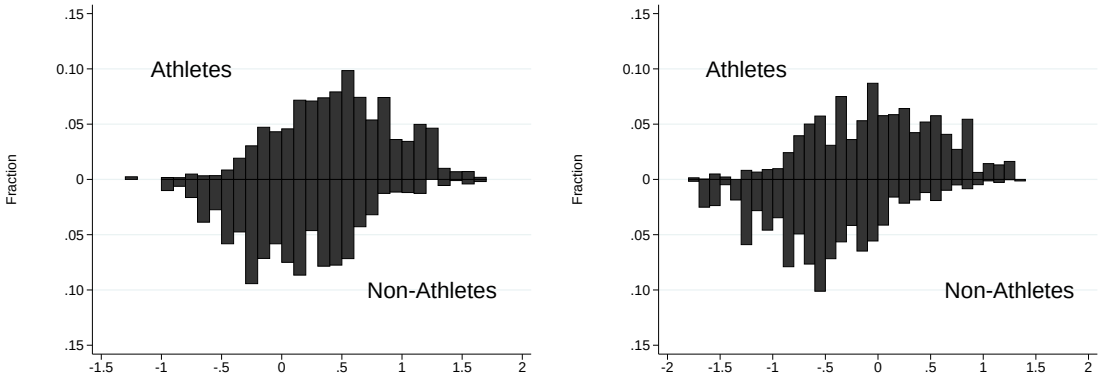
C.2 Common Support

Figure C1: Index of Propensity Scores Before Trimming – Vocational Track



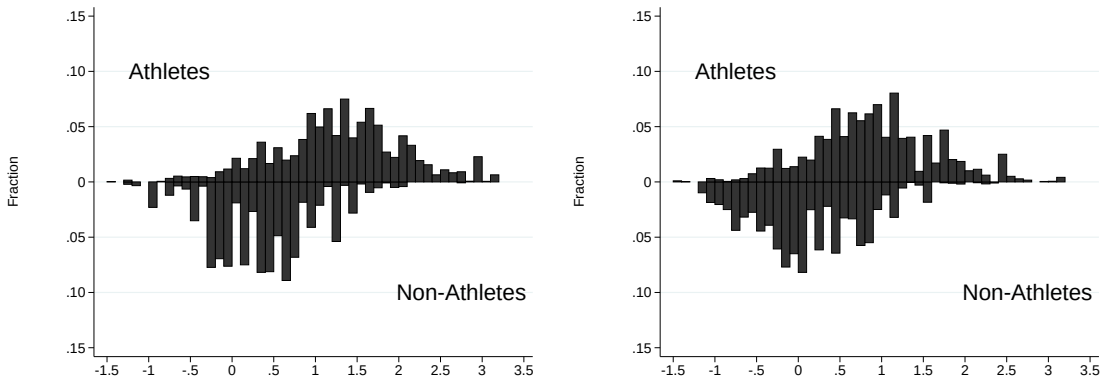
(a) Men (b) Women

Figure C2: Index of Propensity Scores After Trimming – Vocational Track



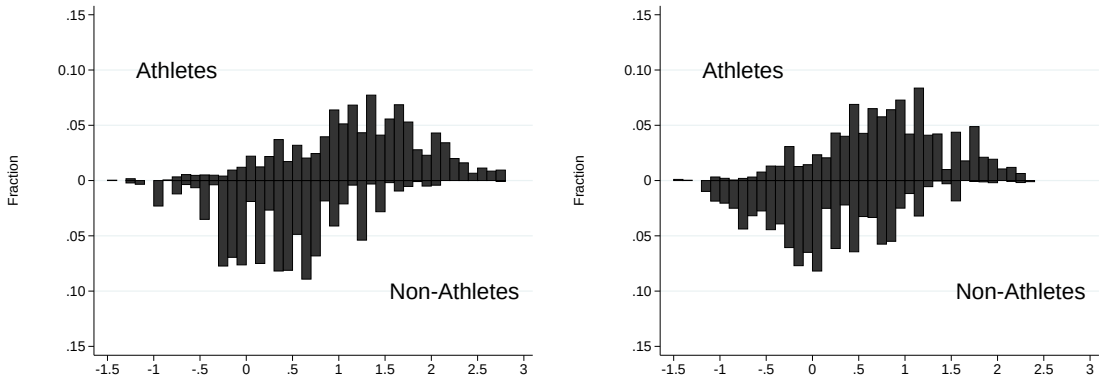
(a) Men (b) Women

Figure C3: Index of Propensity Scores Before Trimming – Academic Track



(a) Men (b) Women

Figure C4: Index of Propensity Scores After Trimming – Academic Track



(a) Men (b) Women

C.3 Additional Results on Balancing of Included Covariates

Table C3: t-Tests of Equality of Means on Included Covariates

	Vocational track		Academic track	
	Men	Women	Men	Women
(a) Covariates in propensity score model				
Unmatched	9	7	7	12
ATT-weights	0	0	0	0
ATU-weights	0	0	0	0
Total number of covariates	49	40	52	47
(b) Covariates in outcome regression model				
Unmatched	22	20	11	20
ATT-weights	0	0	2	2
ATU-weights	1	4	0	0
Total number of covariates	112	112	112	112

Source: SOEP V28 and authors' calculations. Note: Table shows the number of covariates with p-values ≤ 0.05 and ≤ 0.10 in a t-test of equality of means in the athlete and non-athlete samples before and after matching. Panel (a) shows it for covariates used for estimating the propensity score and panel (b) for covariates used in the outcome regressions. Calculations use SOEP sample weights.

Table C4: Hotelling Tests on Covariates in Propensity Score

	Men			Women		
	Before	ATT-weights	ATU-weights	Before	ATT-weights	ATU-weights
(a) Vocational track						
Youth's characteristics	0.000	1.000	1.000	0.000	1.000	0.999
Parent-youth relationship	0.276	0.994	0.917	0.592	0.979	0.771
Parental characteristics	0.005	1.000	1.000	0.000	1.000	1.000
Regional characteristics	0.290	0.686	0.748	0.001	0.998	0.995
Year dummies	0.006	0.917	0.841	0.731	0.996	0.986
(b) Academic track						
Youth's characteristics	0.126	0.811	1.000	0.000	0.999	0.999
Parent-youth relationship	0.161	0.870	0.999	0.063	0.914	0.997
Parental characteristics	0.000	0.989	1.000	0.000	0.998	1.000
Regional characteristics	0.014	0.489	0.978	0.002	0.909	0.891
Year dummies	0.272	0.765	0.992	0.226	0.847	0.983

Source: SOEP V28 and authors' calculations. Note: The table shows the p-values from Hotelling tests of equality of means between the treated and comparison samples. Covariates of the propensity score models are separated into five different categories depending on the source of the covariates. Calculations use SOEP sample weights.

Table C5: Hotelling Tests on Covariates in Outcome Regression

	Men			Women		
	Before	ATT-weights	ATU-weights	Before	ATT-weights	ATU-weights
(a) Vocational track						
Youth's characteristics	0.000	0.996	0.954	0.000	0.991	0.987
Parent-youth relationship	0.329	0.996	0.953	0.224	0.855	0.365
Parental characteristics.	0.009	0.582	0.781	0.000	0.698	0.420
Regional characteristics	0.032	0.998	0.986	0.000	0.895	0.966
Year dummies	0.002	0.764	0.070	0.012	0.247	0.268
(b) Academic track						
Youth's characteristics	0.065	0.932	0.954	0.000	0.919	0.999
Parent-youth relationship	0.310	0.900	0.999	0.043	0.984	0.947
Parental characteristics	0.013	0.018	0.974	0.001	0.850	0.993
Regional characteristics	0.404	0.785	0.931	0.000	0.963	0.943
Year dummies	0.102	0.499	0.593	0.074	0.486	0.290

Source: SOEP V28 and authors' calculations. Note: Table shows the p-values from Hotelling tests of equality of means between the treated and comparison samples. Covariates of the outcome regression models are separated into five different categories depending on the source of the covariates. Calculations use SOEP sample weights.

C.4 Additional Results on Balancing of Excluded Variables

Table C6: t-Tests of Equality of Means on Excluded Variables

	Men			Women		
	Before	ATT-weights	ATU-weights	Before	ATT-weights	ATU-weights
(a) Vocational track						
Height	0.012	0.249	0.531	0.001	0.140	0.049
Missing height	0.681	0.558	0.283	0.613	0.506	0.449
Verbal intelligence	0.251	0.296	0.117	0.372	0.781	0.750
Numerical intelligence	0.110	0.457	0.455	0.991	0.474	0.943
Figural intelligence	0.059	0.415	0.290	0.378	0.919	0.763
Missing intelligence	0.000	0.190	0.095	0.352	0.687	0.730
(b) Academic track						
Height	0.934	0.622	0.364	0.224	0.847	0.884
Missing height	0.624	0.648	0.893	0.880	0.721	0.569
Verbal intelligence	0.367	0.569	0.321	0.787	0.074	0.674
Numerical intelligence	0.765	0.421	0.758	0.109	0.124	0.199
Figural intelligence	0.341	0.907	0.271	0.567	0.009	0.649
Missing intelligence	0.076	0.224	0.219	0.815	0.186	0.309

Source: SOEP V28 and authors' calculations. Note: Table shows p-values from a t-test of equality of means in the athlete and non-athlete samples before and after matching. The covariate categories of interest are height and intelligence and measured by two and four covariates, respectively. Calculations use SOEP sample weights.

D Factor Analyses for Behavioral Outcome Variables

Table D1: Locus of Control

Item	External locus	Internal locus	KMO
(1) Control over my own destiny	−.343	0.664	0.662
(2) In comparison do not have what i deserve	0.590	0.024	0.805
(3) Success in life is due to fate	0.483	−.031	0.807
(4) Others have often controlled my life	0.686	−.015	0.784
(5) One has to work hard to be successful	0.008	0.744	0.545
(6) Doubt myself when faced by difficulties	0.601	0.017	0.786
(7) Opportunities depend on soc. circumstance	0.602	0.172	0.785
(8) Talents you have at birth are very important	0.256	0.605	0.658
(9) I have little control over my life	0.698	−.236	0.765
(10) Social, political activity makes a difference	0.106	0.084	0.488
Overall			0.748

Source: SOEP V28 and authors' calculations. Note: The first column shows all items/variables used in the factor analysis. They are measured on a seven-point Likert scale from *don't agree at all* to *agree completely*. The next columns provide factor loadings between all items and factors, labeled in the corresponding column heading. The column labeled 'KMO' shows the Kaiser-Meyer-Olkin measure of sampling adequacy for each item and overall.

Table D2: Big Five Personality Traits

Item	Conscientiousness	Extraversion	Openness	Agreeableness	Neuroticism	KMO
(1) Work carefully	0.852	0.064	0.050	0.089	0.012	0.699
(2) Communicative	0.201	0.795	0.192	0.093	0.026	0.779
(3) Abrasive towards others (-)	0.141	−.038	−.275	0.747	−.106	0.620
(4) Introduce new ideas	0.233	0.328	0.658	−.155	−.015	0.807
(5) Often worry	0.027	−.026	0.199	0.067	0.739	0.590
(6) Can forgive others	−.004	0.146	0.310	0.607	0.089	0.805
(7) Am lazy (-)	0.703	0.073	−.212	0.100	−.096	0.726
(8) Am outgoing/ sociable	0.057	0.745	0.280	0.180	−.049	0.784
(9) Importance of esthetics	0.073	0.100	0.564	0.129	0.142	0.816
(10) Am nervous	−.045	−.187	0.017	0.009	0.750	0.669
(11) Carryout duties efficiently	0.798	0.043	0.198	0.119	−.034	0.739
(12) Reserved (-)	−.073	0.792	−.061	−.165	−.197	0.724
(13) Considerate, friendly	0.265	0.042	0.254	0.683	0.020	0.775
(14) Lively imagination	−.064	0.180	0.708	0.106	0.007	0.789
(15) Be relaxed, no stress (-)	−.127	−.024	−.397	−.233	0.624	0.781
Overall						0.749

Source: SOEP V28 and authors' calculations. Note: The first column shows all items/variables used in the factor analysis. (-) identifies reverse coded items. They are measured on a seven-point Likert scale from *don't agree at all* to *agree completely*. The next columns provide factor loadings between all items and factors, labeled in the corresponding column heading. The column labeled 'KMO' shows the Kaiser-Meyer-Olkin measure of sampling adequacy for each item and overall.

Table D3: Reciprocity

Item	Negative reciprocity	Positive reciprocity	KMO
(1) If someone does me a favor, I am prepared to return it	−.086	0.746	0.659
(2) If I suffer a serious wrong, I will take revenge as soon as possible, no matter what the cost	0.890	0.032	0.676
(3) If somebody puts me in a difficult position, I will do the same to him/her	0.891	−.017	0.674
(4) I go out of my way to help somebody who has been kind to me before	0.046	0.816	0.603
(5) If somebody offends me, I will offend him/her back	0.825	−.018	0.798
(6) I am ready to undergo personal costs to help somebody who helped me before	0.027	0.738	0.654
Overall			0.685

Source: SOEP V28 and authors' calculations. Note: The first column shows all items/variables used in the factor analysis. They are measured on a seven-point Likert scale from *don't agree at all* to *agree completely*. The next columns provide factor loadings between all items and factors, labeled in the corresponding column heading. The column labeled 'KMO' shows the Kaiser-Meyer-Olkin measure of sampling adequacy for each item and overall.

Table D4: Job Values

Item	Interaction, recognition	Pay, promotion	Personal development	Security, safety	Work-life balance	KMO
(1) Secure job, career	0.016	0.346	0.010	0.754	−.135	0.777
(2) High income	−.145	0.701	−.044	0.145	0.317	0.658
(3) Good promotion possibilities	0.129	0.784	0.107	0.134	−.02	0.724
(4) Job with recognition	0.340	0.611	0.156	0.020	0.099	0.800
(5) Job which allows for spare time	−.036	0.187	0.008	−.069	0.858	0.630
(6) Interesting job, career	0.033	0.017	0.817	0.147	0.091	
(7) Job which allows for independent working	0.172	0.113	0.783	−.047	−.038	0.736
(8) Interaction important	0.680	0.078	0.262	0.010	−.022	0.802
(9) Job important for society	0.812	0.112	0.016	0.081	0.032	0.758
(10) Job with good health, safety conditions	0.218	−.008	0.117	0.713	0.230	0.786
(11) Job allows for family commitments	0.192	−.108	0.097	0.455	0.636	0.727
(12) Job where one can help others	0.789	−.014	0.079	0.149	0.029	0.758
Overall						0.747

Source: SOEP V28 and authors' calculations. Note: The first column shows all items/variables used in the factor analysis. They are measured on a four-point Likert scale from *not important at all* to *very important*. The next columns provide factor loadings between all items and factors, labeled in the corresponding column heading. The column labeled 'KMO' shows the Kaiser-Meyer-Olkin measure of sampling adequacy for each item and overall.

Table D5: Attitudes about Social Success

Item	Extrinsic factors	Positive intrinsic factors	Negative intrinsic factors	KMO
(1) Working hard	−.149	0.589	−.269	0.772
(2) Exploiting others	0.175	−.021	0.836	0.786
(3) Intelligence	0.155	0.645	0.081	0.778
(4) Family background	0.755	−.014	0.212	0.819
(5) Specialized training	0.050	0.680	0.050	0.748
(6) Money	0.704	−.005	0.333	0.829
(7) School grades	0.235	0.551	−.217	0.776
(8) Tough, ruthless	0.211	0.000	0.821	0.785
(9) Connections	0.480	0.224	0.476	0.869
(10) Politically active	0.566	0.028	0.165	0.888
(11) Being male	0.554	0.082	0.132	0.903
(12) Initiative	−.09	0.693	0.137	0.745
Overall				0.812

Source: SOEP V28 and authors' calculations. Note: The first column shows all items/variables used in the factor analysis. They are measured on a four-point Likert scale from *don't agree at all* to *agree completely*. The next columns provide factor loadings between all items and factors, labeled in the corresponding column heading. The column labeled 'KMO' shows the Kaiser-Meyer-Olkin measure of sampling adequacy for each item and overall.

Table D6: Beliefs about the Future

Item	Successful career	Fulfilling family life	Fulfilling career	KMO
(1) Training, university slot	0.754	0.070	0.031	0.869
(2) Success. training, university	0.760	0.104	0.059	0.857
(3) Finding employment	0.845	0.080	0.051	0.801
(4) Job success	0.839	0.102	0.139	0.790
(5) No long-term unemployment	0.572	0.023	−.186	0.880
(6) Being self-employed	0.099	0.059	0.785	0.661
(7) Working abroad	0.061	0.060	0.791	0.640
(8) Marriage	0.148	0.847	0.030	0.796
(9) A child	0.067	0.895	0.018	0.712
(10) Several children	0.030	0.876	0.073	0.740
Overall				0.790

Source: SOEP V28 and authors' calculations. Note: The first column shows all items/variables used in the factor analysis. They are measured on an eleven-point Likert scale from *0% probability* to *100% probability*. The next columns provide factor loadings between all items and factors, labeled in the corresponding column heading. The column labeled 'KMO' shows the Kaiser-Meyer-Olkin measure of sampling adequacy for each item and overall.

E Effect Heterogeneity and Sensitivity Analysis

E.1 Heterogeneity of Effects by Engagement in Other Activities

Table E1: Effects by Engagement in Other Activities – Big Five Personality

	Vocational Track			Academic Track		
Other activities	No	Yes	Diff.	No	Yes	Diff.
Conscientiousness	0.211***	0.279***	−0.067	0.130	−0.016	0.146
	(0.079)	(0.083)	(0.115)	(0.160)	(0.102)	(0.183)
Extraversion	0.191**	0.195**	−0.004	0.324**	0.100	0.224
	(0.087)	(0.090)	(0.121)	(0.160)	(0.106)	(0.181)
Openness	0.111	0.246***	−0.135	0.195	0.082	0.113
	(0.088)	(0.090)	(0.117)	(0.131)	(0.096)	(0.149)
Agreeableness	0.044	0.098	−0.053	0.110	0.010	0.099
	(0.091)	(0.083)	(0.123)	(0.145)	(0.108)	(0.178)
Neuroticism	−0.210**	0.120	−0.331***	−0.063	−0.011	−0.052
	(0.085)	(0.086)	(0.114)	(0.155)	(0.111)	(0.189)

Source: SOEP V28 and authors' calculations. Note: All outcome variables are standardized. Calculations use SOEP sample weights. Table shows average treatment effects (ATE). Columns labeled 'Yes' ('No') show the effects of sports for youths who (do not) engage in at least one other structured activity. Columns labeled 'Diff.' show the difference in both effects. Standard errors in parentheses are bootstrapped with 250 replications and clustered at the family level. *, ** and *** denote significance at the 10%-, 5%- and 1%-level, respectively.

Table E2: Effects by Engagement in Other Activities – Locus of Control

	Vocational Track			Academic Track		
Other activities	No	Yes	Diff.	No	Yes	Diff.
External locus	−0.238**	−0.087	−0.151	−0.146	−0.036	−0.109
	(0.094)	(0.095)	(0.139)	(0.122)	(0.092)	(0.156)
Internal locus	0.259***	0.037	0.221*	0.296**	−0.104	0.400**
	(0.097)	(0.083)	(0.126)	(0.149)	(0.096)	(0.175)

Source: SOEP V28 and authors' calculations. Note: All outcome variables are standardized. Calculations use SOEP sample weights. Table shows average treatment effects (ATE). Columns labeled 'Yes' ('No') show the effects of sports for youths who (do not) engage in at least one other structured activity. Columns labeled 'Diff.' show the difference in both effects. Standard errors in parentheses are bootstrapped with 250 replications and clustered at the family level. *, ** and *** denote significance at the 10%-, 5%- and 1%-level, respectively.

Table E3: Effects by Engagement in Other Activities – Social and Risk Preferences

	Vocational Track			Academic Track		
Other activities	No	Yes	Diff.	No	Yes	Diff.
Negative reciprocity	−0.248**	−0.038	−0.210	0.227	−0.026	0.253
	(0.097)	(0.109)	(0.135)	(0.194)	(0.115)	(0.233)
Positive reciprocity	−0.171*	0.293***	−0.465***	0.264	0.066	0.198
	(0.094)	(0.103)	(0.141)	(0.229)	(0.113)	(0.261)
Willingness to take	0.250***	0.169*	0.082	0.083	0.004	0.079
risks	(0.081)	(0.094)	(0.122)	(0.132)	(0.099)	(0.146)

Source: SOEP V28 and authors' calculations. Note: All outcome variables are standardized. Calculations use SOEP sample weights. Table shows average treatment effects (ATE). Columns labeled 'Yes' ('No') show the effects of sports for youths who (do not) engage in at least one other structured activity. Columns labeled 'Diff.' show the difference in both effects. Standard errors in parentheses are bootstrapped with 250 replications and clustered at the family level. *, ** and *** denote significance at the 10%-, 5%- and 1%-level, respectively.

Table E4: Effects by Engagement in Other Activities – Job Values

	Vocational Track			Academic Track		
Other activities	No	Yes	Diff.	No	Yes	Diff.
Interaction, recognition	0.113	0.346***	−0.233**	0.000	0.180*	−0.180
	(0.078)	(0.082)	(0.112)	(0.129)	(0.096)	(0.163)
Pay, promotion	0.082	0.357***	−0.275**	−0.058	0.225**	−0.283
	(0.079)	(0.084)	(0.114)	(0.144)	(0.104)	(0.182)
Personal development	0.153*	0.224**	−0.071	0.034	−0.061	0.095
	(0.086)	(0.090)	(0.123)	(0.117)	(0.094)	(0.155)
Security, safety	0.076	0.292***	−0.216**	−0.136	0.180*	−0.316**
	(0.070)	(0.084)	(0.110)	(0.121)	(0.103)	(0.158)
Work-life balance	−0.017	0.193**	−0.210*	0.058	0.119	−0.061
	(0.083)	(0.082)	(0.117)	(0.149)	(0.101)	(0.172)

Source: SOEP V28 and authors' calculations. Note: All outcome variables are standardized. Calculations use SOEP sample weights. Table shows average treatment effects (ATE). Columns labeled 'Yes' ('No') show the effects of sports for youths who (do not) engage in at least one other structured activity. Columns labeled 'Diff.' show the difference in both effects. Standard errors in parentheses are bootstrapped with 250 replications and clustered at the family level. *, ** and *** denote significance at the 10%-, 5%- and 1%-level, respectively.

Table E5: Effects by Engagement in Other Activities – Attitudes about Social Success

	Vocational Track			Academic Track		
Other activities	No	Yes	Diff.	No	Yes	Diff.
Extrinsic factors	−0.227**	−0.167**	−0.060	0.189	0.095	0.095
	(0.088)	(0.079)	(0.117)	(0.121)	(0.097)	(0.156)
Positive intrinsic f.	0.234***	0.055	0.178	0.145	−0.079	0.224
	(0.079)	(0.078)	(0.111)	(0.150)	(0.098)	(0.183)
Negative intrinsic f.	−0.246***	−0.119	−0.127	0.259**	0.120	0.139
	(0.080)	(0.076)	(0.108)	(0.125)	(0.096)	(0.161)

Source: SOEP V28 and authors' calculations. Note: All outcome variables are standardized. Calculations use SOEP sample weights. Table shows average treatment effects (ATE). Columns labeled 'Yes' ('No') show the effects of sports for youths who (do not) engage in at least one other structured activity. Columns labeled 'Diff.' show the difference in both effects. Standard errors in parentheses are bootstrapped with 250 replications and clustered at the family level. *, ** and *** denote significance at the 10%-, 5%- and 1%-level, respectively.

Table E6: Effects by Engagement in Other Activities – Beliefs about the Future

	Vocational Track			Academic Track		
Other activities	No	Yes	Diff.	No	Yes	Diff.
(a) Successful career	0.308***	0.149*	0.159	0.238*	0.137	0.101
	(0.084)	(0.090)	(0.126)	(0.134)	(0.087)	(0.159)
(b) Fulfilling career	0.105	0.105	0.000	0.175	0.105	0.071
	(0.080)	(0.090)	(0.119)	(0.134)	(0.097)	(0.175)
(c) Fulfilling family life	0.229***	0.168*	0.062	−0.021	0.220**	−0.241
	(0.083)	(0.093)	(0.124)	(0.152)	(0.097)	(0.175)

Source: SOEP V28 and authors' calculations. Note: All outcome variables are standardized. Calculations use SOEP sample weights. Table includes average treatment effects. Columns labeled 'Yes' ('No') show the effects of sports for youths who (do not) engage in at least one other structured activity. Columns labeled 'Diff.' show the difference in both effects. Standard errors in parentheses are bootstrapped with 250 replications and clustered at the family level. *, ** and *** denote significance at the 10%-, 5%- and 1%-level, respectively.

E.2 Effect Estimates with Family Fixed Effects

Table E7: Family Fixed Effects – Big Five Personality

	Full Sample		Sibling Sample		
	Obs.	ATE	Obs.	ATE	ATE (FE)
Conscientiousness	2,891	0.171***	684	0.160*	0.112
		(0.047)		(0.092)	(0.118)
Extraversion	2,891	0.185***	684	0.080	−0.003
		(0.055)		(0.093)	(0.127)
Openness	2,891	0.156***	684	0.154*	0.048
		(0.052)		(0.089)	(0.125)
Agreeableness	2,891	0.060	684	0.037	0.002
		(0.050)		(0.096)	(0.127)
Neuroticism	2,891	−0.052	684	−0.022	0.019
		(0.052)		(0.098)	(0.137)

Source: SOEP V28 and authors' calculations. Note: All outcome variables are standardized. Calculations use SOEP sample weights. Standard errors (in parentheses) are bootstrapped with 250 replications and clustered at the family level. *, ** and *** denote significance at the 10%-, 5%- and 1%-level, respectively.

Table E8: Family Fixed Effects – Locus of Control

	Full Sample		Sibling Sample		
	Obs.	ATE	Obs.	ATE	ATE (FE)
External locus of control	2,866	−0.146***	679	0.002	0.027
		(0.052)		(0.098)	(0.149)
Internal locus of control	2,866	0.113**	679	0.125	0.140
		(0.057)		(0.097)	(0.155)

Source: SOEP V28 and authors' calculations. Note: All outcome variables are standardized. Calculations use SOEP sample weights. Standard errors (in parentheses) are bootstrapped with 250 replications and clustered at the family level. *, ** and *** denote significance at the 10%-, 5%- and 1%-level, respectively.

Table E9: Family Fixed Effects – Social Skills and Risk Preferences

	Full Sample		Sibling Sample		
	Obs.	ATE	Obs.	ATE	ATE (FE)
Negative reciprocity	2,181	−0.075	542	−0.064	−0.071
		(0.062)		(0.128)	(0.244)
Positive reciprocity	2,181	0.072	542	0.129	0.068
		(0.059)		(0.117)	(0.254)
Willingness to take risks	3,011	0.152***	704	0.200*	0.158
		(0.055)		(0.102)	(0.137)

Source: SOEP V28 and authors' calculations. Note: All outcome variables are standardized. Calculations use SOEP sample weights. Standard errors (in parentheses) are bootstrapped with 250 replications and clustered at the family level. *, ** and *** denote significance at the 10%-, 5%- and 1%-level, respectively.

Table E10: Family Fixed Effects – Job Values

	Full Sample		Sibling Sample		
	Obs.	ATE	Obs.	ATE	ATE (FE)
Interaction, recognition	3,230	0.199***	717	0.227**	0.157
		(0.046)		(0.089)	(0.121)
Pay, promotion	3,230	0.186***	717	0.230**	0.219
		(0.049)		(0.090)	(0.137)
Personal development	3,230	0.134***	717	0.060	0.038
		(0.050)		(0.099)	(0.125)
Security, safety	3,230	0.153***	717	0.158*	0.237*
		(0.046)		(0.093)	(0.133)
Work-Life balance	3,230	0.089*	717	0.035	0.093
		(0.050)		(0.088)	(0.130)

Source: SOEP V28 and authors' calculations. Note: All outcome variables are standardized. Calculations use SOEP sample weights. Standard errors (in parentheses) are bootstrapped with 250 replications and clustered at the family level. *, ** and *** denote significance at the 10%-, 5%- and 1%-level, respectively.

Table E11: Family Fixed Effects – Social Success

	Full Sample		Sibling Sample		
	Obs.	ATE	Obs.	ATE	ATE (FE)
Extrinsic factors	3,168	−0.109**	708	−0.055	−0.108
		(0.048)		(0.095)	(0.138)
Positive intrinsic factors	3,168	0.095**	708	0.012	−0.125
		(0.048)		(0.104)	(0.136)
Negative intrinsic factors	3,168	−0.080*	708	−0.029	−0.084
		(0.042)		(0.086)	(0.121)

Source: SOEP V28 and authors' calculations. Note: All outcome variables are standardized. Calculations use SOEP sample weights. Standard errors (in parentheses) are bootstrapped with 250 replications and clustered at the family level. *, ** and *** denote significance at the 10%-, 5%- and 1%-level, respectively.

Chapter 3

The Effect of Teenage Employment on Character Skills and Occupational Choice Strategies*

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Abstract:

A growing body of research suggests that, even after controlling for cognitive abilities, personality predicts economic success in later life. The learning environment at school focuses on knowledge and cognitive skills. The transmission of character skills, however, is not at the center of attention. Leisure activities as informal learning activities outside of school may affect the formation of skills. By providing valuable opportunities, working part-time while attending full-time secondary schooling can be seen as a stepping stone toward independence and adulthood. The channel of the positive influence, however has not been identified empirically. I suggest that employment during adolescence promotes the formation of character skills that are known to have a positive effect on labor market outcomes and educational achievement. Employing a flexible strategy combining propensity score matching and regression techniques to account for self-selection, I find beneficial effects on character skills. Further, it improves the knowledge on which skills and talents school students have and reduces the importance of parents' advice with respect to their child's future career. The results are robust to several model specifications and varying samples and robust to including family-fixed effects.

Keywords: human capital, teenage employment, non-cognitive skills, time use, treatment effect
JEL: I 21, J 13, J 24

3.1 Introduction

For adolescents and young adults in Germany working part-time while attending full-time education is a common leisure activity. Between 2002 and 2010 the proportion of people who had a paid job during adolescence and young adulthood remained quite stable at around 33%.[1] In 2010 young people spent on average eight hours per week with activities related to their part-time job.[2] A frequently mentioned concern of working during adolescence is that working part-time after school may crowd out homework time and therefore may lead to worse grades and a lower educational attainment. On the other side, taking one's first real job is seen as a stepping stone toward independence and adulthood (Rauscher, Wegman, Wooding, Davis, & Junkin, 2013). Working part-time while in school may promote a sense of responsibility, confidence, and interpersonal skills at an early stage of life and therefore may lead to better labor market outcomes in adulthood.

Part of the existing literature confirms a positive relationship between high school employment and economic success in adulthood. Using different empirical strategies to take account of the endogeneity of high school employment, Ruhm (1997), Light (2001) and Hotz, Xu, Tienda, and Ahituv (2002) find positive and meaningful effects on earnings in later life. Using geographic characteristics such as the local unemployment rate and indicators for various geographic regions as instruments for the endogenous decision to work, Ruhm finds beneficial effects on earnings. For instance, working 20 hours per week during high school's senior year increases earnings by 22% and leads to a 9% higher hourly wage six to nine years later. Light finds similar results using various ability measures, family structure, and the existence of high school employment programs as instruments. Hotz et al. discuss the important role of how the dynamic form of selection is accounted in the model specification and confirm partially the positive relationship between high school employment and later earnings.

Another strand of literature documents a negative relationship between after-school employment and various measures of economic success. Using time-diary data of 15-18 year old high school students, Kalenkoski and Pabilonia (2012) find a substantial negative effect of teenage employment on the amount of time students spend on homework on school and non-school days. This is in line with the allocation of

[1] See Shell Jugendstudie in 2002, 2006, and 2010 for more detailed information.

[2] In 2010 the Shell Jugendstudie consist of secondary school students, apprentices, and college students aged between 12 and 25. While college students work 11 hours, trainees work 8.6 hours per week.

time model by Becker (1965) and the zero-sum model by Coleman (1961) in which a greater involvement in one activity reduces the amount of time people are able to spend on other activities. Distinguishing between working on school days and during summer vacation, Oettinger (1999) confirms a crowding out effect of teenage employment. While working during the preceding summer break does not have any effects on the grade point average (gpa), working on school days initially has a small positive effect on high school performance that becomes negative if the weekly working hours exceed a critical value. Lillydahl (1990), McNeal (1995), Ruhm (1997), and DeSimone (2006) support the inverted U-shaped relationship between work intensity and various measures of high school performance.

While the channel of the negative effect is conceptually straightforward, the channel of the positive effect of working a moderate amount of time during adolescence on educational attainment and earnings in adulthood is less clear. This article sheds more light on this topic by elaborating the influence of adolescent employment on character skills which are confirmed by the existing literature having a positive effect on educational attainment and various labor market outcomes. I assume that working a moderate amount of time during adolescence fosters a broad range of important skills such as responsibility, self-efficacy and good work ethic. Further, I assume that adolescent employment reduces the uncertainty about the world of work, helps adolescents to recognize their talents and interests, makes them more independent of their parents, and may signalize future employers their preference to work and their willingness to reduce their engagement in other leisure activities.

Cunha, Heckman, Lochner, and Masterov (2006) and Cunha, Heckman, and Schennach (2010) present a multistage model of the evolution of cognitive and character skills of children with a focus on parental investments. Their findings suggest that especially for the formation of cognitive skills early investments made by parents matter and that an adverse endowment of cognitive abilities at an early stage of life cannot be easily compensated by later parents' investments. Del Boca, Monfardini, and Nicoletti (2012) confirm empirically this pattern for maternal investments. Using the amount of time mothers' spent actively with their children during childhood and adolescence as a proxy for maternal investments, they find that investments during childhood are more effective for the formation of children's cognitive abilities than during adolescence. In addition to maternal investments, they consider children's own investments measured by the amount of time invested in activities which are assumed to be beneficial for the formation of cognitive abilities such as doing homework, reading, and performing arts or sports. While maternal investments become less relevant with increasing age of children, children's own investments grow in

importance for the formation of cognitive skills. This pattern, however, can also be driven by character skills. Besides cognitive skills also non-cognitive abilities can be affected by leisure activities. Achievement test results used as measures of cognitive abilities do not only cover cognitive but also some character skills (Borghans, Duckworth, Heckman, & ter Weel, 2008 and Borghans, Goldsteyn, Heckman, & Meijers, 2009). Further, Cunha et al. (2006, 2010) find that the formation of character skills is more malleable and not entirely concluded by the time children enter adolescence than in comparison to cognitive skills.

The newer neuroscientific research shows that character skills are reflected in the brain's functional architecture and have therefore also a biological basis. Schmidtke and Heller (2004) document that neuroticism, a measure of emotional instability, is related with increasing activity in the right posterior hemisphere. DeYoung et al.(2010) examine the relationship between the Big Five personality traits, five dimensions used to describe human personality, and the volume of different brain regions. While agreeableness varies with the volume of brain regions that process information about the intention and mental states of other individuals, conscientiousness is related to the volume of regions which are involved in planning and the voluntary control of behavior. As mentioned in Blakemore and Choudhoury (2006), adolescence represents a period of synaptic reorganizations and is therefore a period in which the brain is more sensitive to input. Teenage employment, as an example of input that may affect the development of the brain could then, through this biological channel, influence the development of character skills.

A growing body of research suggests that character skills predict economic success in later life, even after controlling for cognitive abilities. Heckman and Rubinstein (2001) and Heckman, Humphries, and Kautz (2014) show that although high school dropouts who pass the GED are smarter than other dropouts and broadly as smart as high school graduates without any college experience, especially males do not experience any wage premium in comparison to dropouts.[3] Therefore, the GED can be interpreted as a signal of deficits in character skills that led them drop out of high school and lead to adverse labor market outcomes of male GED graduates.

In the Western world the employment of adolescents is legally regulated. In Germany the legal situation to what extent school-aged children are allowed to work is governed by the Youth Employment Protection Act (Jugendarbeitsschutzgesetz, JArbSchG). In general, it is forbidden by law to employ school students younger

[3]The GED (General Educational Development) is a battery of achievement tests for high school dropouts giving them the opportunity to earn a high school equivalency diploma.

than 13 years of age. From age 13 onwards, however, part-time employment is allowed subject to some restrictions. 13- and 14-year-old minors may work up to two hours on school days but not during school hours and not after 6 pm. Further, only physically modest jobs such as baby-sitting, tutoring, and brochure delivery are allowed. At age 15 and older working time on school days is extended to 8 pm. Summer jobs as further employment opportunities are henceforth allowed, but only if they do not exceed 20 full-time employment days per year. After reaching age 18 school students do not face any restrictions concerning working on school days. During school vacations, however, working is still restricted for them to 50 full-time employment days per year. Depending on the type of occupation, many exceptions from these general legal rules exist.

I make use of two different data sets, the German Socio-Economic Panel (SOEP) provided by the DIW and the Time Budget Survey (TBS) provided by the Federal Statistical Office. SOEP is an annual household panel survey covering more than 11,000 households and is representative for Germany. It includes detailed information on family background, involvement in different leisure activities, school performance, future education and career plans as well as various measures of character skills. The TBS covers the years 2001/02 and has detailed information on time use measured in five and ten minute intervals, respectively. Additionally, it provides information on family background, which part-time job adolescents do and how much time per week they spend working. For the analysis both samples are restricted to youths who attended a secondary school in the year in which they completed the questionnaire.

Assuming that the acquisition of character skills is a cumulative process, depending on past and contemporaneous inputs as well as on the innate skill endowment, I use Todd and Wolpin's (2003) cumulative model specification. I employ a flexible strategy combining propensity score matching and regression techniques to account for self-selection into teenage employment.

My main findings are as follows. First, I find a positive selection into teenage employment. Adolescents who work part-time during full-time schooling have on average higher-educated parents and live in financially well-endowed households. Their parents were less non-employed and more likely to be self-employed in the past in comparison to parents of adolescents who never worked while attending school. Teenagers with a migration background or who live in regions with high unemployment rates are less likely to hold jobs. On average, adolescents who work start with their first part-time job at age 14. While supplementing pocket money is the leading

reason for taking the first job for both male and female adolescents, young women are more likely to start their first job because the work interest them. Comparing the type of job adolescents hold, between male and female adolescents differences exist. About 60% of male adolescents hold a delivery job. While young women also favor delivery jobs, in the female sample there is a more heterogeneous pattern. In addition to delivery jobs, service and care jobs are further frequently mentioned types of jobs female adolescents hold. The effect of working part-time after school on time invested in other activities is ambivalent. It reduces time spent with academic learning, an activity assumed to be academically productive, especially for young women on weekdays, and it reduces significantly screen time, an activity assumed to be academically unproductive.

The estimation results imply that holding a paid job while still in school reduces the uncertainty about own interests and talents and reduces the dependency on parents. Especially for female teenagers this result is noticeable. Further, it has beneficial effects on the internal locus of control, a character skill that is correlated with self-esteem. These results are robust across several model specifications and varying samples and robust to including family-fixed effects.

The remainder of this chapter is organized as follows. Section 2 describes the data and the analysis sample. Section 3 lays out the econometric approach and gives detailed account of the propensity score model. The empirical results are presented in Section 4. Section 5 concludes. The Appendix contains the tables and figures.

3.2 Data and Analysis Sample

I make use of two data sets to analyze the effect of working part-time while in full-time education on character skills and occupational choice strategies. The first data set I use is the German Socio-Economic Panel Study (SOEP) that is a representative annual household panel covering more than 11,000 households in Germany.[4] In addition to the standard household and person questionnaire, the SOEP conducts since 2000 a specific youth biography questionnaire targeting all youths turning 17 in the corresponding year.[5] It includes detailed information on family background and childhood, involvement in different leisure activities, school performance, future education and career plans as well as attitudes about different topics. Further, I

[4]I use the data distribution 1984-2012, `http://dx.doi.org/10.5684/soep.v29`. See Wagner et al. (2007), Wagner et al. (2008) and Schupp (2009) for further information.

[5]In 2001, 18- and 19-year-old first time respondents were also considered in the questionnaire.

add past parental questionnaires to construct further variables describing the family background such as parental earning and employment history. The final sample is restricted to youths who attend a secondary school in the year in which they complete the questionnaire.[6] All adolescents who have had a part-time job during secondary school are defined as treated.

Table 3.1 in the Appendix shows the sample size and the number of teenagers in the treatment and control group in the SOEP sample separated by gender. Table 3.2 provides information on the age at which they started to work and why they decided to work. In both samples about 38.5% of teenagers have had at least one job during full-time schooling. On average, male teenagers were nearly two months older than female teenagers when they started their first part-time job. Most teenagers started to work to supplement their pocket money. 84.7% (80.3%) of male (female) adolescents who have ever had a job did their first job to become at least partially financially independent from their parents. Nevertheless, teens find value in employment far beyond financial necessity, especially young women. 15.7% (11.8%) of female (male) teenagers mention interest as main reason. The difference of 3.9%-points is significant at the 10% significance level.

Despite the wealth of valuable information, the SOEP lacks detailed information on in-school work experience. It neither provides information on the type of job adolescents hold nor, as a consequence thereof, information on job characteristics. Previous research suggests that the type of job and its intensity may matter. Rauscher et al. (2013) study how beneficial a part-time job for the human capital accumulation of adolescents can be and find that not only the activity of work but also the quality of work matters. Thus, if jobs for teenagers differ in their characteristics such as the variety of required skills or the degree of autonomy, the effect of adolescent employment on character skills is likely to depend on the type of job. Greenberger and Steinberg (1986) discuss the importance of meaningful jobs for teenagers in more detail.

The Time Budget Survey (TBS), in contrast, provides more detailed information on adolescent employment. The TBS is a representative survey provided by the Federal Statistical Office conducted in 1991/92 and 2001/02.[7] For the analysis I concentrate on wave 2001/02 to get a sample that is more comparable to the SOEP sample. For the analysis the TBS sample is restricted to teenagers aged between 13 and 18 who

[6] Secondary school includes Hauptschule, Realschule, Gymnasium, and Gesamtschule.

[7] See `https://www.destatis.de/EN/FactsFigures/SocietyState/IncomeConsumptionLivingConditions/TimeUse/Current_Information_ZBE.html` for more information.

attend secondary school in the year in which the survey was conducted. It provides information on work intensity measured by the number of hours worked per week and the type of job.[8] Due to different questions, the treatment definition in the TBS sample differs somewhat from the treatment definition in the SOEP sample. In the TBS all adolescents who have a paid job at the time of the survey are counted as treated.

Besides the quality of work, the effect of working part-time while in full-time education may also be at least partially driven by an employment-induced reduction or increase in time adolescents spend with other, for the development of skills relevant, leisure activities. In this case, it would be useful to know how working after school affects the amount of time that is spent with other leisure activities. While the SOEP offers only a crude measure of the intensity of various leisure activities, the TBS provides detailed information on how time is allocated to more than 200 kinds of activities of all household members aged ten and older on three days, two weekdays and one weekend day, measured in 10 minute intervals.[9,10]

Tables 3.3 and 3.4 show the sample size, the share of employed adolescents and the type of job they have. Overall, 25% of male and 21.4% of female adolescents are employed during full-time schooling. For both males and females, delivery jobs are the most common type of job. Among employed male teenagers 57.5% hold a delivery job while any other category is mentioned by less than 7%. A more heterogeneous picture with respect to the type of job emerges for female adolescents. Although delivery jobs are also the most frequent type of job (21.1%), other jobs such as waitressing (15.6%), babysitting (14.3%), and tutoring (12.2%) are also mentioned frequently. These patterns are in line with existing research. Kooreman (2009) confirms a gender-specific occupational segregation for adolescents. Using a sample of Dutch school students, he finds that the selection in a particular part-time job depends strongly on students' gender. Despite equal education, female students tend to work in lower-paying occupations such as baby-sitting or working in a supermarket while male students choose better-paid jobs such as delivering newspapers. In addition, panel (b) of table 3.4 shows the number of hours adolescents work per week. While male teenagers work 4.24 hours per week on average, females work 4.87 hours per week. The evidence so far supports the implementation of a gender-specific anal-

[8]Information on the type of job is captured by the StaBuA 1992 Job Classification at the two digit level. For each two digit category I take the most likely job (type), listed on the four digit level, teenagers can do and present it in table 3.4.

[9]The SOEP measures the frequency of leisure activities by the categories daily, weekly, monthly, less often, and seldom

[10]See Ehling, Holz, and Kahle (2001) for further information on the TBS wave 2001/02.

ysis to control indirectly for heterogeneous job effects assuming that within gender occupation characteristics are more homogeneous than between gender.

3.3 Analytic Framework

3.3.1 Conceptual Background

For estimating the production function of character skills, I assume that adolescents' competencies are an outcome of a cumulative process of skill acquisition. Past and contemporaneous inputs in combination with adolescents' individual genetic endowment are assumed as determinants of the production process.[11]

The production function is given by:

$$Y_{ij} = f(\mathbf{X}_{ij}, T_{ij}, \mu_j^f, \mu_{ij}^c)$$

where Y_{ij} is character skill Y of adolescent i in family j measured at age 17. Y_{ij} is explained by $\mathbf{X}_{ij}$, a vector that includes inputs by the family, school and the adolescent himself and assumed to be relevant for the development of character skills and T_{ij}, a dummy variable indicating whether an adolescent works during full-time schooling.[12] The adolescent's individual pretreatment skill endowment consists of a family-specific part μ_j^f that is constant across siblings and a child-specific part μ_{ij}^c. Both are not observed by the researcher. Estimating the contribution of teenage employment on the development of skills, however, would lead to misleading results if we do not consider the pretreatment endowment of character skills in the production process. Because of the non-random nature of teenage employment, teenagers may self-select into employment depending on their already existing abilities. Further, the pretreatment skill endowment may have a direct effect on the acquisition of further skills as well as on school and family inputs.

Because the actual pretreatment endowment is unobserved, I use variables which are related to the unobserved pretreatment skill endowment as proxies. Due to

[11] Todd and Wolpin (2003) give a theoretical overview of modeling production functions for abilities depending on various data limitations. While they concentrate on the specification of the production function of cognitive skills, this chapter focuses on the production process of character skills.

[12] To increase the sample size, I include Big Five personality traits and locus of control observed in the person questionnaire at an older age if for each character skill no information is available at age 17. Further, reciprocity is only observed at an older age. To control for different age when character skills are measured, age dummy variables are included in the final analysis.

the richness of information contained in the SOEP, I am able to use a bundle of variables as proxies. Character skills of parents are the first proxies. Empirical research documents a substantial intergenerational transmission of abilities. Black, Devereux, and Salvanes (2009) for Norway and Björklund, Eriksson, and Jäntti (2010) for Sweden find a positive relation in cognitive abilities of parents and their offspring. Using the SOEP, Anger and Heineck (2010) confirm the positive relation in cognitive abilities of parents and their offspring even after controlling for educational attainment and family background.[13] These results stress the importance of parental investment for the accumulation of cognitive abilities of children. A growing body of research extends the analysis to character skills and confirms their intergenerational transmission, however at a lower level.[14]

Further proxies for the pretreatment skill endowment are birth order, the school recommendation at the end of grade four given by the class teacher, and whether adolescents grew up with both parents. Price (2008) and Black, Devereux, and Salvanes (2009) show that birth order affects children's cognitive skills negatively. Later-born children tend to exhibit lower cognitive abilities than their older siblings. Black et al. challenge the hypothesis that biological factors play a role in explaining skill deficits since later-born siblings have on average better birth characteristics. However, first- and later-born children experience a different childhood. First, first-borns may benefit from having the exclusive attention of their parents. Second, parents may not be able to invest the same amount of time in later-born children as they invested in firstborns at the same age. Third, firstborns may benefit from having younger siblings to teach and being responsible for them. On the other side, children's development of character skills may benefit from interactions with older siblings (Dai and Heckman, 2013). Lehmann, Nuevo-Chiquero, and Vidal-Fernández (2013) and Buckles and Kolka (2014) find that mother's early investment decreases with birth order. Lehmann et al. notice that not only cognitive but also character skills are affected by birth order such as a lower self-reported sense of general self-worth and self-competence at age 8.

School recommendation at the end of grade four given by the class teacher, as a further proxy, depends in most federal states on the school performance in the basic

[13]They extend the analysis by distinguishing between cognitive skills based on past learning and cognitive skills which are related to innate abilities. Using scores of a verbal fluency test as a proxy of crystallized intelligence which is related to knowledge and skills acquired in the past and scores of a cognitive speed test as a proxy of fluid intelligence which is related to innate abilities, they find a stronger transmission of cognitive skills based on past learning.

[14]See Anger (2012), Dohmen, Falk, Huffman, and Sunde (2009) and Grönqvist, Ockert, and Vlachos (2010).

subjects math, German and a third subject as well as on the child's learning behavior and work attitude.[15] Academic performance depends not only on cognitive but also on character skills. Blickle (1996) points out the importance of Big Five's conscientiousness and openness to experience for successful learning strategies. John, Caspi, Robins, Moffitt, and Stouthamer-Loeber (1994) find positive correlations between character skills and teachers' report of adolescents' academic performance. Heaven, Mak, Barry, and Ciarrochi (2002) pay attention to adolescents' personality and their attitudes to school finding high values of conscientiousness and introversion as significant predictors of school attitudes. Comparing the school recommendation given by the class teacher and the school preference of parents across different social classes, Dombrowski and Solga (2009) conclude that children with the same reading competencies and basic cognitive skills, an indicator for learning potentials, but with higher educated parents are more likely to attend the academic school track[16] than children from lower social classes with less educated parents. They suggest that inequalities in the family's cultural capital, human capital that is related to attitudes and knowledge needed to succeed in the current educational system, will not be compensated in the elementary school and become more important in the explanation of the acquisition of further competencies. Thus, the given school recommendation is a good proxy for the endowment of cognitive and character skills in the pretreatment period.

The fourth and last proxy of the pretreatment endowment of character skills is family structure during childhood. Possible reasons for a positive effect of living together as married couple on children's character are a lower probability of living with economic hardship, more family routines and father involvement as well as less maternal psychological distress and parenting stress than in comparison to their single counterparts. Bachman, Coley, and Carrano (2012) find for adolescents in low-income families with two parents a better emotional and behavioral functioning, measured by mother's report on children's behavior problems such as anxiety, depression, aggression, and rule breaking actions, than for adolescents living with a single parent. Carlson and Corcoran (2001) confirm these results. However, after including measures on maternal mental health and family income, family structure becomes insignificant in the explanation of behavioral problems of children.

[15] In Germany the school recommendation given by the class teacher is not in each federal state mandatory anymore. Nonetheless most parents are guided by the teacher's recommendation in transferring their child to one of the different secondary school types. See Stubbe, Bos, and Euen (2012) for a detailed discussion.

[16] The academic school track, Gymnasium, lasts until grade twelve or 13 and prepares for university entry.

As a sensitivity test I include family fixed effects to control for omitted variables that are constant within a family.

3.3.2 Econometric Approach

To estimate the effect of working part-time while attending secondary school on a set of character skills and occupational choice strategies, I apply the potential outcome approach (Neyman, 1923; Roy, 1951; Rubin, 1974). The treatment effect for each individual i is defined as

$$\Delta_i = Y_i^1 - Y_i^0 \,,$$

where Y_i^1 is the potential outcome if individual i is treated and Y_i^0 if not. For each individual i the observed outcome is given by:

$$\begin{aligned} Y_i &= Y_i^1 \cdot T_i + Y_i^0 \cdot (1 - T_i) \\ &= Y_i^0 + T_i \cdot (Y_i^1 - Y_i^0) \,, \end{aligned}$$

where the expression in parentheses in the second line corresponds to the individual-level treatment effect. Because either Y_i^0 or Y_i^1 can be observed, individual-level treatment effects cannot be identified. Therefore, the interest lies in identifying the population average treatment effect on the treated Δ_T,

$$\Delta_T = \mathrm{E}[Y^1 - Y^0 | T = 1] = \mathrm{E}[Y^1 | T = 1] - \mathrm{E}[Y^0 | T = 1].$$

In experiments in which treatments are randomly assigned and treated and non-treated individuals do not differ systematically in (un-)observed characteristics, the average potential non-treatment outcome of the treated $\mathrm{E}[Y^0|T = 1]$ can be replaced by the observed average non-treatment outcome of the non-treated $\mathrm{E}[Y^0|T = 0]$ and treatment effects can easily be estimated by calculating the mean difference in the outcome of interest between treatment and non-treatment/control group. In observational studies, however, the assumption of a random treatment assignment cannot be maintained anymore. Treated and non-treated individuals may differ in characteristics which simultaneously affect the treatment assignment and the potential outcomes. Thus, individuals in both groups would differ in their outcomes even in the absence of a treatment and calculating the treatment effect as the difference in means of the observed outcomes would then lead to biased results. Under

the conditional independence assumption (CIA) however, treatment assignment and potential outcomes become independent after conditioning on all covariates that influence simultaneously the assignment into treatment and potential outcomes. For the analysis I use conditional mean independence as a weaker assumption that can be formulated as follows:

$$\mathrm{E}[Y^j|\mathbf{Z}, T=1] = \mathrm{E}[Y^j|\mathbf{Z}, T=0] = \mathrm{E}[Y^j|\mathbf{Z}]\,,\ j \in \{0,1\}\,;$$

with $\mathbf{Z}$ including for the development of character skills relevant inputs by the family, school and the adolescents himself as well as proxies for the pretreatment endowment of character skills that affect the potential outcome Y^j and treatment status T. The overlap assumption, as second assumption, is defined as

$$0 < \Pr(T=1|\mathbf{Z}) < 1$$

with $\Pr(T{=}1|\mathbf{Z})$ as the probability of treatment assignment given $\mathbf{Z}$. This assumption ensures that there is a sufficient overlap in the characteristics of treated and non-treated individuals to find adequate matches.

Finally I assume that potential outcomes are independent of the treatment status of other individuals, ruling out general equilibrium effects.

3.3.3 Specification of Propensity Scores and Balancing Tests

The propensity score is estimated separately by gender. For each propensity score model I use two strategies to optimize the model specification. On the one hand, to increase the common support region, I make the propensity score distribution of treated and non-treated individuals as similar as possible. For instance, I compare individuals with a given treatment status and extreme values of the propensity score with individuals with the opposite treatment status and slightly less extreme propensity score values. Then, for this sub-sample, I identify all covariates in the propensity score model in which treated and non-treated individuals differ significantly. If these covariates are highly insignificant in the explanation of the treatment assignment, I omit them. This procedure makes the propensity score distribution of treated and non-treated adolescents more similar without deleting relevant covari-

ates.[17] As elaborated in Rosenbaum and Rubin (1983) in nonrandomized experiments a direct comparison of an outcome variable between treated and non-treated individuals would lead to misleading results because both treatment groups may differ systematically in their characteristics. These systematic differences could then lead to differences in the outcome variable even in the absence of the treatment. The balancing property of the propensity score states that

$$\mathbb{E}[\mathbf{Z}|T, \Pr(\mathbf{Z})] = \mathbb{E}[\mathbf{Z}|\Pr(\mathbf{Z})]$$

Given the propensity score $\Pr(\mathbf{Z})$, observed characteristics $\mathbf{Z}$ are independent of the assignment into treatment. To test a weaker version of the balancing condition, I use a balancing test suggested by Smith and Todd (2005) that tests that on average both treated and non-treated individuals do not differ in their observed characteristics. For each propensity score covariate, I estimate the following regression:

$$\begin{aligned} Z_k = \gamma_0 + \gamma_1 \widehat{\Pr}(\mathbf{Z}) + \gamma_2 \widehat{\Pr}(\mathbf{Z})^2 + \gamma_3 \widehat{\Pr}(\mathbf{Z})^3 + \gamma_4 \widehat{\Pr}(\mathbf{Z})^4 + \gamma_5 T + \gamma_6 T \widehat{\Pr}(\mathbf{Z}) \\ + \gamma_7 T \widehat{\Pr}(\mathbf{Z})^2 + \gamma_8 T \widehat{\Pr}(\mathbf{Z})^3 + \gamma_9 T \widehat{\Pr}(\mathbf{Z})^4 + \nu, \end{aligned}$$

with Z_k as the k-th covariate of the propensity score model, $\widehat{\Pr}(\mathbf{Z})$ as the propensity score estimated with covariates $\mathbf{Z}$, T as a dummy variable indicating the treatment status, and ν as an idiosyncratic error term. Regressing each propensity score covariate Z_k on polynomials of the propensity score up to the fourth degree, the treatment dummy, and interactions between treatment dummy and the before-mentioned polynomials, I test whether all coefficients of covariates in which the treatment dummy is included are jointly significant. If yes, then even after conditioning on the propensity score, the treatment status predicts values of the covariate and indicates an unsuccessful balancing of the covariate. If a covariate does not satisfy the Smith/Todd balancing test, I either drop it if this covariate is highly insignificant in the propensity score model or I modify it to fulfill the balancing test criterion if the covariate has a significant effect on treatment assignment.[18]

All variables in $\mathbf{Z}$ that are used to explain the probability of working while attending full-time schooling and are assumed to be relevant for the acquisition of character

[17] I only remove covariates if the p-value of their coefficients in the estimated propensity score model is larger than 0.3.

[18] In the latter case, I create interaction terms between the covariate and a further covariate. The motivation of this procedure is to control successfully for heterogeneous influences of the corresponding covariate on the probability of being treated that otherwise would lead to a rejection of the Smith/Todd test if not considered.

skills can be categorized into five groups. The first group of covariates includes parents' characteristics such as their educational attainment and past earnings as well as their employment history and age. Further, parents' character skills measured by Big Five personality traits, locus of control and their reciprocal behavior are included. The second group of covariates consists of variables that measure the quality of the parent-child relationship reported by adolescents such as whether adolescents argue or fight with parents on a regular basis, how important parents are, and how often various situations occur which are summarized into a factor that explains the quality of supportive parenting. The third group of covariates includes children's characteristics, for instance their migration background, quarter of birth, birth order, the school recommendation at the end of the fourth grade given by the class teacher, and the frequency of performing various leisure activities measured at age 17. Regional characteristics such as place of childhood, past unemployment rates, and the accessibility of various amenities in the neighborhood are categorized into the fourth group of covariates. The fifth group consists of annual dummies. Table 3.5 gives an overview on some balancing tests and key figures of the propensity score models. For about 95% of all covariates in a given propensity score specification the Smith/Todd-test fails to reject at the 10% significance level, see panel (a). A test for equality of means for each covariate between treatment and control group shows a perfect balancing of means after matching, see panel (b). Panel (d) shows the share of observations within the common support regions that is defined as the region between the smallest estimated propensity score of the treated sample and the largest estimated propensity score of the non-treated sample. Observations outside of the common support region are excluded from further analysis. Table 3.6 shows results of Hotelling T^2 tests of the joint null hypothesis of equal means between treatment and non-treatment group of all of the variables included in the before mentioned covariate groups. In sum, after matching I find a perfect balancing of means between treatment and comparison group within each covariate category.

The SOEP offers a richness of information to approximate relevant factors which influence both treatment assignment and outcomes of interest. Further, various balancing tests conducted before and after matching show that both treatment and non-treatment group are balanced in observed characteristics. Both encourage the plausibility of the non-testable conditional mean independence assumption.

3.3.4 Estimation of Treatment Effects

The estimation follows Fuchs and Osikominu (2015) and proceeds in two steps. First, I estimate for male and female adolescents propensity scores separately. I implement matching on propensity scores and calculate matching weights as follows using the example of the average treatment effect on treated, Δ_T.[19] The sample consists of n_T treated and n_U non-treated adolescents.

Using propensity score matching, for each treated adolescent a comparable "statistical twin" is calculated as weighted average over all non-treated adolescents. Using a Gaussian kernel, each non-treated adolescent j receives weight w_{lj} depending on his similarity to treated adolescent l with respect to the estimated propensity score.

$$w_{lj} = \frac{K[\widehat{\Pr}(\mathbf{Z}_j) - \widehat{\Pr}(\mathbf{Z}_l)]}{\sum_{j=1}^{n_U} K[\widehat{\Pr}(\mathbf{Z}_j) - \widehat{\Pr}(\mathbf{Z}_l)]}$$

with K denoting the Gaussian Kernel, $\widehat{\Pr}(\mathbf{Z}_j)$ and $\widehat{\Pr}(\mathbf{Z}_l)$ as the estimated propensity score of non-treated adolescent j and treated adolescent l, respectively.[20] Because all observations in the analysis are in addition weighted by survey weights v offered by SOEP, the sum of the weights over all non-treated individuals used to generate a "statistical twin" for treated individual l does not equal to one but equals the survey weight of treated individual l, $\sum_{j}^{n_U} w_{lj} = v_l$. This procedure is repeated for each treated adolescent. Thus, for each non-treated adolescent I get as many weights as treated adolescents exist and sum then, at the end, up. More formally, each observation is weighted as follows for the estimation of Δ_T.

$$g_j = \sum_{l}^{n_T} w_{lj},$$

where g_j is the matching weight for non-treated adolescent j and

$$g_l = v_l$$

[19] Potential outcomes are estimated by a local constant and a local linear Gaussian kernel regression. Treatment effects presented in this chapter are based on matching weights of the local constant weighted regression due to slightly better balancing test results.

[20] Instead of the conditional probability I use an index function to avoid compressions near zero and one.

where g_l denotes the matching weight for treated adolescent l that is equal to his survey weight.[21]

In a second step, I run for each outcome variable an ordinary least squares regression in which individuals are weighted by the before-mentioned weights g. For Δ_T, for instance, we have the following minimization problem

$$\min_{\{\hat{\beta}_0,\hat{\beta}_T,\hat{\boldsymbol{\gamma}},\hat{\boldsymbol{\delta}}\}} \sum_i^n g_i \Big[Y_i - \hat{\beta}_0 - \hat{\beta}_T\, T_i - \sum_k \Big\{ \hat{\gamma}_k\, Z_{ik} - \hat{\delta}_k\, T_i (Z_{ik} - \overline{Z}_{kT}) \Big\} \Big]^2 ,$$

where $i = 1, 2, \ldots n$ indexes observations, β_T corresponds to the treatment effect of interest, here Δ_T, $\overline{Z}_{kT}$ identifies the average of Z_k over the treated subsample, and g_i represents the matching weight of individual i. [22]

The combination of propensity score matching and regression techniques is known as doubly robust estimation and has several advantages. First, because propensity score outliers get smaller weights, this method avoids comparisons based on extrapolations not supported by the data. Second, the estimated treatment effects are consistent if at least one of both propensity score and outcome regression model is correctly specified (Robins and Ritov, 1997 and Imbens, 2004). Therefore, the estimated treatment effect is robust to misspecifications of one of both models.

I obtain standard errors and confidence bands for the estimated treatment effects through bootstrapping based on 500 resamples. I resample families to account for correlation across siblings. In each resample, I recomputed the propensity score using a draw from the asymptotic distribution of the coefficients in the propensity score model. This allows me to take account of the estimation error in the propensity score.

[21] The procedure to calculate weights for estimating the average treatment effect on untreated, Δ_U, is identical, however, treated adolescents are used to create statistical twins for each non-treated adolescent. The final matching weights are $g_l = \sum_j^{n_U} w_{lj}$ and $g_j = v_j$ for treated and non-treated adolescents, respectively.

[22] The analogous procedure is conducted to estimate Δ_U, the average treatment effect on the untreated.

3.4 Empirical Results

3.4.1 Descriptive Statistics

Table 3.7 in the Appendix shows a positive selection into teenage employment in the SOEP sample. For both gender, adolescents who work part-time during full-time schooling have on average higher-educated parents. 27.5% of employed male and 28.8% of employed female teenagers have at least one parent with a general qualification for university entrance (Abitur). For teenagers who never had a job the percentage of educated parents is significantly smaller.[23] In addition to their higher education, parents of employed male and female adolescents earn on average € 2,500 per year more than parents of teenagers with no work experience.[24] Further, parents of employed teenagers were less non-employed and more likely to be self-employed in the past.[25] Beside economic factors, parents of employed and non-employed adolescents differ also in their personality. Especially in measures of trust and past trusting behavior, parents of school students with work experience show a significantly higher tendency to trust others.[26] Not only their parents, but also teenagers differ with respect to their characteristics. For both male and female adolescents, employed teens are more likely to have a teacher's recommendation given at the end of grade four to continue on the academically oriented school track and they are more likely to attend this school track at age 17. Further, they are less likely migrants and more engaged in their leisure time at age 17. For instance, employed teenagers are more likely to do sports on a daily basis and they have been more active in formal extracurricular activities. 46.3% of male and 53.8% of female school students who have a job are active as class or student body president or are involved in the school newspaper. In the sample of non-employed teenagers the fraction of students who

[23] With the exception of parents' tertiary education – a dummy variable that takes on the value one if at least one parent has a university degree – of male teenagers where no significant difference can be found.

[24] The variable *Parental Earnings* is the average of past annual earnings up to ten years. In the final analysis I include not only the mean but also the standard deviation to control for past income fluctuations.

[25] For father's past self-employment status, however, the pattern is less clear. The parents' employment status variables show the percentage of years parents were self- or non-employed, respectively.

[26] Both measures of trust are standardized variables created by a factor analysis using three items for each trust variable. While general trust measures the individual expectation of the trustworthiness of other people, past trusting behavior is an indicator of how intensive one has supported and cooperated with friends. See Glaeser, Laibson, Scheinkman, and Soutter (2000) and Naef and Schupp (2009) for a more detailed discussion of trust measured by surveys and experiments.

performs such activities is significantly smaller. Besides these rather formal types of additional school activities, adolescents who work part-time are more active in less formal types of extracurricular activities. 66.6% (75.6%) of male (female) employed adolescents are involved in school theater or dance groups, and school orchestra or sports groups at school. Again, for non-employed adolescents the fraction is significantly smaller. Besides family and individual characteristics, regional conditions can also affect the employment status of teenagers. For both males and females, I find significantly higher unemployment rates in regions in which teenagers who have never worked live.[27] In addition, teenagers with no work experience are more likely to live in East Germany and they rather grew in large cities.

A similar pattern can be found in the TBS sample. Table 3.8 shows that parents of employed adolescents are on average higher educated and more likely to be self-employed. Further, adolescents with work experience are more likely to live in financially well-off households. They are on average 1 to 1.6 years older than their non-employed counterparts, more likely to attend an academically oriented school track and less likely to live in East Germany.

In sum, adolescents who have a job during full-time schooling have a more advantaged family background. Their parents are higher educated and earn more, they invest more time with meaningful leisure activities, and they are more likely to live in economically strong regions. A first interpretation of these findings is, that adolescents work besides full-time schooling not because the households in which they live are under economic pressure and in need for further sources of income, but rather to supplement their pocket money and/or of personal interest in the job.

The existing literature suggests a positive selection into early employment. Youths from families with low socio-economic status (SES) face disadvantages in finding suitable jobs while attending full-time schooling. Because of the relationship between ethnicity and SES, the US literature identifies significant ethnicity differences in adolescents' high school employment status. Hirschman and Voloshin (2007) find that black high school students face disadvantages in finding suitable jobs. Either they do not hold a job or the job is time-consuming and affects negatively the academic learning time and grades. In addition, black students are less likely to perform white-collar work. Instead, if they hold a job, they have low-paid blue-collar jobs which offer in most cases a lower quality of human capital input compared to white-collar jobs. The authors conclude that social networks, spatial mismatch, and

[27]The local unemployment rate is measured at the level of regional spatial planning units (Raumordnungsregionen) which are aggregates of counties (Kreise). Overall, Germany consists of 96 Raumordnungsregionen.

employer preferences may matter for this finding. Hotz, Xu, Tienda, and Ahituv (2002) and Kalenkoski and Pabilonia (2012) confirm these ethnical differences in student employment.

The TBS gives a detailed overview of the daily time allocation. For each respondent time use on three days, two weekdays and one weekend day, is measured in ten minute intervals. I summarized the initial 230 activity categories to 19 thematically different groups. Tables 3.9 and 3.10 compare time allocation of teenagers with and without a job on weekdays and weekend days, respectively.[28] On a normal weekday, see table 3.9, male (female) teenagers who hold a job spend 23.1 (40.4) minutes less with sleeping than their non-employed counterparts. Further, employed adolescents spend about 20 minutes less with media.[29] In contrast, they spend more time in transit and volunteer activities.[30] On a normal weekend day, see table 3.10, employed teenagers spend again significantly less time with sleeping, 26 minutes less for male and 50.5 minutes less for female students. While the amount of time spend with media does not differ between employed and non-employed teenagers on a weekend day, employed teenagers spend on average ten minutes more with academic learning and 15 to 20 minutes more with relaxing. In addition, females who work spend significantly less time with sports.

In sum, employed and non-employed school students differ only in few activity categories. On each day, students who work sleep on average between 20 and 50 minutes less. Further, they spend significantly less time with media and more time in transit on weekdays. On weekends, they spend more time with academic learning and with relaxing.

Tables 3.11 and 3.12 show how working part-time affects the time allocation of employed teenagers on weekdays and weekend days, respectively. On average, male (female) school students work 162.7 (184.4) minutes on a working weekday, see table 3.11. On working weekdays, male students spend 35 minutes less with peers, 40 minutes less with being idle, 20 minutes less with sports activities, and 45 minutes

[28]The definition of being employed while attending full-time schooling is not consistent with the observed time use. Although some adolescents indicate that they do not hold a job, time allocated to employment specific activities can be found in their time diaries. For instance, male adolescents who negated the question, spent on average 13 minutes on a weekday with job specific activities. These 13 minutes split to 4.3 minutes spend with an internship, 3.3 minutes spend with an unpaid activity that is related to employment of other people, 2.2 minutes spend with own secondary employment, 2 minutes spend with activities related to own main employment, 0.7 minutes spend with breaks during working time, and 0.5 minutes spend with job search.

[29]The category *Media Use* includes activities such as watching TV and video, playing pc games, chatting and surfing the internet.

[30]Transit time is the daily travelling time you spend by foot, driving cars or in public transport.

less in front of a screen. Female students reduce significantly time spend with learning activities by 27 minutes, on housework by 35 minutes, on sports activities by 22 minutes, and in front of a screen by 32 minutes. Thus, working part-time while in full-time education reduces the amount of time adolescents spend with activities which are suggested to be harmful for the development of skills such as media use. However, it also reduces time adolescents invest in activities which are suggested to be beneficial such as academic learning and sports activities.[31]

On a weekend day, see table 3.12, male and female adolescents work on average 167.7 and 200.8 minutes, respectively. Irrespective of gender, work reduces substantially sleeping time, especially of female adolescents, and time for relaxing. Further, it reduces time spend in front of a screen by about 22 minutes for males and females.

In sum the effect of working part-time on time spend with other activities varies by gender and depends on whether it is a week- or weekend day. On weekdays, especially screen time and time spend with relaxing is reduced. Further, time spend on homework is significantly reduced, however only for females. On a weekend day, only a minor reduction of time spend on homework is detectable. In addition, adolescents sleep significantly less on weekend days on which they work. Working part-time has therefore a negative effect on activities which are suggested to be harmful for the development of human capital as well as on activities which are assumed to be beneficial for the development of skills.

3.4.2 Early Employment and Character Skills

Tables 3.13 to 3.15 show the sample means and treatment effects for behavioral outcome variables. The behavioral variables, derived from a series of factor analyses, are standardized to allow a comparison of effect sizes across outcomes. The results for male and female adolescents are reported separately.

Table 3.13 shows estimated effects of teenage employment on both locus of control factors.[32] The psychological concept of locus of control can be attributed to Rotter (1966) and measures the individuals' perception of how much control over their life

[31] See Cardoso, Fontainha, and Monfardini (2010), Felfe, Lechner, and Steinmayr (2011), and Del Boca et al. (2012) for a more detailed discussion about which leisure activities are related to the acquisition of human capital and which activities are portrayed as harmful.

[32] Both factors are extracted by a factor analysis based on 10 items. The construction of both factors is identical with Dohmen, Falk, Huffman, and Sunde (2008). Further, both measures of locus of control and all other outcome variables are standardized. The estimated coefficients, therefore, can be interpreted as percentage change in terms of the outcome variable's standard deviation.

they possess. While external-oriented individuals are convinced that events in their life are results of luck and faith or other not controllable factors, internal-oriented individuals believe that they can determine and affect events in their life by own efforts and actions. Strauser, Ketz, and Keim (2002) find that people with a higher internal locus of control tend to persevere through tough times and to pursue a goal more successfully. Contrary to initial research, this chapter assumes a non-perfect reverse connection between internal and external locus of control. Thus, I construct two factors representing both underlying dimensions.

On average male, and female adolescents exhibit a similar external and internal locus of control, see column "Mean". Comparing sample means of treated and control units suggests that treated teenagers are less externally and more internally oriented. Especially for male teenagers this pattern is obvious, see column "Raw Diff". Focusing on the treatment effect estimates, I do not find any significant effects of teenage employment on the external locus of control. While male adolescents face a small reduction in their external-oriented perception, for females an effect is less detectable. The effect of teenage employment on the internal locus of control, in contrast, is more substantial. Considering the ATE, employment during full-time schooling leads to an 18% of a standard deviation increase in the internal-oriented perception for male and a 14.7% increase for female adolescents. The effects are statistically significant.

Locus of control has already been proven empirically as being a crucial determinant of economic success. For instance, Coleman and DeLeire (2003), Cebi (2007), and Báron and Cobb-Clark (2010) find that a one standard deviation higher internal locus of control leads to a 1.4%-4.6% higher probability of high school graduation, partially, even after controlling for cognitive abilities.[33] Further, Osborne-Groves (2005), Heckman, Stixrud, and Urzua (2006), Cebi (2007), Flossmann, Piatek, and Wichert (2007), Judge and Hurst (2007), and Drago (2011) find significant effects on earnings in later life.[34] Osborne-Groves, for instance, find that a one standard deviation higher internal locus of control increases hourly wage by 5%-7%, after controlling for cognitive abilities.

As mentioned in Almlund, Duckworth, Heckman, and Kautz (2011) locus of control, self-esteem, and Big Five's emotional stability measure a common construct termed

[33]The significance of the effect of internal locus of control on educational attainment, however, change differently after including proxies for cognitive abilities. While Cebi find no significant effects anymore, Coleman and DeLeire identify significant effects only after including these proxies.

[34]Instead of locus of control, Drago observes the relationship between earnings and self-esteem, a personality trait that is positively related to internal locus of control.

"core self-evaluations". They argue that a positive self-evaluation indicates in general a positive and proactive view of oneself and the relationship to the world. My findings indicate that working while attending full-time schooling affects positively the internal part of locus of control. However, to go one step further, I include Big Five personality traits in my analysis to study how they are affected by an early employment.

The objective of the Big Five model is to capture the basic structure of an individual's personality. Costa and McCrae (1985) and McCrae and Costa Jr. (1987) verify that the basic dimensions of personality can be represented by five latent factors, namely extraversion, conscientiousness, openness (sometimes termed as intellect), agreeableness, and neuroticism. Extroverted people tend to be communicative and sociable while conscientious people are industrious and tend to work efficiently. Openness measures the individual's valuation of artistic experiences and whether they possess an active imagination. Agreeable people tend to treat other people kindly and with respect and have a forgiving nature while people with neurotic tendencies are emotionally less stable. For instance, they get nervous easily and are less able to handle stressful moments. Table 3.14 gives an overview of the results.[35] Female adolescents are on average more extraverted, more conscientious, more open to new experiences, more agreeable but less emotionally stable than males. The effect of working after school differs between male and female teenagers. While male teenagers become more extraverted by working during full-time schooling, females experience only a slight and insignificant increase. Regarding the ATE, extraversion of young men is increased by 21.1% and of young women by 10.1% of a standard deviation. Panel (b) and (d) show that in-school work experience does not shape conscientiousness and agreeableness considerably. While males suffer a reduction of 8.6% in conscientiousness, females experience an increase of 6.3%. The estimated effects on agreeableness are similar. Panel (c) shows that especially openness of young women is affected by teenage employment while male teenagers experience only a minor positive effect. The effect on neuroticism, see panel (e), is especially for male teenagers in line with results for the internal locus of control. As already mentioned, the internal locus of control and the Big Five's emotional stability are positively correlated and indicates a construct termed "core-self-evaluations". For male teenagers I find a significant reduction in emotional instability of 14.7% of a standard deviation, for females an insignificant increase of 9.9%. Thus, especially for young men I find a meaningful and positive effect of teenage employment on two

[35] In the German SOEP a short 15-item version of the Big Five Inventory was assessed. The Big Five personality traits are extracted by a factor analysis and enter the model standardized.

indicators of individual's core self-evaluation that signalizes a positive and proactive view of oneself and the relationship to the world.[36]

What are the economic implications of these results? Salgado (1997), Hogan and Holand (2003), De Graaf and van Eijck (2004), and Nyhus and Pons (2005) find empirical relevance of Big Five measures for economic success. Especially conscientiousness, emotional stability, and openness are confirmed to be consistent predictors of educational and labor market success. However, their findings vary by gender. For instance, Nyhus and Pons find that a one standard deviation increase in emotional stability is related to a 8.5% higher hourly wage for women and a 0.2% higher hourly wage for men. De Graaf and van Eijck show that especially men profit from higher levels of openness with respect to educational attainment while women rather benefit from being more emotionally stable.[37]

Table 3.15 shows the effect of teenage employment on reciprocal behaviors.[38] Reciprocity describes how people react to kind and positive or impolite and negative interpersonal behavior of other people. While negative reciprocity corresponds to the willingness to punish uncooperative behavior of other people, a positive reciprocal behavior is related to rewarding cooperative and kind behavior. Gouldner (1960), as the classical reference, elaborates the meaning of reciprocity for the stability of social systems. Perugini, Gallucci, Presaghi, and Ercolani (2003) develop a further measure that, in addition to reciprocal behavior, identifies the belief in reciprocity defined as "Beliefs in the efficacy and widespread use of reciprocity-based behaviors and expectations of other's reciprocal behaviour (...) important (...) in predicting reciprocating behaviours ..."(Perugini et al., 2003, p.254). They find that reciprocal behavior is more pronounced the stronger the belief in its efficacy is. Further, they confirm that negative and positive reciprocity are not only "two sides of the same mechanism" (Perugini et al., 2003, p.256) but indicate two different personality dimensions.

Young men tend to be more negatively reciprocal. The estimated effects of teenage employment are most of the time small and insignificant. The strongest effect can be

[36]For young women I only identify a positive effect on the internal locus of control. The effect on emotional stability, is statistically non-significantly negative.

[37]De Graaf and van Eijck use mean values of item responses as proxies for Big Five personality traits, where items are scaled between 1 and 7. For instance, they find that a one unit higher self-rated openness is related to 0.6 additional years of schooling for male and 0.2 additional years for female respondents.

[38]Due to lack of information on reciprocal behavior in the youth biography questionnaire, I construct both factors by using six items obtained from the person questionnaire in 2005 and 2010, respectively. Both factors are then extracted by a factor analysis. In addition, I control for the individuals' age when they completed the corresponding questionnaire.

found on positive reciprocity of male teenagers and amounts to 12.8% of a standard deviation.

Brown, Falk, and Fehr (2004), Dohmen, Falk, Huffman, and Sunde (2009), Dur, Non, and Roelfsema (2010), and Kube, Maréchal, and Puppe (2012, 2013) find substantial relationships between reciprocal behavior and employment patterns. Using contemporaneous measures of reciprocity, Dur et al. find that positively reciprocal people are more sensitive to promotion instead of monetary incentives. Dohmen et al. identify that people with a high positive reciprocal behavior receive higher wages. Monthly earnings are increased by 0.9%-1.2% if positive reciprocity is increased by one unit.[39] In addition, they work harder and are less likely to be unemployed. Brown et al. confirm the latter finding. Further, they find that an increase in negative reciprocal behavior leads to a higher probability of unemployment.

3.4.3 Early Employment and Occupational Choice Strategies

Employment during full-time schooling may not only affect adolescents' character skills but may also provide valuable insights for adolescents into their interests and talents as well as offer them information on the world of work. The youth biography questionnaire includes questions about career and job plans, e.g. how adolescents would search for a future occupation and how well they are already informed about a future occupation. Table 3.16 shows how in-school work experience affects adolescents' occupational choice strategies.[40] I distinguish between three different strategies. Passive strategies imply that adolescents are either still unsure of their talents and what would be the "right" occupation or they do not have the goal to find the one true occupation and take things as they come. Working part-time while attending full-time schooling reduces the approval to these statements. Considering the ATE, I find a similar effect for male and female teenagers. The importance of these passive strategies is reduced by 12.1% and 12.9% of a standard deviation for male and female teenagers, respectively. Panel (b) shows the effect on active strategies. The second factor means that adolescents have already made a lot of efforts and thoughts to decide which occupation could be the best for them. For male and female teenagers I find a significant increase of 13.5% and 18.4% of a standard

[39] In their paper positive reciprocity is measured as the mean value of three items concerning positively reciprocal behavior scaled from 1 to 7.

[40] Four statements about the importance of various strategies to choose an occupation each measured on a four-point Likert scale from *Apply completely* to *Don't apply at all* are used to extract three factors.

deviation in the agreement to these strategies. Panel (c) shows how the importance of parental-dominated strategies to find a future occupation is affected by an early employment. This factor illustrates the importance of parents' advice for making this decision. Again, the effect is quite similar for both genders. Male and female teenagers experience a reduction of 9.6% and 11.1% of a standard deviation in the importance of parents' advice. In sum, teenage employment reduces the importance of both passive and parental-dominated strategies and increases at the same time the importance of active strategies. For both genders the pattern of results is quite similar, for females however more sizable. The results confirm the hypothesis that working while attending secondary school provides adolescents with valuable information on their aptitudes and interests. It helps them to reduce uncertainties and makes them more independent from their parents.

Further, I test whether secondary school employment actually helps teenagers to decide what careers they want. Two questions deal with (i) whether they already know the occupation they would like to do and (ii) to which degree they stay informed about the desired occupation.[41] For the analysis I create two dummy variables to measure the level of information adolescents already have concerning their future occupation.[42] The first variable takes on the value one if they already know the occupation they would like to have and stay at least well informed, see panel (a) of table 3.17. The second variable is equal to one if they already know their future occupation and stay at least very well informed, see panel (b). For both measures of the level of information I find stronger effects for male teenagers. Considering the ATE, teenage employment increases the probability of being informed to some degree (or at least the subjective belief of being well informed) by 16.5% (4.7%) of a standard deviation for males (females). The results are robust when using "very well informed/ with certainty" as an alternative outcome of interest.

In sum, working part-time while attending full-time schooling reduces less active and strengthens more active ways to find out which occupation would suit teenagers. Especially for female adolescents this pattern is statistically significant. Considering the effect on the (subjective) level of information, however, we see that male teenagers profit more from holding a job while for females only a small positive effect is detectable.

[41]The second question is measured on a four-point scale from *Poorly informed* to *Very well informed*.

[42]I standardize both dummy variables to adjust the interpretation of the estimated effects to the former results.

3.4.4 Sensitivity Analysis

The model is extended by including family-fixed effects to examine the sensitivity of the results to potential unobserved confounders that are constant within families. Deleting 1,606 adolescents without sibling information and 695 adolescents living in families in which all siblings have the same treatment status leads to a sample of 561 teenagers. Because of the small sample size, each family-fixed regression is estimated with a sample pooled across gender. Tables 3.18, 3.19 and 3.20 show results of family-fixed effects regressions for locus of control, Big Five personality traits, and reciprocity.[43] For locus of control I find a stable result for the internal locus of control. Considering the ATE, the treatment effect increases slightly from 16.4% to 23.4% of a standard deviation, see table 3.18. Therefore, the positive effect of teenage employment on self-responsibility seems to be robust to family-specific confounders. Treatment effects on Big Five personality traits, in contrast, are not robust to including family-fixed effects. Either they become vanishingly small, their magnitude increases or the effects reverse their direction. A similar pattern holds for reciprocity. While estimated effects on negative reciprocity become more negative, effects on positive reciprocity change signs and become negative.

Tables 3.21 and 3.22 illustrate how robust estimated effects on occupational choice strategies and the level of information on one's future occupation to including family-fixed effects are. For occupational choice strategies, estimated effects on both passive and parental-dominated strategies are robust to including family-fixed effects while estimated effects on active strategies vanish, see table 3.21. For both levels of information variables estimated treatment effects vanish, see table 3.22.

In sum, after controlling for family-fixed effects, teenage employment promotes adolescents' self-responsibility, i.e. the perception that events in their life can be controlled by own efforts and actions. Further, it reduces the uncertainty about own talents and interests and reduces the importance of parents' advices for choosing a future occupation.

[43] A shortcoming of this procedure is that I use results from a pooled sample to confirm gender-specific effects. Thus, I implicitly assume that treatment effects are affected by including family-fixed effects in the same way for male and female teenagers. Nonetheless, treatment effects can be affected differently. I could manage this problem by including interactions between gender and each family dummy to control for gender-varying family-fixed effects. This procedure, however, leads to multicollinearity and is therefore not implemented.

3.5 Concluding Remarks

Adolescence is a stage of life in which people start to take decisions independently of their parents. While the influence of parents' investments on the development of human capital decreases, the amount of time adolescents invest in activities separately from their parents grows in importance. Working part-time while attending full-time schooling is often seen as a stepping stone toward independence and adulthood. It may promote responsibility, independence, and interpersonal skills at an early stage of life. A frequently mentioned concern, however, is that a part-time job may crowd out homework time and therefore may lead to worse grades and a lower educational attainment.

The existing literature documents a positive effect of teenage employment on later economic success, such as higher earnings and better job positions, that becomes negative if the amount of time spent working exceeds a critical threshold. While the reason for the negative relationship between working after school and economic success in adult life is well explained by the limited amount of time and the consequential reduction of time spend with academic learning, channels of the positive influence have not been examined empirically. Explanations of the positive influence could be that working part-time supports the development of skills which are important for later success in life such as promoting responsibility and time management skills, it may reduce uncertainties about own talents and interests, and make adolescents familiar with the world of work. This chapter tests some of the possible explanations by focusing on character skills as important determinants of labor market outcomes and occupational choice strategies.

My main findings are as follows. First, I find a positive selection into teenage employment. Adolescents who have worked part-time during full-time schooling have on average higher-educated parents and live in financially well-endowed households. Their parents were less non-employed and more likely to be self-employed in the past in comparison to parents of adolescents who have never worked while attending school. Teenagers with a migration background or who live in regions with high unemployment rates are less likely to be employed. While supplementing pocket money was the leading reason for taking the first job for both male and female adolescents, young women were more likely to start their first job because the work interested them. Comparing the type of job adolescents hold, between male and female adolescents differences exist. About 60% of male adolescents hold a delivery job. While young women also favor delivery jobs, in the female sample is a more heterogeneous pattern. In addition to delivery jobs, service and care jobs are further

frequently mentioned types of jobs female adolescents hold. Teenagers who work differ in their time use from non-employed teenagers. Teenagers who work sleep less, they spend less time with media use, and they invest more time with academic learning, the latter especially on weekends. Focusing on the time use of employed adolescents, employment reduces time spent with peer activities, academic learning, relaxing, and media use.

Employing a flexible strategy combining propensity score matching and regression techniques to account for self-selection, I find beneficial effects on the internal locus of control that measures the individual belief that events can be controlled by personal decision and efforts. A concept that is related to self-esteem. In addition to promoting character skills, teenage employment improves the knowledge on which skills and talents school students have and reduces the importance of parents' advice with respect to their future career. These results are robust to several model specification and varying samples and robust to including family-fixed effects. The estimated treatment effects on the Big Five personality traits, reciprocity and the level of information on future occupation lose significance after controlling for unobserved confounders that are constant within families.

Overall the robustness of the results to various additional tests and the inclusion of variables which proxy the pre-treatment endowment of character skills support the hypothesis that working part-time while attending full-time schooling affects the locus of control and provides valuable insights for adolescents into their interests and talents.

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3.7 Appendix

Tables

Table 3.1: Sample Size – SOEP

	Men Have Had a Job?		Women Have Had a Job?	
	Yes	No	Yes	No
	1452		1489	
	566	886	562	927
	(38.41%)	(61.02%)	(38.58%)	(61.42%)

Source: SOEP V29. Note: Proportions calculated with SOEP sample weights.

Table 3.2: Information on First Part-Time Job – SOEP

	Men	Women	Difference
(a) Age When Started First Part-Time Job			
	14.41	14.25	0.16*
	(1.53)	(1.64)	(0.09)
(b) Reasons for First Part-Time Job			
Interest	0.118	0.157	−0.039*
	(0.323)	(0.364)	(0.022)
Supplement Allowance	0.847	0.803	0.044*
	(0.360)	(0.398)	(0.024)

Source: SOEP V29. Note: Calculations use the SOEP sample weights. Standard deviations and standard errors (in column labeled "Difference") are in parentheses. *, ** and *** denote significance at the 10%-, 5%- and 1%-level, respectively.

Table 3.3: Sample Size – TBS

	Men Have a Job?		Women Have a Job?	
	Yes	No	Yes	No
	611		687	
	153	458	147	540
	(25.00%)	(75.00%)	(21.40%)	(78.60%)

Source: Time Budget Survey. Wave 2001/2002.

Table 3.4: Additional Information on Employment – TBS

Men		Women	
	Share		Share
(a) Types of Jobs			
1 Delivery Jobs	0.575	Delivery Jobs	0.211
2 Salesclerk	0.065	Other Service Jobs (Waitress)	0.156
3 Other Service Jobs (Waiter)	0.052	Care Jobs (Babysitter)	0.143
4 Tutors	0.046	Tutors	0.122
5 Agriculture and Forestry Jobs	0.039	Salesclerk	0.075
(b) Working Hours per Week			
4.24		4.87	
(4.37)		(4.24)	

Source: Time Budget Survey. Wave 2001/2001. Standard deviations are in parentheses.

Table 3.5: Summary of Common Support and Balancing Tests on Variables Included in the Propensity Score

	Men	Women
(a) Smith/Todd-Test		
p-Value$\leq$ 0.05	2	4
p-Value$\leq$ 0.10	4	4
(b) Test of Equality of Means		
Unmatched	17	21
ATT-Weights	0	0
ATU-Weights	0	0
(c) Total Number of Covariates		
	73	77
(d) Percent Within Common Support Region		
Treated	99.5%	99.6%
Nontreated	99.4%	96.1%
(e) Percentage of Correctly Predicted		
	0.649	0.653

Source: SOEP V29. Panel (a) shows the number of covariates for which the null hypothesis of no influence of the treatment status on a given covariate conditional on a polynomial of the propensity score is rejected. The rows in panel (b) show the number of covariates with p-values ≤ 0.05 in a t-test of equality of means in the treated and non-treated samples before and after matching. Panel (c) shows the final number of covariates used for estimating the propensity score model. Panel (d) shows the percentage of observations that are within the common support region separately by treatment status. The common support region lays between the minimum propensity score of a treated and the maximum propensity score of a non-treated individual. Panel (e) shows the percentage of correctly predicted. All calculations use (in addition) SOEP sample weights.

Table 3.6: Hotelling Balancing Tests

	Men			Women		
	Unmatched	Matched		Unmatched	Matched	
		ATT	ATU		ATT	ATU
Parents	0.005	1.000	1.000	0.000	1.000	1.000
Parents' Character	0.146	1.000	1.000	0.000	1.000	1.000
Parents-Youth	0.587	1.000	0.998	0.017	1.000	0.999
Youth	0.000	1.000	0.995	0.000	1.000	1.000
Location	0.000	1.000	0.999	0.004	1.000	1.000
Annual Dummies	0.118	1.000	1.000	0.019	0.999	0.991

Source: SOEP V29. Note: The table shows the p-values from Hotelling tests of equality of means between the treated and comparison samples. Covariates of the propensity score models are separated into different categories. Category "Parents' character" consists of a subgroup of variables that measures parents' character skills such as Big Five, Locus of Control and Trust. These variables are also included in category "Parents" in addition to parents' earnings and education level. In columns labeled "Unmatched" adolescents are weighted by survey weights provided by the SOEP. In columns labeled "ATT" and "ATU" adolescents are weighted by matching weights calculated in section 3.3.4.

Table 3.7: Descriptive Statistics for Key Covariates – SOEP

	Men			Women		
	Have Held a Job?			Have Held a Job?		
	Yes	No	p-Value	Yes	No	p-Value
N	1,452			1,489		
	566	886		562	927	
Parent with University Entrance Qualification	0.275 (0.447)	0.219 (0.414)	**0.016**	0.288 (0.453)	0.182 (0.386)	**0.000**
Parent with Tertiary Education	0.376 (0.485)	0.338 (0.473)	0.183	0.389 (0.488)	0.301 (0.459)	**0.002**
Parental Earnings (1,000 €)	22.888 (15.665)	20.315 (16.581)	**0.004**	22.222 (17.285)	19.877 (14.783)	**0.006**
Father not Employed	0.060 (0.198)	0.103 (0.237)	**0.000**	0.054 (0.181)	0.081 (0.214)	**0.015**
Father Self-Employed	0.074 (0.242)	0.088 (0.258)	0.310	0.095 (0.261)	0.093 (0.269)	0.855
Mother not Employed	0.261 (0.353)	0.329 (0.388)	**0.001**	0.304 (0.373)	0.332 (0.389)	0.185
Mother Self-Employed	0.083 (0.240)	0.048 (0.170)	**0.001**	0.079 (0.231)	0.054 (0.194)	**0.031**
Father's General Trust	0.097 (0.967)	-0.015 (0.956)	**0.060**	0.156 (1.064)	-0.139 (1.010)	**0.000**
Father's Past Trusting Behavior	0.070 (0.941)	-0.063 (1.005)	**0.028**	0.067 (0.979)	-0.018 (1.040)	0.177
Mother's General Trust	0.148 (1.079)	-0.061 (0.964)	**0.000**	0.096 (1.028)	-0.090 (0.952)	**0.001**
Mother's Past Trusting Behavior	0.067 (0.941)	-0.059 (1.028)	**0.026**	0.136 (1.013)	-0.066 (0.989)	**0.000**
Academically Oriented School Track	0.517 (0.500)	0.402 (0.491)	**0.000**	0.585 (0.493)	0.465 (0.499)	**0.000**
Academic School Track Recommendation	0.533 (0.499)	0.382 (0.486)	**0.000**	0.590 (0.492)	0.441 (0.497)	**0.000**
Migration Background	0.186 (0.389)	0.299 (0.458)	**0.000**	0.238 (0.426)	0.318 (0.466)	**0.001**
Sports on Daily Basis	0.306 (0.461)	0.252 (0.435)	**0.031**	0.170 (0.376)	0.122 (0.327)	**0.012**
Formal Extracurricular Activity at School	0.463 (0.499)	0.355 (0.479)	**0.000**	0.538 (0.499)	0.369 (0.483)	**0.000**
Less Formal Extracurr. Activity at School	0.666 (0.472)	0.548 (0.498)	**0.000**	0.756 (0.430)	0.606 (0.489)	**0.000**
East Germany	0.176 (0.381)	0.219 (0.414)	**0.048**	0.158 (0.365)	0.227 (0.419)	**0.001**
Grew Up in City	0.641 (0.480)	0.731 (0.444)	**0.000**	0.658 (0.475)	0.723 (0.448)	**0.008**
Unemployment Rate	10.759 (4.211)	11.175 (4.629)	**0.084**	10.530 (4.494)	11.120 (4.897)	**0.019**

Source: SOEP V29. Columns labeled 'N' show the number of observations with non-missing values of the corresponding variable. Columns labeled 'Yes' and 'No' show the means and standard deviations (in parentheses) of each variable. The column labeled 'p-Value' shows the p-value from a t-test of equality of means. Calculations use the SOEP sample weights.

Table 3.8: Descriptive Statistics for Key Covariates – TBS

	Men			Women		
	Hold a Job?			Hold a Job?		
	Yes	No	p-Value	Yes	No	p-Value
N	611			687		
	153	458		147	540	
Parent with University	0.412	0.356	0.216	0.449	0.381	0.138
Entrance Qualification	(0.494)	(0.479)		(0.499)	(0.486)	
Self Employed Parent	0.248	0.186	**0.094**	0.279	0.176	**0.005**
	(0.433)	(0.389)		(0.450)	(0.381)	
Monthly Household Net Income						
Less than € 1500	0.033	0.061	0.178	0.034	0.057	0.260
	(0.178)	(0.240)		(0.182)	(0.233)	
€ 1500 - € 3750	0.346	0.404	0.207	0.320	0.385	0.146
	(0.477)	(0.491)		(0.468)	(0.487)	
More than € 3750	0.621	0.535	**0.064**	0.646	0.557	**0.053**
	(0.487)	(0.499)		(0.480)	(0.497)	
Age	15.719	14.683	**0.000**	16.184	14.770	**0.000**
	(1.583)	(1.495)		(1.490)	(1.549)	
Academically Oriented	0.660	0.526	**0.004**	0.748	0.581	**0.000**
School Track	(0.475)	(0.500)		(0.435)	(0.494)	
East Germany	0.124	0.231	**0.004**	0.102	0.243	**0.000**
	(0.331)	(0.422)		(0.304)	(0.429)	

Source: Time Budget Survey. The column labeled 'p-Value' shows the p-value from a t-test of equality of means. Standard deviations are in parentheses.

Definition of Activity Categories in Tables 3.9 to 3.12

The categories in Tables 3.9 to 3.12 are defined as follows. Category "Sleep" covers sleep between 9pm and 8am. Category "Eating/Washing/Dressing" includes eating, washing and dressing oneself. Category "Part-Time Job" denotes time that is spend with job specific activities such as part-time employment, internship, breaks during working time and job search. Category "School Attendance" shows the amount of time spent in school while category "Learning Activities" covers activities such as attending tutoring sessions and self-learning including internet based learning. Category "Housework" includes preparing meal, cleaning the apartment/house, washing clothes and shopping. Category "Technical & Related Activities" covers activities such as model making, crafting, photographing and filming. Category "Volunteering" shows how much time is spent with volunteer activities at clubs and parties while category "Neighborly Help" covers informal help for other households such as child care and shopping. Category "Peer Activities" denotes time that is spend in social activities with friends or in a clique such as going to cinema, sports events or clubs. Category "Relaxing" shows the amount of time spent with relaxing while category "Sports Activities" covers different types of athletic activities. Category "Artistic Activities" captures time spent with playing music, singing, painting and writing and category "Reading" includes activities such as reading magazines, newspapers and books. Category "Media Use" includes activities such as watching TV and video, playing pc games, chatting and surfing the internet. Category "Listening to Music" shows time spent with listening to music. Category "Travelling" measures time spent travelling, category "Time Diary" shows time spent filling in the time diary and category "Transit Time" shows how much time they spent being on the way by foot, bus and other means of travel.

Table 3.9: Time Use on a Weekday – TBS

	Men			Women		
	Hold a Job?			Hold a Job?		
	Yes	No	Diff	Yes	No	Diff
N	300	892		285	1053	
Sleep	473.3	496.3	−23.1***	457.2	497.6	−40.4***
	(98.7)	(84.8)	(5.9)	(97.4)	(77.4)	(5.5)
Eating/Washing/Dressing	108.2	111.3	−3.1	135.3	127.2	8.1**
	(49.3)	(48.5)	(3.3)	(67.6)	(51.9)	(3.7)
Part-Time Job	35.8	13.0	22.8***	26.5	7.1	19.4***
	(96.0)	(67.4)	(5.0)	(81.2)	(50.2)	(3.9)
School Attendance	219.3	218.8	0.5	208.2	212.9	−4.7
	(165.7)	(157.0)	(10.6)	(158.0)	(158.4)	(10.6)
Learning Activities	48.5	45.1	3.3	62.8	56.4	6.5
	(70.2)	(59.8)	(4.2)	(83.8)	(72.1)	(5.0)
Housework	39.4	40.1	−0.7	73.6	66.0	7.6
	(57.3)	(62.4)	(4.1)	(83.3)	(73.2)	(5.0)
Technical & Related Act.	6.6	6.1	0.5	6.9	5.1	1.9
	(25.2)	(26.8)	(1.8)	(24.3)	(21.9)	(1.5)
Volunteering	13.5	7.8	5.7*	9.4	4.6	4.8**
	(67.8)	(36.1)	(3.1)	(40.7)	(24.7)	(1.9)
Neighborly Help	2.1	1.6	0.5	2.5	2.2	0.4
	(14.9)	(15.4)	(1.0)	(17.2)	(15.6)	(1.1)
Peer Activities	93.2	86.7	6.5	110.2	101.5	8.8
	(128.4)	(123.2)	(8.3)	(130.5)	(111.7)	(7.7)
Relaxing	58.0	48.1	9.9	47.2	41.3	5.8
	(103.1)	(88.8)	(6.2)	(76.0)	(71.2)	(4.8)
Sports Activities	37.4	43.9	−6.5	32.3	33.2	−0.9
	(69.2)	(75.4)	(4.9)	(61.6)	(64.3)	(4.3)
Artistic Act.	8.2	5.4	2.8	9.1	10.5	−1.4
	(31.4)	(30.8)	(2.1)	(29.8)	(36.2)	(2.3)
Reading	15.0	17.8	−2.7	26.1	26.5	−0.3
	(37.5)	(36.1)	(2.4)	(42.6)	(51.6)	(3.3)
Media Use	170.0	191.3	−21.3**	111.4	136.1	−24.7***
	(133.8)	(148.6)	(9.7)	(107.9)	(112.9)	(7.5)
Listening to Music	11.2	10.1	1.0	12.6	11.7	0.9
	(29.0)	(29.4)	(2.0)	(36.7)	(28.9)	(2.1)
Travelling	1.0	5.0	−4.1*	4.0	4.1	0.0
	(6.9)	(39.4)	(2.3)	(43.4)	(38.3)	(2.6)
Time Diary	3.4	3.8	−0.4	3.5	4.6	−1.2
	(11.0)	(12.0)	(0.8)	(10.6)	(15.2)	(1.0)
Transit Time	94.6	84.5	10.1**	99.9	89.8	10.1**

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Time Use on a Weekday – TBS

	Men			Women		
	Hold a Job?			Hold a Job?		
	Yes	No	Diff	Yes	No	Diff
	(78.4)	(61.8)	(4.4)	(71.0)	(70.2)	(4.7)
Total	1438.5	1436.7	1.7	1438.9	1438.3	0.6
Not Covered	1.5	3.3		1.1	1.7	

Source: Time Budget Survey. Wave 2001/02. Time allocation in minutes. The table shows time that is spend with main activities. Secondary activities are ignored.

Table 3.10: Time Use on a Weekend Day – TBS

	Men			Women		
	Hold a Job?			Hold a Job?		
	Yes	No	Diff	Yes	No	Diff
N	158	478		155	564	
Sleep	538.2	564.2	−26.0***	519.0	569.5	−50.5***
	(117.6)	(102.4)	(9.8)	(125.7)	(101.9)	(9.7)
Eating/Washing/Dressing	123.2	128.3	−5.1	146.4	151.3	−4.9
	(68.3)	(65.5)	(6.1)	(60.7)	(66.9)	(6.0)
Part-Time Job	32.9	8.3	24.6***	32.4	2.6	29.8***
	(82.3)	(56.7)	(5.9)	(91.0)	(27.2)	(4.4)
School Attendance	4.4	7.1	−2.8	5.2	4.1	1.1
	(28.9)	(44.6)	(3.8)	(39.0)	(33.8)	(3.2)
Learning Activities	37.2	27.1	10.1*	38.6	28.5	10.2*
	(79.2)	(58.9)	(5.9)	(68.5)	(59.0)	(5.5)
Housework	46.1	49.1	−3.0	94.1	74.4	19.7**
	(70.1)	(65.2)	(6.1)	(100.5)	(80.9)	(7.8)
Technical Related Act.	6.4	10.8	−4.4	14.1	9.5	4.6
	(34.0)	(38.8)	(3.5)	(53.4)	(39.7)	(3.9)
Volunteering	9.4	11.9	−2.5	11.4	15.4	−3.9
	(47.3)	(52.9)	(4.7)	(39.1)	(61.3)	(5.2)
Neighborly Help	5.3	6.3	−1.0	1.1	7.6	−6.5*
	(31.2)	(38.0)	(3.3)	(8.4)	(44.0)	(3.6)
Peer Activities	138.2	133.7	4.5	173.5	160.5	13.1
	(150.8)	(150.9)	(13.8)	(160.2)	(148.7)	(13.7)
Relaxing	85.3	70.0	15.2**	92.1	72.6	19.6**
	(84.9)	(84.3)	(7.7)	(91.3)	(82.9)	(7.7)
Sports Activities	49.4	52.7	−3.3	21.4	42.7	−21.3***
	(93.2)	(98.3)	(8.9)	(51.8)	(85.9)	(7.2)

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Time Use on a Weekend Day – TBS

	Men			Women		
	Hold a Job?			Hold a Job?		
	Yes	No	Diff	Yes	No	Diff
Artistic Act.	6.4	7.4	−1.1	13.5	10.9	2.7
	(23.9)	(33.9)	(2.9)	(59.6)	(38.0)	(4.0)
Reading	18.6	21.5	−2.9	30.9	35.1	−4.2
	(43.0)	(46.7)	(4.2)	(48.4)	(59.2)	(5.2)
Media Use	247.3	249.1	−1.8	157.7	159.7	−2.1
	(166.3)	(177.3)	(16.0)	(147.3)	(131.6)	(12.3)
Listening to Music	13.1	15.9	−2.8	11.7	19.8	−8.1*
	(33.4)	(40.3)	(3.6)	(34.9)	(50.3)	(4.3)
Travelling	2.9	5.5	−2.6	3.3	4.8	−1.5
	(29.0)	(50.2)	(4.2)	(33.3)	(41.1)	(3.6)
Time Diary	3.4	3.8	−0.4	3.5	3.8	−0.3
	(12.1)	(15.2)	(1.3)	(10.5)	(12.5)	(1.1)
Transit Time	66.6	62.6	4.0	68.6	62.9	5.7
	(76.9)	(81.9)	(7.4)	(70.7)	(72.2)	(6.5)
Total	1434.3	1435.6	−1.3	1438.6	1435.5	3.1
Not Covered	5.7	4.4		1.4	4.5	

Source: Time Budget Survey. Wave 2001/02. Time allocation in minutes. The table shows time that is spend with main activities. Secondary activities are ignored.

Table 3.11: Time Use on a Working/Non-Working Weekday Based on the Subset of Adolescents who Work, i.e. Column "Yes" in Table 3.9 – TBS

	Men			Women		
	Workday?			Workday?		
	Yes	No	Diff	Yes	No	Diff
N	66	234		41	244	
Sleep	480.2	471.3	8.8	452.0	458.1	−6.1
	(85.1)	(102.3)	(13.8)	(84.2)	(99.6)	(16.5)
Eating/Washing/Dressing	110.0	107.6	2.4	136.3	135.1	1.2
	(53.7)	(48.1)	(6.9)	(56.2)	(69.4)	(11.4)
Part-Time Job	162.7	0.0	162.7***	184.4	0.0	184.4***
	(146.5)	(0.0)	(9.5)	(130.1)	(0.0)	(8.3)
School Attendance	203.6	223.7	−20.0	195.9	210.3	−14.5
	(156.6)	(168.3)	(23.1)	(151.9)	(159.3)	(26.7)
Learning Activities	47.3	48.8	−1.5	39.8	66.7	−27.0*
	(61.3)	(72.7)	(9.8)	(59.8)	(86.7)	(14.1)

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Time Use on a Working/Non-Working Weekday Based on the Subset of Adolescents who Work, i.e. Column "Yes" in Table 3.9 – TBS

	Men			Women		
	Working Day?			Working Day?		
	Yes	No	Diff	Yes	No	Diff
Housework	35.9	40.3	−4.4	43.4	78.7	−35.3**
	(52.7)	(58.6)	(8.0)	(48.0)	(86.9)	(13.9)
Technical Related Act.	9.8	5.7	4.2	5.9	7.1	−1.3
	(36.2)	(21.1)	(3.5)	(25.0)	(24.2)	(4.1)
Volunteering	7.7	15.2	−7.4	7.3	9.8	−2.4
	(32.2)	(74.8)	(9.5)	(33.0)	(41.9)	(6.9)
Neighborly Help	2.4	2.0	0.4	2.2	2.6	−0.4
	(14.3)	(15.1)	(2.1)	(14.1)	(17.7)	(2.9)
Peer Activities	65.3	101.0	−35.7**	83.4	114.8	−31.3
	(89.1)	(136.6)	(17.8)	(92.9)	(135.4)	(22.0)
Relaxing	26.1	67.0	−40.9***	29.8	50.1	−20.3
	(45.1)	(112.6)	(14.2)	(47.9)	(79.5)	(12.8)
Sports Activities	22.4	41.6	−19.2**	13.4	35.5	−22.0**
	(54.2)	(72.4)	(9.6)	(39.9)	(64.1)	(10.3)
Artistic Act.	10.9	7.5	3.4	4.1	9.9	−5.8
	(36.9)	(29.7)	(4.4)	(18.3)	(31.3)	(5.0)
Reading	12.4	15.8	−3.3	19.0	27.3	−8.3
	(36.2)	(37.8)	(5.2)	(32.8)	(44.0)	(7.2)
Media Use	135.3	179.7	−44.4**	83.7	116.0	−32.4*
	(115.7)	(137.1)	(18.5)	(70.8)	(112.4)	(18.1)
Listening to Music	5.8	12.7	−6.9*	16.1	12.0	4.1
	(19.3)	(31.1)	(4.0)	(57.0)	(32.2)	(6.2)
Travelling	0.3	1.2	−0.9	0.0	4.7	−4.7
	(2.5)	(7.7)	(1.0)	(0.0)	(46.9)	(7.3)
Time Diary	3.9	3.2	0.7	3.2	3.5	−0.4
	(13.0)	(10.4)	(1.5)	(7.9)	(11.0)	(1.8)
Transit Time	97.6	93.8	3.8	120.2	96.5	23.7**
	(57.7)	(83.4)	(10.9)	(59.7)	(72.3)	(11.9)
Total	1439.7	1438.1	1.6	1440.0	1438.7	1.3
Not Covered	0.3	1.9		0.0	1.3	

Source: Time Budget Survey. Wave 2001/02. Time allocation in minutes. The table shows time that is spend with main activities. Secondary activities are ignored.

Table 3.12: Time Use on a Working/Non-Working Weekend Day Based on the Subset of Adolescents who Work, i.e. Column "Yes" in Table 3.10 – TBS

	Men			Women		
	Working Day?			Working Day?		
	Yes	No	Diff	Yes	No	Diff
N	31	127		25	130	
Sleep	505.5	546.2	−40.7*	450.4	532.2	−81.8***
	(117.3)	(116.8)	(23.4)	(133.7)	(120.2)	(26.7)
Eating/Washing/Dressing	128.4	122.0	6.4	134.8	148.6	−13.8
	(66.3)	(68.9)	(13.7)	(41.2)	(63.6)	(13.2)
Part-Time Job	167.7	0.0	167.7***	200.8	0.0	200.8***
	(110.0)	(0.0)	(9.7)	(133.8)	(0.0)	(11.6)
School Attendance	2.9	4.7	−1.8	0.0	6.2	−6.2
	(16.2)	(31.3)	(5.8)	(0.0)	(42.5)	(8.5)
Learning Activities	27.7	39.5	−11.8	32.0	39.9	−7.9
	(53.9)	(84.2)	(15.9)	(48.9)	(71.7)	(15.0)
Housework	47.4	45.7	1.7	75.2	97.8	−22.6
	(89.9)	(64.7)	(14.1)	(88.4)	(102.6)	(21.9)
Technical Related Act.	5.5	6.6	−1.1	9.2	15.0	−5.8
	(16.1)	(37.1)	(6.8)	(30.0)	(56.8)	(11.7)
Volunteering	20.6	6.6	14.0	23.2	9.2	14.0*
	(82.5)	(33.6)	(9.4)	(73.6)	(28.1)	(8.5)
Neighborly Help	0.0	6.6	−6.6	3.6	0.6	3.0
	(0.0)	(34.7)	(6.3)	(18.0)	(4.8)	(1.8)
Peer Activities	121.3	142.4	−21.1	176.0	173.1	2.9
	(116.2)	(158.2)	(30.3)	(186.5)	(155.4)	(35.1)
Relaxing	36.1	97.2	−61.1***	53.2	99.6	−46.4**
	(48.6)	(87.7)	(16.4)	(65.6)	(93.8)	(19.6)
Sports Activities	30.0	54.2	−24.2	16.8	22.2	−5.4
	(68.8)	(97.9)	(18.6)	(56.0)	(51.1)	(11.3)
Artistic Act.	9.7	5.6	4.1	0.4	16.1	−15.7
	(20.4)	(24.7)	(4.8)	(2.0)	(64.9)	(13.0)
Reading	26.5	16.7	9.8	31.6	30.8	0.8
	(54.0)	(39.8)	(8.6)	(41.5)	(49.7)	(10.6)
Media Use	229.7	251.7	−22.0	138.8	161.3	−22.5
	(170.6)	(165.7)	(33.4)	(128.7)	(150.7)	(32.2)
Listening to Music	7.7	14.4	−6.7	20.4	10.1	10.3
	(19.3)	(36.0)	(6.7)	(50.5)	(31.0)	(7.6)
Travelling	0.0	3.6	−3.6	0.0	3.9	−3.9
	(0.0)	(32.4)	(5.8)	(0.0)	(36.3)	(7.3)
Time Diary	4.2	3.1	1.0	4.4	3.3	1.1
	(12.9)	(11.9)	(2.4)	(12.9)	(10.0)	(2.3)

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Time Use on a Working/Non-Working Weekend Day Based on the Subset of Adolescents who Work, i.e. Column "Yes" in Table 3.10 – TBS

	Men			Women		
	Working Day?			Working Day?		
	Yes	No	Diff	Yes	No	Diff
Transit Time	66.8	66.5	0.2	69.2	68.5	0.7
	(70.9)	(78.5)	(15.4)	(58.8)	(73.0)	(15.5)
Total	1437.7	1433.5	4.3	1440.0	1438.3	1.7
Not Covered	2.3	6.5		0.0	1.7	

Source: Time Budget Survey. Wave 2001/02. Time allocation in minutes. The table shows time that is spend with main activities. Secondary activities are ignored.

Table 3.13: Locus of Control

	N	Mean	Raw Diff.	ATT	ATU	ATE	OLS
			(a) External Locus of Control				
Men	1268	−0.020	−0.218**	−0.087	−0.088	−0.087	−0.085
		(1.031)	(0.090)	(0.074)	(0.075)	(0.073)	(0.074)
Women	1262	0.021	0.009	0.002	0.013	0.009	0.012
		(0.967)	(0.084)	(0.076)	(0.080)	(0.072)	(0.075)
			(b) Internal Locus of Control				
Men	1268	0.022	0.194*	0.180**	0.180**	0.180**	0.187**
		(1.029)	(0.100)	(0.078)	(0.078)	(0.080)	(0.079)
Women	1262	−0.029	0.077	0.116	0.167**	0.147*	0.107
		(0.955)	(0.085)	(0.075)	(0.081)	(0.075)	(0.075)

Source: SOEP V29. Note: All outcome variables are standardized. Calculations use SOEP sample weights. Standard deviations (mean) and standard errors are in parentheses. Standard errors of the treatment effects are bootstrapped with 500 replications and clustered at the family level. *, ** and *** denote significance at the 10%-, 5%- and 1%-level, respectively.

Table 3.14: BIG Five Personality Traits

	N	Mean	Raw Diff.	ATT	ATU	ATE	OLS
(a) Extraversion							
Men	1284	−0.059	0.206**	0.214***	0.208***	0.211***	0.208***
		(1.030)	(0.085)	(0.080)	(0.075)	(0.072)	(0.076)
Women	1270	0.066	0.188**	0.095	0.104	0.101	0.097
		(0.958)	(0.077)	(0.069)	(0.072)	(0.067)	(0.070)
(b) Conscientiousness							
Men	1284	−0.140	−0.096	−0.120	−0.065	−0.086	−0.097
		(0.988)	(0.084)	(0.079)	(0.081)	(0.077)	(0.078)
Women	1270	0.143	0.127	0.070	0.059	0.063	0.073
		(0.990)	(0.086)	(0.070)	(0.073)	(0.069)	(0.071)
(c) Openness							
Men	1284	−0.116	0.028	0.040	0.065	0.055	0.037
		(1.010)	(0.083)	(0.077)	(0.074)	(0.071)	(0.072)
Women	1270	0.120	0.219***	0.168**	0.134*	0.147**	0.154**
		(0.965)	(0.078)	(0.069)	(0.072)	(0.068)	(0.069)
(d) Agreeableness							
Men	1284	−0.130	−0.044	−0.113	−0.077	−0.091	−0.108
		(0.993)	(0.085)	(0.080)	(0.084)	(0.080)	(0.079)
Women	1270	0.121	0.167*	0.091	0.097	0.095	0.096
		(0.994)	(0.088)	(0.067)	(0.072)	(0.070)	(0.068)
(e) Neuroticism							
Men	1284	−0.214	−0.097	−0.120	−0.164**	−0.147**	−0.110
		(0.958)	(0.081)	(0.075)	(0.071)	(0.070)	(0.073)
Women	1270	0.236	0.021	0.095	0.101	0.099	0.111
		(0.985)	(0.081)	(0.074)	(0.078)	(0.076)	(0.073)

Source: SOEP V29. Note: All outcome variables are standardized. Calculations use SOEP sample weights. Standard deviations (mean) and standard errors are in parentheses. Standard errors of the treatment effects are bootstrapped with 500 replications and clustered at the family level. *, ** and *** denote significance at the 10%-, 5%- and 1%-level, respectively.

Table 3.15: Reciprocity

	N	Mean	Raw Diff.	ATT	ATU	ATE	OLS
(a) Negative Reciprocity							
Men	901	0.200	0.031	0.057	0.054	0.055	0.055
		(0.986)	(0.105)	(0.097)	(0.096)	(0.099)	(0.098)
Women	905	−0.194	−0.176	−0.071	−0.060	−0.064	−0.069
		(0.973)	(0.114)	(0.083)	(0.085)	(0.081)	(0.085)
(b) Positive Reciprocity							
Men	901	−0.040	0.292***	0.124	0.130	0.128	0.125
		(1.010)	(0.101)	(0.093)	(0.093)	(0.098)	(0.094)
Women	905	0.028	0.142	0.059	0.057	0.058	0.056
		(0.993)	(0.112)	(0.095)	(0.096)	(0.096)	(0.096)

Source: SOEP V29. Note: All outcome variables are standardized. Calculations use SOEP sample weights. Standard deviations (mean) and standard errors are in parentheses. Standard errors of the treatment effects are bootstrapped with 500 replications and clustered at the family level. *, ** and *** denote significance at the 10%-, 5%- and 1%-level, respectively.

Table 3.16: Occupational Choice Strategy

	N	Mean	Raw Diff.	ATT	ATU	ATE	OLS
(a) Passive Strategy							
Men	1338	−0.019	−0.101	−0.096	−0.137*	−0.121	−0.099
		(1.019)	(0.081)	(0.076)	(0.083)	(0.075)	(0.074)
Women	1347	0.031	−0.155**	−0.158**	−0.110	−0.129*	−0.159**
		(0.973)	(0.072)	(0.074)	(0.081)	(0.078)	(0.074)
(b) Active Strategy							
Men	1338	−0.012	0.091	0.121	0.145*	0.135*	0.120
		(1.000)	(0.078)	(0.074)	(0.076)	(0.075)	(0.074)
Women	1347	0.014	0.137*	0.172**	0.192***	0.184***	0.169**
		(0.995)	(0.079)	(0.071)	(0.073)	(0.069)	(0.071)
(c) Parental-Dominated Strategy							
Men	1338	0.085	−0.188**	−0.112	−0.085	−0.096	−0.120
		(1.027)	(0.086)	(0.079)	(0.081)	(0.081)	(0.079)
Women	1347	−0.089	−0.240***	−0.121*	−0.104	−0.111*	−0.126**
		(0.958)	(0.071)	(0.062)	(0.067)	(0.064)	(0.063)

Source: SOEP V29. Note: All outcome variables are standardized. Calculations use SOEP sample weights. Standard deviations (mean) and standard errors are in parentheses. Standard errors of the treatment effects are bootstrapped with 500 replications and clustered at the family level. *, ** and *** denote significance at the 10%-, 5%- and 1%-level, respectively.

Table 3.17: Level of Information on Future Occupation

	N	Mean	Raw Diff.	ATT	ATU	ATE	OLS
(a) To Some Degree							
Men	1427	0.002	0.088	0.155**	0.171**	0.165**	0.153**
		(1.000)	(0.077)	(0.067)	(0.068)	(0.065)	(0.067)
Women	1431	−0.012	0.096	0.042	0.051	0.047	0.049
		(0.999)	(0.077)	(0.069)	(0.072)	(0.069)	(0.068)
(b) With Certainty							
Men	1427	0.021	0.036	0.115*	0.134*	0.127*	0.111
		(1.015)	(0.078)	(0.070)	(0.073)	(0.072)	(0.069)
Women	1431	−0.031	−0.018	0.003	0.032	0.021	0.007
		(0.978)	(0.070)	(0.071)	(0.073)	(0.069)	(0.068)

Source: SOEP V29. Note: All outcome variables are standardized. Calculations use SOEP sample weights. Standard deviations (mean) and standard errors are in parentheses. Standard errors of the treatment effects are bootstrapped with 500 replications and clustered at the family level. *, ** and *** denote significance at the 10%-, 5%- and 1%-level, respectively.

Table 3.18: Locus of Control - Fixed Effects

	N	Raw Diff.	ATT	ATU	ATE	OLS
(a) External Locus of Control						
Full Sample	2530	−0.110*	−0.028	−0.027	−0.027	−0.016
		(0.063)	(0.053)	(0.057)	(0.054)	(0.055)
Sibling Sample	515	−0.063	0.009	0.016	0.013	−0.040
		(0.133)	(0.111)	(0.116)	(0.107)	(0.108)
Sibling Sample (FE)			0.128	0.148	0.138	0.109
			(0.209)	(0.212)	(0.201)	(0.201)
(b) Internal Locus of Control						
Full Sample	2530	0.139**	0.133**	0.184***	0.164***	0.139**
		(0.067)	(0.056)	(0.056)	(0.055)	(0.057)
Sibling Sample	515	0.047	0.224*	0.238**	0.231**	0.166
		(0.120)	(0.115)	(0.115)	(0.109)	(0.107)
Sibling Sample (FE)			0.223	0.244	0.234	0.188
			(0.182)	(0.184)	(0.174)	(0.179)

Source: SOEP V29. Note: All outcome variables are standardized. Calculations use SOEP sample weights. Standard errors are in parentheses. Standard errors of the treatment effects are bootstrapped with 500 replications and clustered at the family level. Rows labeled "Full Sample" show results estimated with a pooled sample and with all adolescents but without including family dummy variables. Rows labeled "Sibling Sample" and "Sibling Sample (FE)" show results estimated with the restricted sibling sample without and with dummy variables for each family in the regression to control for unobserved confounders that are constant within families. *, ** and *** denote significance at the 10%-, 5%- and 1%-level, respectively.

Table 3.19: BIG Five Personality Traits - Fixed Effects

	N	Raw Diff.	ATT	ATU	ATE	OLS
(a) Extraversion						
Full Sample	2554	0.200***	0.158***	0.186***	0.175***	0.154**
		(0.058)	(0.058)	(0.057)	(0.054)	(0.061)
Sibling Sample	520	0.200	0.123	0.170	0.148	0.156
		(0.127)	(0.127)	(0.128)	(0.124)	(0.131)
Sibling Sample (FE)			0.010	0.042	0.027	0.033
			(0.175)	(0.169)	(0.167)	(0.170)
(b) Conscientiousness						
Full Sample	2554	0.018	−0.014	−0.004	−0.008	0.000
		(0.061)	(0.056)	(0.059)	(0.056)	(0.057)
Sibling Sample	520	0.065	−0.036	0.017	−0.009	0.015
		(0.134)	(0.098)	(0.097)	(0.094)	(0.100)
Sibling Sample (FE)			−0.071	−0.062	−0.067	−0.063
			(0.154)	(0.145)	(0.145)	(0.147)
(c) Openness						
Full Sample	2554	0.125**	0.100*	0.108*	0.105**	0.094*
		(0.058)	(0.054)	(0.056)	(0.053)	(0.057)
Sibling Sample	520	0.055	−0.013	0.021	0.004	0.016
		(0.140)	(0.118)	(0.119)	(0.115)	(0.120)
Sibling Sample (FE)			0.062	0.025	0.043	0.032
			(0.169)	(0.164)	(0.162)	(0.162)
(d) Agreeableness						
Full Sample	2554	0.064	−0.002	0.016	0.009	0.017
		(0.062)	(0.056)	(0.058)	(0.055)	(0.055)
Sibling Sample	520	0.085	0.007	0.029	0.018	0.029
		(0.149)	(0.112)	(0.103)	(0.104)	(0.105)
Sibling Sample (FE)			0.121	0.102	0.111	0.094
			(0.171)	(0.159)	(0.158)	(0.163)
(e) Neuroticism						
Full Sample	2554	−0.031	−0.017	−0.034	−0.027	0.010
		(0.059)	(0.056)	(0.054)	(0.052)	(0.056)
Sibling Sample	520	−0.091	−0.022	−0.058	−0.041	−0.045
		(0.145)	(0.121)	(0.119)	(0.116)	(0.117)
Sibling Sample (FE)			0.099	0.138	0.119	0.134
			(0.205)	(0.198)	(0.198)	(0.198)

Source: SOEP V29. Note: All outcome variables are standardized. Calculations use SOEP sample weights. Standard errors are in parentheses. Standard errors of the treatment effects are bootstrapped with 500 replications and clustered at the family level. Rows labeled "Full Sample" show results estimated with a pooled sample and with all adolescents but without including family dummy variables. Rows labeled "Sibling Sample" and "Sibling Sample (FE)" show results estimated with the restricted sibling sample without and with dummy variables for each family in the regression to control for unobserved confounders that are constant within families. *, ** and *** denote significance at the 10%-, 5%- and 1%-level, respectively.

Table 3.20: Reciprocity - Fixed Effects

	N	Raw Diff.	ATT	ATU	ATE	OLS
(a) Negative Reciprocity						
Full Sample	1806	−0.085	−0.011	−0.003	−0.006	−0.013
		(0.082)	(0.063)	(0.064)	(0.063)	(0.064)
Sibling Sample	394	−0.161	−0.186	−0.166	−0.176	−0.160
		(0.166)	(0.125)	(0.119)	(0.118)	(0.115)
Sibling Sample (FE)			−0.462*	−0.399	−0.430*	−0.411
			(0.265)	(0.257)	(0.247)	(0.259)
(b) Positive Reciprocity						
Full Sample	1806	0.218***	0.139**	0.143**	0.141**	0.137**
		(0.075)	(0.065)	(0.063)	(0.064)	(0.064)
Sibling Sample	394	−0.003	0.092	0.083	0.088	0.084
		(0.145)	(0.135)	(0.136)	(0.131)	(0.136)
Sibling Sample (FE)			−0.120	−0.112	−0.116	−0.105
			(0.377)	(0.425)	(0.376)	(0.425)

Source: SOEP V29. Note: All outcome variables are standardized. Calculations use SOEP sample weights. Standard errors are in parentheses. Standard errors of the treatment effects are bootstrapped with 500 replications and clustered at the family level. Rows labeled "Full Sample" show results estimated with a pooled sample and with all adolescents but without including family dummy variables. Rows labeled "Sibling Sample" and "Sibling Sample (FE)" show results estimated with the restricted sibling sample without and with dummy variables for each family in the regression to control for unobserved confounders that are constant within families. *, ** and *** denote significance at the 10%-, 5%- and 1%-level, respectively.

Table 3.21: Occupational Choice Strategy - Fixed Effects

	N	Raw Diff.	ATT	ATU	ATE	OLS
(a) Passive Strategy						
Full Sample	2685	−0.126**	−0.124**	−0.113*	−0.117**	−0.128**
		(0.055)	(0.053)	(0.062)	(0.056)	(0.054)
Sibling Sample	540	−0.034	−0.033	−0.029	−0.031	−0.059
		(0.125)	(0.110)	(0.115)	(0.110)	(0.108)
Sibling Sample (FE)			−0.118	−0.123	−0.121	−0.098
			(0.178)	(0.181)	(0.176)	(0.176)
(b) Active Strategy						
Full Sample	2685	0.114**	0.131**	0.149***	0.142***	0.132**
		(0.055)	(0.053)	(0.055)	(0.052)	(0.055)
Sibling Sample	540	−0.010	0.062	0.035	0.048	0.051
		(0.127)	(0.117)	(0.124)	(0.118)	(0.118)
Sibling Sample (FE)			−0.018	−0.011	−0.014	−0.013
			(0.180)	(0.178)	(0.177)	(0.171)
(c) Parental-Dominated Strategy						
Full Sample	2685	−0.216***	−0.121**	−0.094	−0.105*	−0.125**
		(0.056)	(0.054)	(0.059)	(0.055)	(0.056)
Sibling Sample	540	−0.053	−0.017	−0.058	−0.038	−0.065
		(0.137)	(0.111)	(0.112)	(0.108)	(0.112)
Sibling Sample (FE)			−0.057	−0.091	−0.074	−0.060
			(0.161)	(0.157)	(0.155)	(0.153)

Source: SOEP V29. Note: All outcome variables are standardized. Calculations use SOEP sample weights. Standard errors are in parentheses. Standard errors of the treatment effects are bootstrapped with 500 replications and clustered at the family level. Rows labeled "Full Sample" show results estimated with a pooled sample and with all adolescents but without including family dummy variables. Rows labeled "Sibling Sample" and "Sibling Sample (FE)" show results estimated with the restricted sibling sample without and with dummy variables for each family in the regression to control for unobserved confounders that are constant within families. *, ** and *** denote significance at the 10%-, 5%- and 1%-level, respectively.

Table 3.22: Level of Information on Future Occupation - Fixed Effects

	N	Raw Diff.	ATT	ATU	ATE	OLS
(a) To Some Degree						
Full Sample	2858	0.092*	0.097**	0.103**	0.100**	0.108**
		(0.055)	(0.049)	(0.050)	(0.048)	(0.051)
Sibling Sample	560	0.066	0.071	0.069	0.070	0.075
		(0.126)	(0.101)	(0.100)	(0.100)	(0.103)
Sibling Sample (FE)			0.000	0.012	0.006	0.008
			(0.145)	(0.144)	(0.144)	(0.148)
(b) With Certainty						
Full Sample	2858	0.009	0.069	0.081	0.077	0.073
		(0.053)	(0.048)	(0.052)	(0.048)	(0.047)
Sibling Sample	560	−0.132	−0.098	−0.086	−0.092	−0.090
		(0.127)	(0.110)	(0.110)	(0.110)	(0.107)
Sibling Sample (FE)			−0.031	−0.012	−0.021	−0.024
			(0.157)	(0.159)	(0.157)	(0.163)

Source: SOEP V29. Note: All outcome variables are standardized. Calculations use SOEP sample weights. Standard errors are in parentheses. Standard errors of the treatment effects are bootstrapped with 500 replications and clustered at the family level. Rows labeled "Full Sample" show results estimated with a pooled sample and with all adolescents but without including family dummy variables. Rows labeled "Sibling Sample" and "Sibling Sample (FE)" show results estimated with the restricted sibling sample without and with dummy variables for each family in the regression to control for unobserved confounders that are constant within families. *, ** and *** denote significance at the 10%-, 5%- and 1%-level, respectively.

Chapter 4

Residency Discount for Rents in Germany and the Tenancy Law Reform Act 2001: Evidence from Quantile Regressions*

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Abstract:

The rental housing market in most countries shows a residency discount for sitting tenants. Until the 1990s, Germany was characterized by fairly liberal rent laws. In light of housing shortages and strong rent increases in the 1990s, there was a change towards more regulation in order to protect sitting tenants, but there are less restrictions on rent increases for new leases. Thus, one would expect an increase of the residency discount in response to a reform limiting rent increases for sitting tenants. Based on linked housing-tenant data from 1984 to 2011, this chapter estimates panel OLS and quantile regressions of rents within tenancies. We find a significant annual residence discount which is stronger early in a tenancy and which increases across the distribution. The tenancy reform act in 2001 shows a significantly negative effect on rents altogether, and the negative effect becomes stronger over the distribution. The annual residency discount during the first three years of tenure increases significantly after the reform, but there is no further discount after the fourth year of tenure. The evidence suggests that the reform was successful in curtailing rent increases, especially for expensive apartments early in a tenancy, but there is no evidence that rents for new leases increase disproportionately.

Keywords: linked housing-tenant data, rent regression, length of residency discount, rent control, quantile regression
JEL: C 21, C 23, R 30

4.1 Introduction

In comparison to other European countries, a fairly large share of the population in Germany lives in rental housing (Eurostat 2013). At the same time, the large private rental housing market in Germany shows a higher level of regulation through rent control and tenant protection against eviction than the OECD average (Johannsson 2011). In contrast to the current situation, Germany was characterized until the 1990s by fairly liberal rent laws (Börsch-Supan 1994; Hubert 1998).[1] In light of housing shortages and strong rent increases in the 1990s, there was a change towards more regulation in order to protect sitting tenants. In contrast, there are less restrictions on rent increases for new leases. The rental housing market in most countries shows a residency discount for sitting tenants. With stronger rent control for sitting tenants and tenant protection against eviction, one would expect a stronger residency discount for sitting tenants if rents for new leases can adjust to market conditions (Börsch-Supan 1994; Hubert 1995, 1998). Thus, rent control is likely to protect sitting tenants more than tenants in new leases. Based on linked housing-tenant data from 1984 to 2011, this chapter estimates OLS and panel quantile regressions of rents within tenancies. Specifically, we analyze the impact of the Tenancy Law Reform Act implemented in 2001 on the level of rents and on the residency discount.

As an application of hedonic price models (Court 1939, Rosen 1974), a large body of empirical research examines the relationship between characteristics of rental units and average rents (see e.g. Barnett 1979, Follain and Malpezzi 1980, Guasch and Marshal 1987 for the U.S. or Hoffmann and Kurz 2002 or Bischoff and Maennig 2011 for Germany). Rents are regressed on the characteristics of rental units and the coefficients are interpreted as the marginal prices for these characteristics. In a perfectly competitive rental market, the price effects reflect market conditions which are the result of supply and demand. Not all price relevant characteristics are observed in rent data and the distribution of unobserved characteristics may change with observed characteristics. This motivates the estimation of quantile regressions which go beyond the estimation of the effects on average rents. The hedonic price regressions are often augmented by covariates which are not per se characteristics of the rental units and which might may reflect frictions in the rental

[1] Currently (in 2015), the regulation of the private rental housing market in Germany is further strengthened through stronger rent control ('Mietpreisbremse') for new leases and through the requirement that the person, who engages a real estate agent to find a tenant/an apartment, has to pay for the service her-/himself. Thus, landlords cannot add the service fee for an agent they engaged to the rents the tenants have to pay.

market. Regulations such as rent control and tenant protection against eviction have an impact on rents and the effects may differ by the level of rents. For instance, one would expect that rent control should reduce the rents for expensive apartments more strongly than for cheap apartments. Similarly, rent control for sitting tenants should increase the length of residency discount when rents for new leases are less regulated (as it is the case in Germany). This effect may be strongest for expensive rental units, which further motivates the estimation of quantile regressions for rents. The regulations of rental housing in Germany through local rent indices focus on the span of rents between the one sixth (17%) and five sixth (83%) quantile of rents for rental unit with given observed characteristics (see e.g. Hofmann and Kurz 2002). For this reason, we estimate rent regression at these two quantiles in addition to OLS and median rent regressions.

The rent control and the protection of tenants against eviction were strengthened in light of the rent increases observed in West Germany during the 1990s. The Tenancy Law Reform Act, implemented since September 1, 2001, covers all tenancies starting on this date or later. Its most substantial changes involve a cap on the maximum rent increases by landlords for sitting tenants and a reduction of the minimum notice time until termination of a tenancy by the tenant to three months, while keeping the protection of the tenant against eviction unchanged. Before the reform, landlords could increase rents by 30% within three years. After the reform, the maximum is reduced to 20%.[2] Our empirical analysis investigates the impact of the reform on rents. Specifically, we investigate the observed change in the length of residency discount because the reform did not change regulations of the rents for new leases.

Our empirical analysis uses linked housing-tenant data from the German Socio-Economic Panel (SOEP) for the time period 1984 and 2011 that offer the unique advantage of a large and representative panel data set of tenancies. The panel structure allows us to control for unobservable time-invariant characteristics of a tenancy. We restrict the analysis to West German households.

Our empirical results show a significant annual residence discount which decreases in absolute value with tenure, which is stronger at the top than at the bottom of the rent distribution, and which falls with elapsed tenure. The tenancy reform act in 2001 shows a significantly negative effect on rents altogether and the negative effect becomes stronger at higher quantiles. While the reform further increases the

[2]The actual upper limit of rent increases, however, was and still is given by the average local rent index (published by local authorities) reflecting the average rent of comparable rental units in the neighborhood ('ortsübliche Vergleichsmiete'). Higher rent increases are possible to compensate for modernization costs or for an increase in costs of utilities used by the tenant.

annual residency discount for tenants during the first three years of a tenancy, the discount for tenancies affected by the reform vanishes from the fourth year onwards. Our results on the residency discounts are robust to including tenancy mean fixed effects. The evidence suggests that the reform was successful in curtailing rent increases especially for expensive apartments early in a tenancy but there is no evidence that rents for new leases increase disproportionately in response. However, this result must not be overinterpreted because, while real rents grew strongly during the 1990s, the increase in real rents stopped in the 2000s even for those apartments which were unaffected by the reform.

The remainder of this chapter is organized as follows. Section 2 discusses the background of the analysis and reviews the existing literature. Section 3 describes the data used. Section 4 introduces the econometric approach. Section 5 provides descriptive statistics and discusses the regression results. The final section involves our concluding remarks.

4.2 Background

We first discuss economic and institutional aspects of private rental housing in Germany. Then, we provide a selective literature review and develop some hypotheses as the basis of our empirical analysis.

4.2.1 Private Rental Housing in Germany

Evidence provided by Eurostat (2013)[3] shows that in 2013 about 47% of the German population live in rental housing, which is a high share in international comparison. Only in Switzerland, this share is even higher while especially in Eastern and Southern Europe owner-occupied housing is much more common. The causes for this difference are manifold. Differences in attitudes towards home-ownership may play a role. While in Germany home ownership is rather viewed as a long-term investment and rental housing seems better suited for temporary housing needs, it is more common in Anglo-Saxon countries to buy and sell residential houses depending on the own current economic situation and needs (Börsch-Supan 1994). In addition, to differences in the flexibility to buy and sell residential houses, preferential tax treatment may shape housing demand. In contrast to a number of other European countries, there is no preferential tax treatment of owner-occupied housing in Ger-

[3]Online data code: ilc_lvho02.

many regarding the difference between the after-tax and the pre-tax interest rate of mortgage loans, which is a likely reason for the high share of rental housing in Germany (CESifo 2005).[4]

While Germany is characterized by rather liberal rental laws up to the early 1990s, a shift takes place since then towards much more "tenant friendly" rental laws (Hubert 1998, Börsch-Supan 1994). In comparison to other OECD countries, the private rented housing sector in Germany is strongly regulated, curtailing the flexibility of landlords. Figures 4.1 and 4.2 in the Appendix, as taken from Johansson (2011), show that Germany as of 2010 shows a very high level of rent control and an above average level of tenant protection in international comparison. Despite the tighter regulations, rents increased strongly during the 1990s and 2000s in most parts of Germany, especially in the metropolitan areas. Hubert (1998) views the rising regulation in the 1990s as a response to an acute housing shortage after German unification in order to avoid strong rent increases for incumbent tenants. Because rent increases for new leases are less regulated (Börsch-Supan 1994), strong rent control for sitting tenants is complemented by tenant protection against eviction by the landlord motivated by the goal of increasing the rent (henceforth denoted as economic eviction).

As a further policy response to protect tenants, the Tenancy Law Reform Act[5] in 2001 reduces the maximum rent increases for sitting tenants from 30% to 20% over the course of three years. The new cap applies only, if the planned increase in rents does not exceed the average rent of comparable units in the neighborhood ("ortsübliche Vergleichsmiete") as measured by the local rent index. Rent increases due to modernization or growing extra costs included in rents are excluded.[6] The local rent index is intended to provide both tenants and landlords an indication of market conditions and to allow tenants to identify particularly high rents. A local rent index typically provides the average rent for comparable apartments and the interval around, which covers two thirds (two-third span) of the rents observed and which ranges from the one sixth (17%) quantile to the five sixth (83%) quantile. The local rent index serves as a monitoring instrument for rent control in Germany.

Furthermore, the reform involves a reduction of the minimum notice time until

[4]The current situation differs strongly from the rather favorable taxation of owner-occupied housing during the 1970s and 1980s in West Germany, see Hubert (1998) and Börsch-Supan (1994).

[5]Gesetz zur Neugliederung, Vereinfachung und Reform des Mietrechts (Mietrechtsreform), see Bundestag (2000) for a discussion of the objectives of the reform.

[6]See §558(3), §559, and §560 German Civil Code [BGB] for further details. Based on a sample from the local rental market, the local rent index (Mietspiegel) reports the average rents and the dispersion of rents for comparable apartments/housing units.

termination of a tenancy by the tenant to three months, while it keeps the protection of the tenant against eviction by the landlord unchanged. Before the reform, the notice time depends upon the length of the tenancy, with a minimum of three and a maximum of twelve months. The reform initially only applies to tenancies that started on September 1, 2001 or later. As an extension of the reform in 2005, the notice time of three months also applies to tenancies which has started before September 1, 2001.[7] One objective of this chapter is to estimate the statistical association between the 2001 reform and the length of residency discount over the distribution of rents.

4.2.2 Literature Review and Hypotheses

There exists a sizeable literature in economics on the effect of rent control on the rental market. Eekhoff (1981), Börsch-Supan (1986), and Schwager (1994) provide a theoretical discussion of the welfare implications of a reform in Germany in 1975, which strengthens the protection of tenants against economic eviction and which regulates maximum rent increases for sitting tenants.[8] There is stronger rent control for sitting tenants compared to new leases in order to protect sitting tenants. The predicted welfare effects are ambiguous. On the one hand, there are negative welfare effects because rent control reduces efficiency and flexibility in the rental market, thus resulting in deviations from market equilibrium and from the law-of-one-price for a good with the same characteristics. On the other hand, there could be positive welfare effects if landlords value the curtailment of their property rights less than tenants value the benefits of a cap on rent increases in a dynamic perspective (Börsch-Supan 1994, Hubert 1995). Furthermore, rent control for sitting tenants is likely to imply a front loaded rent payment schedule, where landlords would ask for higher rents at the beginning of a tenancy to compensate for the stronger rent control during tenancy. This could result in rental payments that decrease with the length of residency for sitting tenants relative to rents for new leases for comparable apartments. Further implications of these considerations are that, for a given apartment, rents increase stronger than market rents for comparable apartments where a new lease starts and therefore landlords have an incentive to evict sitting tenants in order to realize a rent increase with a new lease. Because of the latter incentive, a stronger rent control for sitting tenants is typically complemented with a stronger

[7] See Klarstellungsgesetz 2005 and Art. 229 §3 Abs. 10 EGBGB - Einführungsgesetz BGB - for further information.

[8] "Law for the Protection of Tenants from Arbitrary Eviction" [Zweites Wohnraumkündigungsschutzgesetz (2. WKSchG)] The law is a predecessor of the 2001 Tenancy Law Reform Act.

protection of sitting tenants against economic eviction.

Before reviewing some empirical results on the length of residency discount, let us discuss some pertinent theoretical aspects in a bit more detail. A large part of the U.S. literature (e.g. Guasch and Marshall 1987) argues that the length of residency discount can be explained by the survival of good matches of landlords and tenants in the presence of turnover costs for both sides. Providing a somewhat different perspective, Barker (2003) considers the relationship between turnover costs and the level of price discrimination between new leases and long-term tenancies. Landlords of apartments with low turnover costs are more likely to raise rents for sitting tenants. Furthermore, tenants in new leases could obtain a discount because of a lower demand elasticity of long-term tenants or because of the higher mobility costs of the latter. Thus, it is an open empirical question as to whether a length of residency discount exists.

Relating the length of residency discount to regulation, Hubert (1995) discusses a possible justification for a regulation, which protects tenants against arbitrary eviction, based on efficiency grounds. The argument relies on adverse selection operating in the presence of asymmetric information about tenants. If tenants differ in the 'service costs' to be paid for by the landlords and landlords offer rental contracts with different lengths, then tenants with low service costs would select into shorter tenancies because they can show after a while that they are good ($\equiv$ low service cost) tenants. Furthermore, longer tenancies would rather involve tenants with high service costs. Increasing tenant protection may overcome an inefficient segmentation of good (bad) tenants in short-term (long-term) tenancies in market equilibrium. Hubert (1995) discusses the combination of rent control and tenant protection to prevent economic eviction. The analysis implies that the length of residency discount increases with the strength of rent control. However, the lower the rent the stronger is the incentive for economic eviction, possibly using one of the legal routes (e.g. modernization of apartment). Altogether it is an open empirical question as to whether tenancies with low rents are more likely to survive because of the higher interest of tenants to keep a cheap apartment or less likely to survive because of the higher interest of landlords in economic evictions. Furthermore, rent control may be binding more for the rent increases for new leases of more expensive apartments. Thus, it is an open empirical question as to how the length of residency discount varies across the distribution of rents.

Hoffmann and Kurz (2002) find a length of residency discount for Germany which could be a kind of compensation for the diminishing quality of an apartment over

time. Schlicht (1983) interprets the discount as a landlord's concession trying to keep good tenants, especially when tenants' preferences change over time and landlords want to avoid turnover costs, e.g. forgone rents and search costs for new tenants. The existing empirical literature for the U.S. mostly finds evidence for a length of residency discount in average real rents for rental housing when regulation is lower than in Germany, see e.g. Barnett (1979), Börsch-Supan (1994), Follain and Malpezzi (1980), Noland (1979), Goodman and Kawai (1985), Basu and Emerson (2000), or Guasch and Marshall (1987). Guasch and Marshall (1987) decompose the discount into a *pure sit discount* and a *length of residency discount*. While the former discount is offered by landlords when contracts are renegotiated, the latter discount is given for each additional year tenants spend in the same rental unit. Using the Annual Housing Survey (AHS) data from 1974 to 1977 they estimate multiple specifications and find a sit discount between 6% and 13% and an annual residency discount between 0.2% and 0.8%.[9] Using data of 102 apartment complexes in US-American metropolitan areas, Barker (2003) finds that discounts for short-term tenants are more common. Since rental payments rise faster than turnover costs, he predicts that discounts for new leases become more frequent. Sims (2007) analyzes the effect of rent control in various cities in Massachusetts that ended in 1995. The rent increase was adjusted to a specific annual rate, condominium conversions were made harder for landlords to avoid a reduction of the rental stock, and a prohibition to evict tenants without permission was imposed. Altogether, only 20% of rental housing was under active control because vacancy decontrol was possible. Based on difference-in-differences estimates, Sims (2007) finds that rent control leads to a significant rent decline. Furthermore, tenants' mobility falls as measured by significantly longer tenancies and the stock of rental housing declines because of the reduced attractiveness of rental apartments as investments for landlords.

Summing up and providing an outlook on our empirical analysis, our reading of the literature implies that the empirical studies so far have been restricted to an empirical analysis of how average rents vary by length of residency and other characteristics of the apartment and the tenant. We provide an analysis of the change in rents for new leases and of the effect of the length of residency (elapsed tenure) depending on the level of rents using quantile regression. The theoretical considerations above suggest that the length of residency discount depends upon tenants' characteristics

[9]Guasch and Marshall (1987) also implement a selection correction for the termination of a tenancy accounting for selection on unobservables. Correcting for selection on unobservables in our quantile regression estimates is beyond the scope of this chapter for two reasons. First, how to account for selection when estimating quantile regression is still subject of an intensive debate (Huber and Melly 2012). Second, finding a credible instrument with sufficient bite is difficult.

such that tenants with lower mobility costs experience a higher discount. The discount should be larger when rents for new leases show a strong upward trend. It is an open empirical question as to how the length of residence discount varies with the level of rents because, on the one hand, tenants are more interested to keep a cheaper apartment and rent control may be binding more for the rent increases for new leases of more expensive apartments. On the other hand, landlords of cheaper apartments have a higher incentive for economic evictions and there may be a stronger need for a modernization of the apartment justifying a rent increase. Furthermore, the above considerations imply that a reform strengthening the protection of sitting tenants against eviction and against rent increase should increase the length of residency discount. However, it is a priori unclear as to how the increase varies with the size of the rent. Because the theoretical considerations suggest that the level of rents and the length of residency discount depend upon both tenants' characteristics and characteristics of the apartment, we use a panel of linked housing-tenant data.

4.3 Data

The empirical analysis uses the German Socio-Economic Panel Study (SOEP), a representative annual household panel survey.[10] Because of a lack of information on East German rental units before German unification and the ongoing transition process as well as the strong regulation of rents in East Germany during the 1990s, our analysis is restricted to West Germany.

The SOEP offers detailed information on rental housing from the perspective of tenants, thus providing *linked housing-tenant data*.[11] Because these are panel data on tenancies, we can study the length of residency discount within tenancies. The available variables include the size of an apartment (or house) in square meters (sqm), its equipment like the existence of a basement, balcony or terrace, and a garden, the type of building regarding the number of rental units and the year of construction, information as to whether the apartment is subsidized by the government and as to whether there is a private or a public landlord. We exclude outliers with a reported apartment size of less than 20 sqm and more than 200 sqm as well as observations with a reported monthly rent of less than 50 Euros (in current prices).

[10] We use the version of the data set for the time period 1984-2011, `http://dx.doi.org/10.5684/soep.v28.1` (see Wagner et al. (2007), Wagner et al. (2008) and Schupp (2009) for further information).

[11] We coin this term in analogy to linked employer-employee data used in labor market research. Up to our knowledge, the term *linked housing-tenant data* (or another term conveying the same idea) has not been used so far in the literature.

To account for variation in regional housing markets, we account for the state ("Bundesland") and we use detailed information on the location available in the SOEP, such as city size (number of inhabitants), region, type of residential area, and information on amenities in the local neighborhood.[12] In addition, one observes the length of residence so far (tenure ≡ elapsed tenancy duration). Our panel data allow us to control for unobserved time-invariant tenancy-specific characteristics, which can account for biases induced by the selective termination of tenancies (Guasch and Marshall 1987). Our dependent variable of interest is the monthly real gross rent actually paid (without costs for heating) - henceforth referred to as rent. We deflate rents to 2005 prices using the consumer price index.

The final data set consists of 13,694 households and 21,401 tenancies, which means that we observe on average 1.6 tenancies per household. To account for the 2001 Tenancy Law Reform Act, we define a dummy variable that indicates whether the tenancy started on September 1, 2001 or later.

4.4 Econometric Approach

4.4.1 Hedonic Price Model

We estimate a standard hedonic price regression which we augment with variables observed for tenants. The estimated model decomposes the price of a product into the prices for its characteristics, which are denoted as implicit prices because they are not directly observed. Waugh (1929) and Court (1939) were the first to use this approach. Court was the first to refer to these implicit prices as hedonic prices. Griliches (1961 and 1971), Lancaster (1966 and 1971), and Rosen (1974) introduced the hedonic price model to a wider audience of economists. Hedonic price models are estimated for two reasons. First, for the construction of price indices to account for changes in the quality of a product and, second, for the identification of consumer demand for characteristics of heterogeneous products (Sheppard, 1999).

We specify the rent for a rental unit by

[12] The information on the amenities is available for the years 1986, 1994, 1999, 2004, and 2009. To impute the values in between, we assume that within a tenancy the distance to amenities measured by the time needed by foot to reach the amenity does not change over time.

$$log(rent) = \beta_0 + \sum_{j=1}^{k} \beta_j \cdot X_j + \varepsilon \tag{4.1}$$

with the log deflated rental payment $log(rent)$ as dependent variable that is decomposed in β_j, the implicit price of the corresponding apartment characteristics X_j for $j = 1, \ldots, k$, and an idiosyncratic error term ε. Court (1941) notes that, in competitive markets, implicit or hedonic prices can be interpreted as a consumer's marginal willingness to pay if he or she is able to choose between a sufficiently large number of units that vary in their characteristics. However, based on the limited set of characteristics of the apartment observed and because of likely frictions in the rental housing market, prices for apartments with the same observed characteristics vary. Consumers may differ in their willingness to pay and the limited mobility of tenants may prevent relative prices to equal the willingness to pay for certain characteristics. These issues motivate the estimation of quantile regressions.

Sirmans, Macpherson, and Zietz (2005) examine more than 125 hedonic price models for housing data. Their findings indicate that implicit prices of certain house characteristics may vary strongly in magnitude and even in direction. They argue that this variation cannot be explained solely by the fact that different samples or different identification strategies are used. Zietz, Zietz, and Sirmans (2007) and Zietz, Sirmans, and Smersh (2008) discuss this problem from a theoretical perspective and conclude that due to a heterogeneous supply and demand structure housing markets are divided into different segments where each segment can be identified by its own supply and demand curve. This may result in segment-specific prices. Decomposing the unconditional rental price distribution of advertised apartments in Berlin, Thomschke (2015) finds that the increase in rental prices are due to a changing demand structure regarding quality and quantity rather than a change in apartment characteristics, especially in the high-price segment. In addition, it is likely that the distribution of unobservables, as measured by the dispersion of prices within cells defined by observed apartment characteristics, may differ across segments. These considerations further motivate the estimation of quantile regressions which can account for segment-specific price differences.

4.4.2 Quantile Regression

While OLS regression estimates the effects of covariates on the conditional expectation, a quantile regression estimates the effect on quantiles of the conditional

distribution of the response variable. Quantile regressions allow for varying effects across different positions on the entire conditional distribution and therefore provide more details on the relationship between covariates and the dependent variable, see Koenker and Hallock (2001) and Koenker (2005) for details. Thus, it is possible to estimate how the market valuation of characteristics of apartments varies with the level of rents across the conditional rent distribution. A further advantage is that quantile regressions are more robust than OLS to outliers in the dependent variable.

Estimating quantile regressions at different quantiles for panel data on tenancies can reveal the net effect of rent setting for new leases and sorting effects due to termination of tenancies if the ranking of rents across tenancies does not change over time. For instance, if the length of residency discount is generally higher (lower) at the top of the rent distribution than at the bottom, then tenancies for cheaper apartments may be more (less) likely to end early. Furthermore, if the discount between the first and the second year of a tenancy is higher (lower) at the top of the rent distribution than at the bottom, then rents for new leases grow more (less) for more expensive apartments compared to less expensive apartments.

We estimate quantile regressions at the median, at the 17%- (one sixth) and at the 83%- (five sixth) quantile of the conditional rent distribution. This way we cover the two-third span of conditional rents as it is customary for an official local rent index in Germany. We obtain clustered standard errors for our estimated coefficients through bootstrapping based on 200 resamples. We resample entire tenancies to account for heteroscedasticity and serial correlation of the error term within a tenancy. To identify the nonlinear effect of length of tenancy, we construct linear splines. After a cross-validation of models with equally positioned but varying number of knots, the final specification has knots at the 3%, 34%, 66%, and 97% quantile of the unconditional distribution of elapsed tenure within a tenancy. Because the 3% quantile is zero, only three knots enter the analysis. An interaction between the reform dummy and length of tenancy splines are used to analyze how the reform affects the length of residency discount.

As robustness check, we estimate panel regressions accounting for mean tenancy fixed effects as suggested for quantile regression by Canay (2011). We first estimate the fixed effects OLS regression and obtain the mean tenancy fixed effects. Then, to implement the quantile regressions with fixed effect, we subtract the mean tenancy fixed effects from the rents within a tenancy and estimate the panel quantile regressions for these adjusted rents. This simple two-step approach does not suffer from the incidental parameter problem because the estimated fixed effect is part of the

dependent variable. However, the approach does not allow for fixed effects which differ across quantiles.

4.5 Empirical Results

4.5.1 Descriptive Statistics

Table 4.1 shows means and standard deviations of apartment characteristics for the full sample as well as for subsamples with tenancies starting before September 1, 2001, or afterwards [before and after the reform - here and henceforth, *after September 1, 2001* also includes tenancies that start on September 1, 2001]. 16% (84%) of the tenancies are observed to have started after (before) September 1, 2001. The column labeled "Difference" displays results of t-tests of equality of means for each variable in both subsamples. The average rent for tenancies starting after the reform is € 461 and the average rent for tenancies starting before the reform is € 399.

Both subsamples differ significantly in further apartment characteristics which explains the higher average rent observed for the after-reform subsample. Tenancies starting after the reform are on average 2.6 sqm larger, can rather be found in more recently built tenancy-occupied houses (especially in houses built after 1990), and are on average better equipped (more likely to include a balcony, a terrace or a garden, and central heating). Mechanically, the elapsed tenure in tenancies starting after the reform is 9.8 years shorter. In addition to differences in apartment characteristics, the households in the two subsamples value (assess) their rental payment and apartment size in a different way.[13] Tenants in the after-reform subsample tend to be less satisfied with both the rent level and the apartment size. While for tenancies starting before the reform, 37.6% of the tenants think that their apartments are inexpensive, after the reform only 28.7% agree with this statement. Correspondingly, 22.4% of the tenants affected by the reform and 18.6% of the tenants in tenancies starting before the reform think that their apartments are expensive. These subjective assessments can be rationalized by comparing the tenant household's rent-to-income ratio.[14] The rent-to-income ratio is 25.6% for tenancies starting before the reform and 29% for tenancies starting after the reform. Furthermore, tenants in the after-

[13]The variables displayed in Table 4.1 under "Further Characteristics" are only used for descriptive comparisons. They are not part of the specification of the final regressions.

[14]The rent-to-income ratio is calculated as the share of the household net income that is spent on the gross rent without heating.

reform subsample are on average less satisfied with the apartment size. After the reform, 23.3% of the tenants (and therefore 2.9%-points more than for tenancies starting before the reform) say that their apartments are too small. However, after the reform the apartment size in sqm per person is 1.1 sqm higher (45.9 sqm against 44.8 sqm per person) than before. Apparently, the demand for larger (and better equipped) apartments is rising over time.

Table 4.2 shows mean differences in some key variables between rental apartments in the first tertile (low-price segment) and the third tertile (high-price segment) of the unconditional rent distribution. The average apartment size in the high-price segment is 88.5 sqm, which is 30 sqm larger than in the low-price segment. Average elapsed tenure is 8.3 years and significantly shorter than in low-price apartments, whose average elapsed tenure is about 13 years. High-price apartments are rather located in new residential areas, in recently built houses/buildings, in larger cities, and in centers (evidence on the latter three variables is available upon request). As to be expected, high-price apartments are on average better equipped. For instance, in the high-price segment, 83.8% of the apartments are equipped with a balcony or terrace, whereas the share is 33.9 percentage points lower in the low-price segment. Also apartments in the high-price segment are rather located next to stores, parks, sports complexes or public transport, and the apartment size per person is larger (46.2 sqm per person in the high-price segment versus 43.6 sqm per person in the low-price segment). Households in the high-price segment tend to assess the rent as being too high and the size of the apartment as being too large compared to the assessments in the low-price segment. Consistent with the subjective assessments, there is a significantly higher rent-to-income ratio in the high-price segment (30% in the high-price segment versus 21.9% in the low-price segment). The evidence suggests that tenants in the high-price segment do indeed demand higher quality apartments, but they tend to think that their apartments are over-priced and possibly too well equipped relative to their needs. These findings are consistent with the large rent increases during the 1990s and 2000s, and they may explain the political momentum towards stronger rent control at the time. The observed differences across the distribution of rents further motivate the estimation of quantile regressions.

4.5.2 Estimation Results

Table 4.3 provides the estimation results for our baseline panel OLS and quantile regressions. We estimate quantile regressions at the median (QR 50%), at the one

sixth (QR 17%), and at the five sixth (QR 83%) quantile. The column '83%-17%' involves Wald test statistics for the significance of the difference of the coefficients between QR 83% and QR 17%.

Quite uniformly, the covariates apartment size, city size, and central location show the expected positive effects on rents. The differences across quantiles are mostly not significant, but there are some notable exceptions. The average partial effect of apartment size increases between the two quantiles by 3.2 log points, thus implying a higher dispersion of rents for larger apartments. Regarding the type of house, rents for nondetached houses and apartments in multiunit buildings are ceteris paribus higher than in detached houses. A priori, one would expect ceteris paribus a higher rent for detached houses and our estimates should not be viewed as being causal. Most likely, detached houses and multiunit buildings differ on average in some unmeasured characteristics. Furthermore, in multiunit buildings, the rents are less dispersed than in detached houses. It is likely that unobserved characteristics among detached houses are more dispersed than in more standardized multiunit buildings. Rents are higher in new residential areas compared to old residential areas, typically in apartments with more amenities in walking distance, and in better equipped apartments. Rents are higher and more dispersed for private landlords and for non-subsidized housing. A housing subsidy may imply a particular restriction on rent increases for higher rents. Private landlords, who tend to focus more on higher revenues, are more likely to raise rents compared to non-private landlords.

Let us now turn to our estimates of the length of residency discount. We estimate flexible linear splines and our regressions report the slope (the annual discount) for each linear segment of our splines. For the first three years of a tenancy, we find a significant annual reduction of rents which amounts to 1.5 log points per year and the decline is significantly stronger for higher rents. At the 83% quantile the annual discount amounts to 2 log points while at the 17% quantile the annual discount is only 0.8 log points. From the fourth year of a tenancy onwards, the residency discounts become more uniform. While at the 17% quantile the annual discount increases slightly to 1 log point, it falls to 0.9 log points at the 83% quantile. After twelve years of a tenancy, the annual discount is much smaller and varies between 0.2 and 0.4 log points. However, the discount is still significant.

The baseline rent regressions further control for year dummies, states, and the year of construction (the corresponding coefficients and further details are available upon request). As to be expected, rents increase with the year of construction and the increase is significantly stronger at the bottom of the rent distribution compared to

the top. There are also significant differences in rents across states.

Let us now consider the time and the reform effects. The estimated time effects reflect a uniform growth of average and median rents (deflated by the CPI) between 1984 and 2001 by 24 log points. The increase is five log points higher at the 17% quantile compared to the 83% quantile (the difference is significant at the 5% level). The stronger increase at the bottom of the distribution may explain the strong political demands for further rent control in the 1990s and 2000s. Incidentally, rents do not increase further after 2001 and rents at the 17% quantile (83% quantile) are five (two) log points lower in 2011 compared to 2001. This suggests that rent growth has stopped after 2001 but it has to be kept in mind that the regression also includes a dummy variable 'After Reform' which corresponds to tenancies starting after the reform in 2001. The average reform effect is -5.5 log points and the decline is 2.5 log points stronger at the top of the distribution compared to the bottom. One explanation could be that more expensive tenancies are less likely to survive because tenants are more mobile. However, the difference across the distribution is not significant (P-value = 12.4%). Altogether we find a general decline in rents after 2001 and a further decline of rents for new tenancies after the reform. While the general decline is stronger for lower rents the specific (partial) reform effect is stronger for higher rents. Prima facie, our findings suggest that in times of generally falling rents the reform did in fact result both in reducing rent growth for new leases and in curtailing especially the rents of expensive new leases. The latter implies that households living in expensive apartments tend to benefit more from the reform than households living in cheaper apartments. Thus, one may be concerned that the reform may not have been sufficiently targeted if the goal was to curtail rents for low-income tenants who tend to pay lower rents.

Next, we investigate the impact of the reform on the length of residency discount. As discussed above, one would expect that the reform increases the discount, and the reduction should be particularly strong for higher rents. We interact the reform dummy with the splines in elapsed tenure, and we account for the fact that we do not observe long tenancies which started after the reform. After the reform, we only estimate two linear spline segments up to an elapsed tenure of up to 11 years. Table 4.4 provides the annual discounts estimated separately before and after the reform (all other covariates are as in the baseline regressions reported in Table 4.3 and results for the other covariates are available upon request). The general pattern of the annual discounts before the reform is quite similar to the results discussed above. During the first three years of a tenancy, the annual discount is 1.7 log points at the 83% quantile, being 1.3 log points (significantly) larger than at the

17% quantile. From the fourth year onwards, the annual discount is more uniform and lies between 0.9 and 1 log point until the eleventh year. After the reform, the annual discount during the first three years of a tenancy amounts to 1.4 log points at the 17% quantile and 3.4 log points at the 83% quantile. However, after the fourth year there is no further length of residency discount after the reform. Thus, the reform effect reverses its sign. While during the first three years of a tenancy rents are reduced, the reform effect is significantly reduced afterwards, especially for higher rents. This finding may be related to the fact that in general real rents are falling after the reform and CPI inflation is generally low, thus restricting the scope for rent increases at low tenure levels. Nevertheless, in accordance with our prior expectations, the rent gap between new leases and sitting tenants over the first three years of tenure increases with the reform because the reform curtails rent increases for sitting tenants without putting additional restrictions on rent increases for new leases. At the same time, however, rent increases fall in general after the reform, thus limiting in particular the scope for rent increases for sitting tenants, which may explain that the residency discount disappears after the third year of tenure.

4.5.3 Tenancy Fixed Effects

To examine the sensitivity of our results to potential unobserved confounders that are constant within tenancies, we reestimate the models in Table 4.4 also accounting for tenancy fixed effects. To do so, we first exclude 6,591 tenancies (7.1% of our full sample) with only one observation and estimate the tenancy fixed effects regression based on this restricted sample. Table 4.5 provides the fixed effects estimates for the residency discount before and after the reform. The estimated annual discounts are broadly similar to the results reported in Table 4.4, but there are some interesting differences. Before the reform, the annual discount is 0.9 log points at the 17% quantile and 1.5 log points at the 83% quantile. While the discount at the 17% (83%) quantile is slightly stronger (weaker) than in the model without fixed effects, the OLS estimate remains the same as before. After the fourth year, the estimated discount becomes even significantly larger at the 17% quantile compared to the 83% quantile. These results are compatible with sorting effects such that high price tenancies are more likely to end early (before year 11), thus enhancing the 'observed' discount at the top of the distribution as reported in Table 4.4. This finding would be consistent with tenants in high-price rental units searching more strongly for cheaper alternatives. In contrast, more expensive tenancies in the low price segment tend to survive longer, thus reducing slightly the 'observed' discount

at the bottom of the distribution as reported in Table 4.4. This finding would be consistent with tenants in low-price rental units being more likely to experience economic evictions or to search for better quality alternatives. Note, however, that the small differences for the quantile regressions between Table 4.4 and 4.5 should not be overinterpreted. Because the changes in the fixed effects estimates of the discount across the distribution change in an almost balanced way, the OLS fixed effects discount estimates remain unchanged.

For tenancies starting after the reform, we find larger annual discounts during the first three years and smaller discounts afterwards compared to the results without fixed effects. The direction of changes is the same for both OLS and quantile regressions, and the results during the first three years are also compatible with more expensive tenancies ending earlier during a tenancy. There are no apparent sorting effects for less expensive tenancies.

Summing up, controlling for tenancy fixed effects does not affect the qualitative nature of our results. If anything, sorting effects are only playing a minor role.

4.6 Conclusions

The large private rental housing market in Germany shows a higher level of regulation through rent control and tenant protection against eviction than the OECD average. In contrast to the current situation, Germany was characterized by fairly liberal rent laws until the 1990s. In light of housing shortages and strong rent increases in the 1990s, there was a change towards more regulation in order to protect sitting tenants. For instance, the German government passed the Tenancy Law Reform Act in 2001 to restrict rent increases and to strengthen the protection of tenants against eviction. Based on linked housing-tenant data from the Socioeconomic Panel, this chapter estimates panel OLS and quantile regressions of rents within tenancies during the time period 1984 and 2011. Specifically, we analyze the impact of the Tenancy Law Reform Act implemented in 2001 (the reform) on the level of rents and on the residency discount.

Our main findings are as follows. Households whose tenancy started after the reform rather live in newer and in better equipped rental units. The rent-to-income ratio is significantly larger than for households living in tenancies that started before the reform. Although the rental units are 1.14 sqm per person larger after the reform, the share of tenants, who assess the size of their rental unit as being too small,

increases after the reform. This suggests that demand for better equipped housing increases over time.

Our empirical results show a significant annual residence discount which decreases in absolute value with tenure, which is stronger at the top than at the bottom of the rent distribution, which is stronger early in a tenancy, and which falls with elapsed tenure. The reform shows a significantly negative effect on rents altogether and the negative effect becomes stronger over the distribution. At the 83% quantile the reduction amounts to 5.7 log points and it is 3.2 log points at the 17% quantile. Thus, households living in expensive apartments tend to benefit more from the reform than households living in cheaper apartments.

Furthermore, we find significant annual residency discounts. During the first three years of a tenancy the discounts are higher at the top compared to the bottom of the conditional rent distribution. From the fourth year onwards, however, the annual discounts are smaller and become more similar across the rent distribution. The reform further increases the annual residency discount for tenants during the first three years of a tenancy, but from the fourth year onwards the annual residency discount vanishes after the reform. Our results on the residency discounts are robust to including tenancy mean fixed effects. The evidence suggests that the reform was successful in curtailing rent increases especially for expensive apartments early in a tenancy but there is no evidence that rents for new leases increase disproportionately in response. However, this result must not be overinterpreted because, while real rents grew strongly during the 1990s, the increase in real rents stopped in the 2000s even for those apartments which were unaffected by the reform.

4.7 References

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4.8 Appendix

Figures

Figure 4.1: Rent Control in the Private Rental Market,[1] 2009

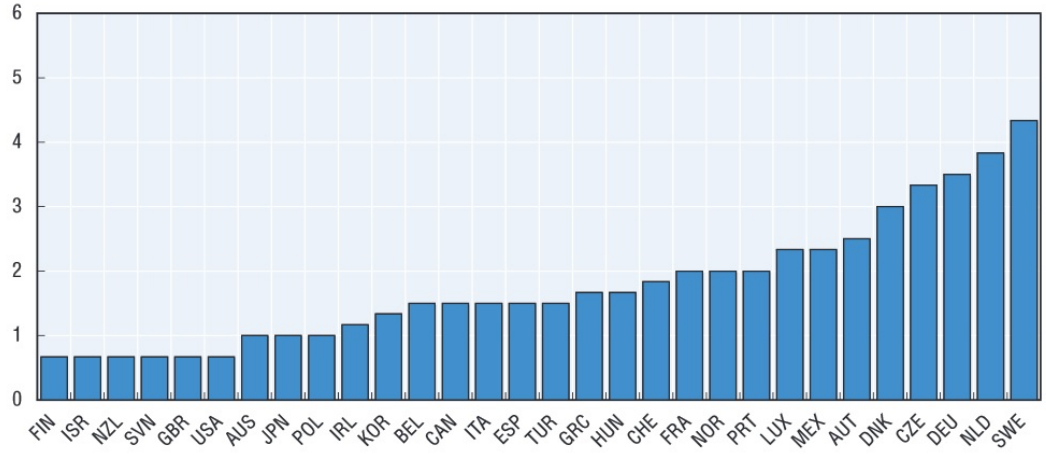
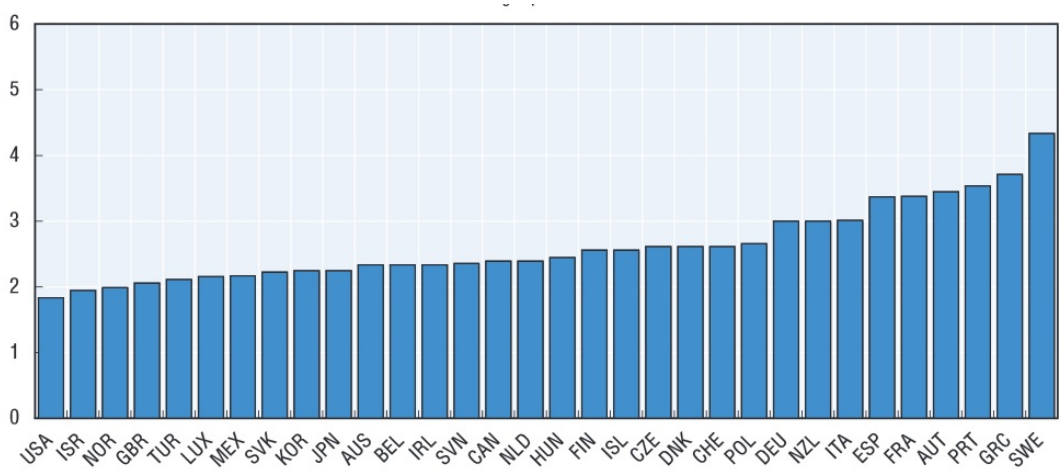


Figure 4.2: Tenant-Landlord Regulations in the Private Rental Market,[2] 2009



1. Scale 0-6: Increasing in degree of control. This indicator is a composite indicator of the extent of controls of rents, how increases in rents are determined and the permitted cost pass-through onto rents in each country. Control of rent levels includes information on whether rent levels can be freely negotiated between the landlord and the tenant, coverage of controls on rent levels and the criteria for setting rent levels (market based, utility/cost based, negotiation based or income based). Controls of rent increases includes information on whether rent increases can be freely agreed by the landlord/tenant, whether rent increases are regularly indexed to some cost/price index or if increases are capped or determined through some other administrative procedure, including negotiation between tenant/landlord associations. The pass-through of costs onto rents includes information on whether landlords are allowed to pass on increases in costs onto rents (cost pass-through) and the extent of such pass-through i.e. the types of cost that can be passed on.
2. Scale 0-6: Increasing in protection for tenants. The indicator measures the extent of tenant-landlord regulation within a tenancy. It includes the ease of evicting a tenant, degree of tenure security and deposit requirements.

   Source: Johansson (2011)

Tables

Table 4.1: Descriptive Statistics

Variable	Full	Before Reform	After Reform	Difference
Rent (Deflated to 2005 €)	408.919	399.009	460.864	61.855***
	(195.404)	(187.442)	(225.720)	(1.734)
Apartment Size (in m^2)	72.136	71.716	74.338	2.622***
	(25.268)	(24.756)	(27.690)	(0.226)
Elapsed Tenure (in Years)	10.922	12.489	2.705	−9.784***
	(11.973)	(12.431)	(2.060)	(0.102)
Private Landlord	0.741	0.724	0.789	0.065***
	(0.438)	(0.447)	(0.408)	(0.004)
Subsidized Housing	0.147	0.166	0.047	−0.119***
	(0.354)	(0.372)	(0.211)	(0.003)
Year of Construction				
Before 1918	0.110	0.112	0.096	−0.017***
	(0.313)	(0.316)	(0.294)	(0.003)
1918 to 1948	0.168	0.170	0.154	−0.016***
	(0.374)	(0.376)	(0.361)	(0.003)
1949 to 1971	0.436	0.452	0.345	−0.107***
	(0.496)	(0.498)	(0.475)	(0.005)
1972 to 1980	0.168	0.169	0.164	−0.005
	(0.374)	(0.375)	(0.370)	(0.003)
1981 to 1990	0.055	0.050	0.078	0.027***
	(0.227)	(0.219)	(0.268)	(0.002)
Since 1991	0.064	0.046	0.163	0.117***
	(0.245)	(0.210)	(0.370)	(0.002)
City Size (Number of Inhabitants, k $\hat{=}$ 1000 inhabitants)				
$\geq$ 500k (Center)	0.417	0.431	0.342	−0.089***
	(0.493)	(0.495)	(0.474)	(0.004)
$\geq$ 500k (Suburb)	0.095	0.099	0.076	−0.022***
	(0.293)	(0.298)	(0.266)	(0.003)
100k to 500k (Center)	0.150	0.138	0.211	0.073***
	(0.357)	(0.345)	(0.408)	(0.003)
100k to 500k (Suburb)	0.064	0.054	0.113	0.059***
	(0.244)	(0.227)	(0.317)	(0.002)
50k to 100k (Center)	0.029	0.030	0.025	−0.005***
	(0.168)	(0.171)	(0.155)	(0.002)
50k to 100k (Suburb)	0.024	0.020	0.048	0.028***
	(0.154)	(0.140)	(0.213)	(0.001)
20k to 50k	0.074	0.071	0.089	0.018***
	(0.262)	(0.257)	(0.284)	(0.002)
5k to 20k	0.093	0.097	0.067	−0.031***

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Descriptive Statistics <continued>

Variable	Full	Before Reform	After Reform	Difference
	(0.290)	(0.297)	(0.250)	(0.003)
< 5k	0.054	0.059	0.029	−0.030***
	(0.227)	(0.236)	(0.169)	(0.002)
Type of House				
Detached House	0.131	0.127	0.152	0.025***
(1-2 Family)	(0.337)	(0.332)	(0.359)	(0.003)
Nondetached House	0.081	0.082	0.079	−0.002
(1-2 Family)	(0.273)	(0.274)	(0.270)	(0.002)
Apt. in 3-4 Units Bldg.	0.180	0.176	0.201	0.025***
	(0.384)	(0.381)	(0.401)	(0.003)
Apt. in 5-8 Units Bldg.	0.363	0.369	0.334	−0.034***
	(0.481)	(0.482)	(0.472)	(0.004)
Apt. in 9+ Units Bldg.	0.211	0.215	0.192	−0.023***
	(0.408)	(0.411)	(0.394)	(0.004)
High-Rise Apt. Bldg.	0.020	0.020	0.022	0.002*
	(0.141)	(0.140)	(0.147)	(0.001)
Other Bldg.	0.013	0.012	0.019	0.006***
	(0.115)	(0.110)	(0.136)	(0.001)
Residential Area				
Old Residential Area	0.287	0.272	0.368	0.095***
	(0.453)	(0.445)	(0.482)	(0.004)
New Residential Area	0.372	0.387	0.293	−0.094***
	(0.483)	(0.487)	(0.455)	(0.004)
Mixed Area	0.313	0.314	0.305	−0.009**
	(0.464)	(0.464)	(0.460)	(0.004)
Other Areas	0.021	0.022	0.017	−0.006***
	(0.144)	(0.147)	(0.127)	(0.001)
Equipment				
Central Heating	0.899	0.887	0.963	0.076***
	(0.302)	(0.317)	(0.190)	(0.003)
Balcony or Terrace	0.678	0.669	0.725	0.056***
	(0.467)	(0.471)	(0.446)	(0.004)
Basement	0.934	0.937	0.919	−0.018***
	(0.248)	(0.242)	(0.273)	(0.002)
Garden	0.323	0.316	0.360	0.044***
	(0.468)	(0.465)	(0.480)	(0.004)
Amenities in 10 Minutes Walking Distance				
Stores	0.643	0.644	0.635	−0.010*
	(0.479)	(0.479)	(0.482)	(0.005)

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Descriptive Statistics <continued>

Variable	Full	Before Reform	After Reform	Difference
Park	0.537	0.530	0.582	0.052***
	(0.499)	(0.499)	(0.493)	(0.005)
Sports Complex	0.362	0.355	0.408	0.053***
	(0.481)	(0.478)	(0.491)	(0.005)
Public Transport	0.860	0.859	0.861	0.001
	(0.347)	(0.348)	(0.346)	(0.004)
Further Characteristics				
Rent-to-Income Ratio	0.262	0.256	0.290	0.034***
	(0.196)	(0.202)	(0.155)	(0.002)
Apt. Size per	45.003	44.820	45.957	1.137***
Person (sqm/Person)	(21.325)	(21.282)	(21.520)	(0.190)
Rent Inexpensive	0.363	0.376	0.287	−0.090***
(Assessment)	(0.481)	(0.484)	(0.452)	(0.005)
Rent Reasonable	0.445	0.438	0.490	0.052***
(Assessment)	(0.497)	(0.496)	(0.500)	(0.005)
Rent Expensive	0.192	0.186	0.224	0.037***
(Assessment)	(0.394)	(0.389)	(0.417)	(0.004)
Apt. Size Too Small	0.208	0.204	0.233	0.029***
(Assessment)	(0.406)	(0.403)	(0.423)	(0.004)
Apt. Size Appropriate	0.726	0.730	0.707	−0.023***
(Assessment)	(0.446)	(0.444)	(0.455)	(0.004)
Apt. Size Too Large	0.065	0.066	0.060	−0.006***
(Assessment)	(0.247)	(0.248)	(0.238)	(0.002)
Apt. Condition Good	0.606	0.600	0.637	0.037***
(Assessment)	(0.489)	(0.490)	(0.481)	(0.004)
Share of Observations	100%	84%	16%	–

Note: Calculations use the SOEP sample weights. The table reports means and standard deviations/standard errors in parentheses. The column labeled "Full" refers to the full sample. The columns labeled "Before Reform" and "After Reform" refer to the subsamples with tenancies starting before and after September 1, 2001, respectively. The column labeled "Difference" reports the mean difference between the two subsamples and its standard error. "Apt." denotes apartment, "Bldg." building, *,** and *** significance at the 10%-, 5%- and 1%-level, respectively. For sets of dummy variables the reference category is printed in bold. Variables reported under "Further Characteristics" are not used for the final regressions. Source: SOEP V28.1 and authors' calculations.

Table 4.2: Further Descriptive Statistics by Tertiles of Rents

Variable	Overall	1st Tertile	3rd Tertile	Difference
Rent (Deflated to 2005 €)	408.919	236.537	616.985	380.448***
	(195.404)	(52.544)	(189.963)	(1.113)
Apartment Size (in sqm)	72.136	58.270	88.456	30.186***
	(25.268)	(20.484)	(25.456)	(0.184)
Elapsed Tenure (in Years)	10.922	12.991	8.340	−4.651***
	(11.973)	(13.412)	(9.684)	(0.093)
Private Landlord	0.741	0.665	0.832	0.168***
	(0.438)	(0.472)	(0.373)	(0.004)
Subsidized Housing	0.147	0.210	0.082	−0.128***
	(0.354)	(0.407)	(0.275)	(0.003)
Tenancy Starting	0.160	0.112	0.205	0.093***
After Reform	(0.367)	(0.315)	(0.404)	(0.003)
Type of House				
Detached House	0.131	0.135	0.139	0.004
(1-2 Family)	(0.337)	(0.342)	(0.346)	(0.003)
Nondetached House	0.081	0.077	0.106	0.030***
(1-2 Family)	(0.273)	(0.266)	(0.308)	(0.002)
Apt. in 3-4 Units Bldg.	0.180	0.177	0.176	0.000
	(0.384)	(0.381)	(0.381)	(0.003)
Apt. in 5-8 Units Bldg.	0.363	0.373	0.326	−0.048***
	(0.481)	(0.484)	(0.469)	(0.004)
Apt. in 9+ Units Bldg.	0.211	0.204	0.219	0.015***
	(0.408)	(0.403)	(0.414)	(0.003)
High-Rise Apt. Bldg.	0.020	0.017	0.024	0.007***
	(0.141)	(0.128)	(0.153)	(0.001)
Other Bldg.	0.013	0.017	0.010	−0.008***
	(0.115)	(0.130)	(0.098)	(0.001)
Residential Area				
Old Residential Area	0.287	0.337	0.235	−0.101***
	(0.453)	(0.473)	(0.424)	(0.004)
New Residential Area	0.372	0.323	0.425	0.102***
	(0.483)	(0.467)	(0.494)	(0.004)
Mixed Area	0.313	0.315	0.308	−0.007**
	(0.464)	(0.465)	(0.462)	(0.004)
Other Areas	0.021	0.022	0.025	0.003**
	(0.144)	(0.145)	(0.155)	(0.001)
Equipment				
Central Heating	0.899	0.789	0.971	0.181***
	(0.302)	(0.408)	(0.169)	(0.003)
Balcony or Terrace	0.678	0.498	0.838	0.339***

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Further Descriptive Statistics by Tertiles <continued>

Variable	Overall	1st Tertile	3rd Tertile	Difference
	(0.467)	(0.500)	(0.369)	(0.004)
Basement	0.934	0.904	0.961	0.058***
	(0.248)	(0.295)	(0.193)	(0.002)
Garden	0.323	0.303	0.372	0.068***
	(0.468)	(0.460)	(0.483)	(0.004)
Amenities in 10 Minutes Walking Distance				
Stores	0.643	0.635	0.658	0.023***
	(0.479)	(0.481)	(0.474)	(0.004)
Park	0.537	0.505	0.583	0.078***
	(0.499)	(0.500)	(0.493)	(0.004)
Sport Complex	0.362	0.344	0.394	0.051***
	(0.481)	(0.475)	(0.489)	(0.004)
Public Transport	0.860	0.837	0.881	0.044***
	(0.347)	(0.369)	(0.324)	(0.003)
Further Characteristics				
Rent-to-Income Ratio	0.262	0.219	0.300	0.082***
	(0.196)	(0.143)	(0.185)	(0.001)
Apt. Size per	45.003	43.614	46.218	2.604***
Person (sqm/Person)	(21.325)	(19.270)	(23.771)	(0.173)
Rent Inexpensive	0.363	0.498	0.223	−0.275***
(Assessment)	(0.481)	(0.500)	(0.416)	(0.004)
Rent Reasonable	0.445	0.386	0.490	0.104***
(Assessment)	(0.497)	(0.487)	(0.500)	(0.004)
Rent Expensive	0.192	0.116	0.287	0.170***
(Assessment)	(0.394)	(0.320)	(0.452)	(0.003)
Apt. Size: Too Small	0.208	0.237	0.184	−0.053***
(Assessment)	(0.406)	(0.425)	(0.387)	(0.003)
Apt. Size: Appropriate	0.726	0.726	0.717	−0.009**
(Assessment)	(0.446)	(0.446)	(0.451)	(0.004)
Apt. Size: Too Large	0.065	0.038	0.100	0.062***
(Assessment)	(0.247)	(0.190)	(0.299)	(0.002)
Good Apt. Condition	0.606	0.545	0.661	0.115***
(Assessment)	(0.489)	(0.498)	(0.474)	(0.004)

Note: Calculations use the SOEP sample weights. The table reports the overall mean, the mean in the first tertile (one third quantile), the mean in the third tertile (two third quantile) of the unconditional rent distribution, and the difference between the tertile-specific means. See Table 4.1 for further details.

Table 4.3: Baseline Rent Regressions

Variable	QR 17%	QR 50%	QR 83%	83% - 17%	OLS
Annual Residency Discount					
$0 \leq$ Elapsed Tenure ≤ 3	-0.008^{**}	-0.016^{***}	-0.020^{***}	-0.013^{***}	-0.015^{***}
	(0.004)	(0.003)	(0.003)	(0.004)	(0.002)
$4 \leq$ Elapsed Tenure ≤ 11	-0.010^{***}	-0.009^{***}	-0.009^{***}	0.001	-0.010^{***}
	(0.002)	(0.001)	(0.001)	(0.002)	(0.001)
$12 \leq$ Elapsed Tenure ≤ 41	-0.002^{***}	-0.003^{***}	-0.004^{***}	-0.001	-0.003^{***}
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Elapsed Tenure ≥ 42 years	0.002	0.001	0.001	-0.001	0.001
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Reform Effect					
After Reform	-0.032^{**}	-0.043^{***}	-0.057^{***}	-0.025	-0.055^{***}
	(0.014)	(0.009)	(0.013)	(0.016)	(0.010)
Apartment Size					
Ln(Size)	0.489^{***}	0.562^{***}	0.553^{***}	0.064	0.509^{***}
	(0.046)	(0.025)	(0.028)	(0.044)	(0.027)
Ln(Size) $\times$ Balcony	0.086^{***}	0.100^{***}	0.106^{***}	0.021	0.109^{***}
	(0.025)	(0.019)	(0.018)	(0.028)	(0.017)
Ln(Size) $\times$ Basement	0.219^{***}	0.162^{***}	0.170^{***}	-0.049	0.181^{***}
	(0.045)	(0.027)	(0.030)	(0.046)	(0.026)
Ln (Size) (APE)	0.748^{***}	0.778^{***}	0.780^{***}	0.032^{**}	0.749^{***}
	(0.014)	(0.011)	(0.011)	(0.014)	(0.011)
City Size by Population (Ref.cat.: $<$ 5k)					
$\geq$ 500k (Central Location)	0.268^{***}	0.280^{***}	0.277^{***}	0.009	0.277^{***}
	(0.024)	(0.020)	(0.018)	(0.025)	(0.017)
$\geq$ 500k (Suburb)	0.223^{***}	0.227^{***}	0.210^{***}	-0.012	0.215^{***}
	(0.026)	(0.020)	(0.019)	(0.026)	(0.018)
100k to 500k (Central Location)	0.171^{***}	0.155^{***}	0.124^{***}	-0.047^{*}	0.144^{***}
	(0.024)	(0.019)	(0.018)	(0.024)	(0.017)
100k to 500k (Suburb)	0.112^{***}	0.076^{***}	0.057^{***}	-0.055^{*}	0.072^{***}
	(0.026)	(0.020)	(0.020)	(0.029)	(0.018)
50k to 100k (Central Location)	0.107^{***}	0.113^{***}	0.108^{***}	0.001	0.091^{***}
	(0.034)	(0.025)	(0.022)	(0.034)	(0.024)
50k to 100k (Suburb)	0.078^{**}	0.105^{***}	0.056^{***}	-0.023	0.084^{***}
	(0.033)	(0.023)	(0.018)	(0.033)	(0.020)
20k to 50k	0.101^{***}	0.084^{***}	0.049^{**}	-0.052^{**}	0.076^{***}
	(0.024)	(0.020)	(0.020)	(0.026)	(0.018)
5k to 20k	0.051^{*}	0.038^{*}	0.019	-0.031	0.027
	(0.028)	(0.021)	(0.020)	(0.027)	(0.019)
Missing Dummy	0.315	0.346^{**}	0.171	-0.144	0.232

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Baseline Rent Regressions <continued>

Variable	QR 17%	QR 50%	QR 83%	83% - 17%	OLS
	(0.461)	(0.169)	(0.154)	(0.482)	(0.173)
Type of House (Ref.cat.: Detached House, 1-2 Family)					
Other Bldg.	−0.098	0.004	0.026	0.124*	−0.009
	(0.070)	(0.042)	(0.030)	(0.065)	(0.036)
Nondetached House (1-2 Family)	0.048*	0.073***	0.070***	0.022	0.070***
	(0.027)	(0.016)	(0.016)	(0.028)	(0.016)
Apt. in 3-4 Units Bldg.	0.120***	0.069***	0.046***	−0.074***	0.087***
	(0.018)	(0.014)	(0.013)	(0.018)	(0.013)
Apt. in 5-8 Units Bldg.	0.155***	0.093***	0.065***	−0.090***	0.112***
	(0.019)	(0.013)	(0.012)	(0.019)	(0.013)
Apt. in 9+ Unit Bldg.	0.148***	0.112***	0.091***	−0.057***	0.130***
	(0.021)	(0.014)	(0.015)	(0.021)	(0.014)
High-Rise Apt. Bldg.	0.176***	0.143***	0.134***	−0.043	0.159***
	(0.027)	(0.020)	(0.027)	(0.031)	(0.021)
Missing Dummy	0.009	0.037	0.102***	0.093	0.050
	(0.063)	(0.036)	(0.033)	(0.066)	(0.033)
Residential Area (Ref.cat.: Old residential area)					
New Residential Area	0.020*	0.027***	0.021**	0.001	0.019**
	(0.011)	(0.008)	(0.010)	(0.013)	(0.008)
Mixed Area	0.006	0.017**	0.016*	0.010	0.011
	(0.010)	(0.008)	(0.009)	(0.011)	(0.008)
Other Areas	−0.009	0.047	0.061***	0.070**	0.031
	(0.032)	(0.028)	(0.023)	(0.031)	(0.025)
Missing Dummy	−0.029	0.007	−0.034	−0.006	−0.016
	(0.049)	(0.027)	(0.023)	(0.051)	(0.022)
Equipment					
Central Heating	0.200***	0.204***	0.156***	−0.045***	0.187***
	(0.014)	(0.012)	(0.013)	(0.015)	(0.010)
Central Heating, Missing	0.067	0.148***	0.070	0.003	0.113**
	(0.068)	(0.049)	(0.091)	(0.101)	(0.048)
Balcony or Terrace (APE)	0.092***	0.070***	0.063***	−0.029***	0.080***
	(0.011)	(0.008)	(0.009)	(0.011)	(0.008)
Balcony or Terrace, Missing	0.095**	0.000	−0.004	−0.099**	0.031
	(0.040)	(0.029)	(0.030)	(0.045)	(0.025)
Basement (APE)	0.084***	0.033***	0.021	−0.064***	0.051***
	(0.023)	(0.012)	(0.013)	(0.023)	(0.012)
Basement, Missing	0.092	0.110**	0.139	0.048	0.121***
	(0.061)	(0.049)	(0.086)	(0.094)	(0.045)
Garden	−0.061***	−0.024***	−0.005	0.057***	−0.031***
	(0.010)	(0.007)	(0.007)	(0.011)	(0.007)

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Baseline Rent Regressions <continued>

Variable	QR 17%	QR 50%	QR 83%	83% - 17%	OLS
Garden, Missing	−0.087	−0.034	−0.006	0.080	−0.050
	(0.055)	(0.033)	(0.027)	(0.052)	(0.033)
Amenities in 10 Minutes Walking Distance					
Stores	0.024**	0.010	0.004	−0.019	0.016*
	(0.012)	(0.008)	(0.010)	(0.013)	(0.008)
Park	0.017*	0.026***	0.023***	0.005	0.029***
	(0.010)	(0.008)	(0.009)	(0.011)	(0.008)
Sports Complex	−0.041***	−0.019**	−0.001	0.040***	−0.027***
	(0.013)	(0.009)	(0.010)	(0.013)	(0.010)
Public Transportation	0.025*	0.021*	0.003	−0.022	0.016
	(0.015)	(0.011)	(0.012)	(0.016)	(0.011)
Missing Dummy	0.042***	0.044***	0.039***	−0.003	0.039***
	(0.015)	(0.011)	(0.011)	(0.017)	(0.010)
Further Characteristics					
Private Landlord	0.048***	0.066***	0.082***	0.034***	0.064***
	(0.010)	(0.007)	(0.008)	(0.011)	(0.007)
Private Landlord, Missing	0.046***	0.039***	0.061***	0.014	0.047***
	(0.017)	(0.011)	(0.014)	(0.020)	(0.011)
Subsidized Housing	−0.065***	−0.088***	−0.105***	−0.041***	−0.088***
	(0.009)	(0.008)	(0.009)	(0.010)	(0.007)
Subsidized Housing, Missing	−0.069	−0.007	0.027	0.095**	−0.016
	(0.045)	(0.027)	(0.029)	(0.043)	(0.027)
Year of Construction	x	x	x		x
Year Dummies (Observation)	x	x	x		x
State	x	x	x		x

Note: QR 17%, 50%, 83% denote quantile regressions at the three quantiles. 83% - 17% denotes the difference between the two quantiles 83% and 17%. Ref.cat. denotes the reference category. Calculations use the SOEP sample weights. Standard errors are in parentheses estimated by bootstrap with 200 replications, clustered at tenancy level. *,** and *** denote significance at the 10%-, 5%- and 1%-level, respectively. Average partial effects (APE) are partial effects at the mean of the covariates used for the interactions. Source: SOEP V28.1 and authors' calculations.

Table 4.4: Annual Residency Discount Before and After Reform

	QR 17%	QR 50%	QR 83%	83% - 17%	OLS
(a) Before Reform					
$0 \leq$ Elapsed Tenure ≤ 3	-0.004	-0.013^{***}	-0.017^{***}	-0.013^{***}	-0.011^{***}
	(0.004)	(0.003)	(0.003)	(0.004)	(0.003)
$4 \leq$ Elapsed Tenure ≤ 11	-0.010^{***}	-0.009^{***}	-0.009^{***}	0.001	-0.010^{***}
	(0.002)	(0.001)	(0.001)	(0.002)	(0.001)
$12 \leq$ Elapsed Tenure ≤ 41	-0.002^{***}	-0.003^{***}	-0.003^{***}	-0.001	-0.003^{***}
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Elapsed Tenure $\geq$ 42 Years	0.002	0.001	0.002	0.000	0.001
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
(b) After Reform					
$0 \leq$ Elapsed Tenure ≤ 3	-0.014^{**}	-0.026^{***}	-0.034^{***}	-0.020^{***}	-0.028^{***}
	(0.006)	(0.004)	(0.005)	(0.007)	(0.004)
$4 \leq$ Elapsed Tenure ≤ 11	0.005	0.002	0.009^{*}	0.004	0.007^{*}
	(0.004)	(0.004)	(0.005)	(0.006)	(0.003)
(c) Difference (After minus Before)					
$0 \leq$ Elapsed Tenure ≤ 3	-0.010	-0.013^{***}	-0.017^{***}	-0.007	-0.018^{***}
	(0.006)	(0.004)	(0.005)	(0.007)	(0.004)
$4 \leq$ Elapsed Tenure ≤ 11	0.014^{***}	0.011^{***}	0.018^{***}	0.003	0.017^{***}
	(0.005)	(0.004)	(0.005)	(0.006)	(0.004)

Note: Pooled panel OLS and quantile regressions. Calculations use the SOEP sample weights. Standard errors are in parentheses and bootstrapped with 200 replications, clustered at tenancy level. *,** and *** denote significance at the 10%-, 5%- and 1%-level, respectively. Panel (a) shows annual discounts for tenancies where the old legal situation apply while panel (b) provides information on annual discounts for tenancies affected by the reform in 2001. Panel (c) shows the difference. Source: SOEP V28.1 and authors' calculations.

Table 4.5: Annual Residency Discount Before and After Reform (Tenancy Fixed Effects)

	QR 17%	QR 50%	QR 83%	83% - 17%	OLS
(a) Before Reform					
$0 \leq$ Elapsed Tenure ≤ 3	-0.009^{***}	-0.012^{***}	-0.015^{***}	-0.006^{***}	-0.011^{***}
	(0.002)	(0.001)	(0.002)	(0.002)	(0.002)
$4 \leq$ Elapsed Tenure ≤ 11	-0.011^{***}	-0.009^{***}	-0.006^{***}	0.005^{***}	-0.009^{***}
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
$12 \leq$ Elapsed Tenure ≤ 41	-0.004^{***}	-0.004^{***}	-0.003^{***}	0.000	-0.004^{***}
	(0.001)	(0.001)	(0.001)	(0.000)	(0.001)
Elapsed Tenure ≥ 42 years	0.001	0.002	0.003^{*}	0.002	0.002
	(0.001)	(0.001)	(0.002)	(0.001)	(0.001)
(b) After Reform					
$0 \leq$ Elapsed Tenure ≤ 3	-0.017^{***}	-0.022^{***}	-0.025^{***}	-0.008^{***}	-0.020^{***}
	(0.004)	(0.003)	(0.003)	(0.002)	(0.004)
$4 \leq$ Elapsed Tenure ≤ 11	-0.001	0.003	0.003	0.004	0.001
	(0.003)	(0.002)	(0.002)	(0.002)	(0.002)
(c) Difference (After minus Before)					
$0 \leq$ Elapsed Tenure ≤ 3	-0.008^{**}	-0.010^{***}	-0.010^{***}	-0.002	-0.009^{**}
	(0.004)	(0.004)	(0.004)	(0.002)	(0.004)
$4 \leq$ Elapsed Tenure ≤ 11	0.010^{***}	0.011^{***}	0.009^{***}	-0.001	0.010^{***}
	(0.003)	(0.002)	(0.002)	(0.002)	(0.002)

Note: Panel OLS and quantile regressions. The estimates account for tenancy mean fixed effects. Calculations use the SOEP sample weights. Standard errors are in parentheses and bootstrapped with 200 replications, clustered at tenancy level. *,** and *** denote significance at the 10%-, 5%- and 1%-level, respectively. Panel (a) shows annual discounts for tenancies where the old legal situation apply while panel (b) provides information on annual discounts for tenancies affected by the reform in 2001. Panel (c) shows the difference. Source: SOEP V28.1 and authors' calculations.

Chapter 5

General Conclusion

This thesis provides a differentiated picture of two interventions and one policy reform to alleviate economic inequality. Chapter 2 and 3 analyze the underlying mechanisms of how out-of-school activities affect educational attainment and labor market outcomes. In both chapters this question is addressed by examining whether out-of-school activities affect behavioral outcomes reflecting character, social and executive function skills.

Technological change and globalization have led to a growth in high- and low-skilled jobs on the labor market of the Western world, while middle-skilled jobs have been more and more displaced by machines or outsourced to low-wage countries. In response to a labor market that is characterized by job polarization with increasing earnings of high-skilled and decreasing earnings of low-skilled workers, the formation of socially productive skills and the increase of skills of unskilled workers should be at the center of attention.

In chapter 2 we analyze the effect of performing sports on a regular basis on the formation of character skills. We find beneficial effects of athletic involvement on a broad range of character skills, especially for youths on the vocational school track the effects are sizeable. For youths from less advantaged family backgrounds, sports constitutes often the only quality pastime they engage in while for youths from more advantaged family backgrounds sports is only one possible quality pastime besides playing music, singing or being technically active. Considering the engagement in other structured leisure activities in the analysis it turns out that the beneficial effects are largely driven by the sizeable effect among youths who do not engage in any other structured activity. The treatment effect estimates can therefore be interpreted as estimates of the broader effect of having access to an enriched social environment rather than the pure effect of physical exercise. The effects are robust

to including family fixed effects.

Chapter 3 analyzes the effect of working part-time while attending full-time secondary schooling on the formation of character skills and occupational choice strategies. The results suggest a positive selection into teenage employment. Adolescents who have held a job during full-time schooling are more likely to have high-educated parents and live in financially well-endowed households. Further, parents' employment history is a good predictor for the early work experience of school-aged children. For male teenagers, delivery jobs are the most popular type of jobs. Female teenagers, however, are more likely to hold service jobs such as waitressing, care jobs such as baby-sitting, and tutoring besides delivery jobs. The effect of working part-time after school on time invested in other activities is ambivalent. It reduces time spent with academic learning, an activity assumed to be academically productive, especially for young women on weekdays, and it reduces significantly screen time, an activity assumed to be academically unproductive. The estimation results imply that holding a paid job while still in school reduces the uncertainty about own interests and talents and reduces the dependency on parents. Further, it has beneficial effects on the internal locus of control, a character skill that is correlated with self-esteem. The effects are robust to including family fixed effects.

In sum, the results in both chapters are consistent with the hypothesis that experiences and informal learning activities during adolescence influence the development of nonacademic skills.

Chapter 4 evaluates a policy which targets to protect especially low-income households against rent increase. Germany is one of the European countries with the smallest percentage of the population who lives in owner-occupied houses or apartments. In 2013 about 53% of the German population lived in an owner-occupied home. A predominant percentage of the German population therefore satisfies one of their basic needs by living in a tenancy instead by home-ownership. This illustrates the importance of a functioning tenancy law, socially and economically. Until the 1990s, Germany was characterized by fairly liberal rent laws. Because of housing shortages and a strong rent increase in the 1990s, there was a change towards more regulation in order to protect sitting tenants. Since then the legal framework has been adjusted several times in favor of sitting tenants. In this chapter we analyze the impact of the Tenancy Law Reform Act in 2001 on the level of rents as well as on the residency discount. A residency discount signalizes a front loaded rent payment schedule where landlords ask for higher rents at the beginning of a tenancy to compensate for the stronger rent control during tenancy. The two substantial changes

were first, the reduction of the maximum rent increases for sitting tenants from 30% to 20% over the course of three years and second, the reduction of the minimum notice period until the termination of a tenancy by the tenant to three months while the protection of the tenant against eviction by the landlord remained unchanged. While the second modification accounts for the higher mobility of workers, the first modification targets the protection against rent increases which happened especially in metropolitan areas leading to undue hardship for low-income families. The results show a significant annual residence discount which decreases with tenure, which is stronger at the top than at the bottom of the rent distribution, and which falls with elapsed tenure. The tenancy reform act in 2001 shows a negative effect on rents that becomes stronger at higher quantiles. During the first three years of a tenancy, the reform further increases the annual residency discount for tenants. However, from the fourth year onwards, the discount for tenancies affected by the reform vanishes. The results suggest that the reform was successful in curtailing rent increases especially for expensive apartments early in a tenancy but there is no evidence that rents for new leases increase disproportionately in response. The results are robust to including tenancy mean fixed effects.

This thesis provides evidence on how economic inequalities can be alleviated. On the one side this thesis focuses on how out-of-school activities are able to promote the formation of character skills in contrast to the tightly structured learning environment at school that rather focuses on the development of cognitive abilities ignoring the importance of character skills. Representing valuable assets, character skills are helpful in bringing especially unskilled people into employment and to better paid jobs and thus, beneficial to reduce the wage gap between high- and low-skilled workers by lifting the skill level of unskilled people. As discussed in the general introduction, several early childhood interventions between the 1960s and 1980s were beneficial in promoting valuable character skills. They reduced significantly the probability of being involved in criminal activities in adulthood and were successful in integrating people with a disadvantaged social background in the mainstream society. In two chapters, this thesis documents beneficial effects of out-of-school activities on character skills supporting the hypothesis that structured leisure activities positively affect the development of nonacademic skills. On the other side, this thesis focuses on a tenancy law reform that aimed to protect low-income households against rent increases. In international comparison a high share of the German population lives in rental housing. Thus, the tenancy law plays an essential role in an economic and social view. The evidence suggests that the reform was successful in curtailing rent increases especially for expensive apartments early

in a tenancy. Thus, one may be concerned that the reform may not have been sufficiently targeted. As a consequence, the inequality between low-income tenants who tend to pay lower rents and high-income tenants who are able to live in expensive apartments increases.