

Four Essays on the Role of Personality
in the Transition from the Education System
to the Labor Market

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1 Introduction

“The ultimate purpose of economics, of course, is to understand and promote the enhancement of well-being.”

Ben S. Bernanke as the chairman of the U.S. Federal Reserve, 2012¹

“Poverty is not about not having money. Poverty is about living a life that is not to its full potential. And it has a number of facets. It’s about lack of health, it’s about lack of education, it’s about lack of the ability to realize yourself as an individual.”

Esther Duflo, professor of economics at the Massachusetts Institute of Technology, 2009²

¹ Speech at the 32nd General Conference of the International Association for Research in Income and Wealth, Cambridge, MA.

[www.federalreserve.gov/newsevents/speech/bernanke20120806a.htm, found on September 8, 2016].

² Lecture at the PopTech Conference 2009. The quoted passage starts at 05:29 minutes. [http://poptech.org/popcasts/esther_duflo_ending_poverty, found on September 8, 2016].

1.1 Topic, research questions, and relevance of the dissertation

This dissertation studies the role of personality in the transition from the education system to the labor market. It does so by focusing on four important questions, which are investigated in four different studies.

The first study (chapter 2) focuses on students at university and asks how personality traits (in particular, narcissism) and field of study (in particular, studying business administration or economics) are related to specific social preferences: positional preferences, which are preferences regarding the relative position in comparison to others (see ARONSSON/JOHANSSON-STENMAN 2014; EL HARBI et al. 2015). Positional preferences can lead to inefficient outcomes if distributions that are suboptimal for the group or even suboptimal for the absolute outcomes of the decision maker are preferred over alternative distributions. They are also relevant in education, because when preferences for a higher relative position are prevalent, this might increase motivation but can worsen the achievement of everybody in case cooperation is reduced, information are hidden, or the learning of students is even actively hindered through sabotage. (Compare the distinction between mastery goals, which are absolute and intrapersonal goals, and performance goals, which are relative and interpersonal goals: see ELLIOT/MCGREGOR 2001. Positional preferences correspond to performance goals in education.)

The individual determinants of positional preferences are largely unknown. Understanding the determinants of positional preferences is relevant for education but also for employers, because understanding what motivates people is a precondition for an effective performance management (in particular, for giving effective incentives) as well as for personnel recruitment and development decisions. In addition, the investigation of the relationship between narcissism and positional preferences contributes to the question how personality traits in psychology and social preferences in behavioral economics are related to each other (see BORGHANS et al. 2008). The investigation of the role of field of study for positional preferences informs the discussions about social preferences among business/economics students (see BAUMAN/ROSE 2011; CADSBY/MAYNES 1998; FARAVELLI 2007; MERTINS/WARNING 2014), may inform discussions about business/economics curricula, and may motivate further research on the question how education contributes to efficient decision making.

The second study (chapter 3) turns to the transition to the labor market and asks how civic virtue, the motive to support other people's well-being by contributing to society

(see GRANT 2008; ORGAN 1988: 12f.), relates to public sector employment in comparison to private sector employment. (Self-) selection effects (sorting into the public versus private sector) and socialization effects (the development of motives in the different sectors) are separately investigated. So far, research on the determinants of public sector employment has largely focused on other motives. When investigating the role of prosocial motivation (the desire to support other people's well-being; see BATSON 1987; GRANT 2008) for public sector employment, existing research is mostly restricted to altruism, which is understood as the motive to care for others (see, e.g., DUR/ZOUTENBIER 2015). Because civic virtue has been argued to be essential for good governance (see BOWLES/HWANG 2008), evidence on the relationship between civic virtue and public sector employment is of practical relevance. While altruism may rather be important for specific jobs, such as caring jobs (both in the public and in the private sector), civic virtue is likely to be important for the public sector as a whole because of this sector's mission to serve to community. Distinguishing selection from socialization effects is particularly important for understanding the relationship between motives and sector of employment.

The third study (chapter 4) focuses on teachers and investigates teachers' risk aversion in comparison to other occupations, whether risk-averse individuals are attracted to the teaching profession, and how working as a teacher relates to the development of risk aversion. Risk aversion is the preference (or motive) to avoid risks; for example, to avoid risky choices even if they have a higher expected value (see HOLT/LAURY 2002; KAHNEMAN/TVERSKY 1979). Previous research on teachers' risk aversion (see, e.g., BOWEN et al. 2015; DOHMEN/FALK 2010) leaves many questions open: for example, how a specific form of risk aversion that relates to career risks (occupation-related risk aversion; see PFEIFER 2011) is associated with working as a teacher; whether teachers are also more risk-averse, on average, than employees who work in related areas (caring jobs: education, health, and social care; see DUR/ZOUTENBIER 2015; GREGG et al. 2011); and whether there are socialization effects during the career as a teacher in addition to the attraction of risk-averse individuals to the teaching profession. Risk aversion has been argued to be relevant for the reaction to performance pay systems (see BOWEN et al. 2015) and is thus an important factor to consider when designing teacher payment reforms. Insofar as teachers' higher average risk aversion is a selection effect and explained by fixed payment schemes, changing the payment schemes would attract differently motivated workers to the teaching profession (see DOHMEN/FALK 2010). Varying the reference group (e.g., all

other employees or only those in the caring branch) helps to understand whether the relationship between the teaching profession and risk aversion reflects a more general relationship between job types and risk aversion, or whether teachers tend to be more risk-averse even than employees in similar jobs.

The fourth and last study of the dissertation (chapter 5) is concerned with economic effects of the field choice at university and asks what part of the associations between field of study and later earnings is due to (self-) selection by individual characteristics, including vocational interests and personality traits. Because evidence on causal effects of field of study on earnings is very limited and only possible in specific contexts with random or quasi-random assignment to fields (see, e.g., KIRKEBOEN/LEUVEN/MOGSTAD 2016), researchers mostly rely on descriptive data, which include only few control variables, in this research area (see ALTONJI/ARCIDIACONO/MAUREL 2016; ALTONJI/BLOM/MEGHIR 2012). It is therefore important for researchers – as well as for students who choose a field of study – to know how descriptive evidence on the relationship between field of study and earnings should be interpreted. Existing evidence indicates that a part of the field of study–earnings relationship is explained by individual differences in educational achievement measures before studying the field (see GRAVE/GÖRLITZ 2012; HAMERMESH/DONALD 2008; KINSLER/PAVAN 2015). Chapter 5 extends this research by using a large set of individual characteristics – psychological and sociological variables, assessed at the end of high school, that are relevant both for the field choice and for earnings – to systematically assess the role of selection effects in the field of study–earnings relationship.

1.2 Methodological foundation: The understanding of economics as part of an interdisciplinary social science

The present dissertation uses economic³ constructs, models, and methods to contribute to educational research in four empirical studies. Psychological theories and constructs – in particular, from personality psychology – as well as sociological constructs are explicitly considered in the studies, whenever they are needed for adequately treating a specific

³ In the remainder of this dissertation’s introduction as well as in the conclusion (chapter 6), whenever only the term “economic[s]” is used, it refers to business administration (in particular management science) as well as to economics in a narrower sense.

research question. Therefore, the present dissertation uses elements from behavioral economics – the systematic combination of psychology and economics (see CAMERER 1999) – to empirically analyze the role of personality in the transition from the education system to the labor market. The interdisciplinary methodological approach shall now be explained in more detail.

The dissertation follows the idea that the field of economics and business administration is not only concerned with financial questions and the efficient distribution of scarce resources, but also linked to well-being, self-actualization, and social balance – together these goals highlight the important role of education. To understand what contributes to social and individual well-being, and to generate implications that are suitable in this regard, it is in some cases useful to overcome the abstractions and simplifications that are typical for classical and neoclassical economics⁴ and to perceive humans as complex beings with different and dynamic personalities.

An interdisciplinary approach, combining economics and other social science disciplines such as psychology, has several advantages. On the one hand, core topics of economics – such as organization and efficiency – are arguably necessary to solve social problems. On the other hand, psychological factors, sociological factors, and insights from educational science may be crucial to work on some of the social issues sufficiently. Thomas Piketty notes in his seminal book *Capital in the Twenty-First Century*: “To be useful, economists must above all learn to be more pragmatic in their methodological choices, to make use of whatever tools are available, and thus to work more closely with other social science disciplines.” (PIKETTY 2014: 757.)

Claims for interdisciplinarity in economic research have often been raised in relation to basic assumptions of economics. Neoclassical economic approaches are based on the idea that individuals exclusively aim at maximizing their own utility and proceed perfectly rationally in their decisions (“economic man” or “homo oeconomicus”). Rationality in this context means that individuals know what they want (preference order), that these preferences are consistent (e.g., transitivity: If *A* is preferred over *B* and *B* over *C*, then *A* is preferred over *C*), and that individuals make their decisions accordingly. (See, e.g., HAMPICKE 1992.)

⁴ A fundamental description of neoclassical economics is given, e.g., by HAMPICKE (1992). Its precursor, the classical political economy, is described, e.g., by ALBERT (1995).

It is not necessary for a social science to give a “complete” account of human nature in each analysis; it is necessary, however, to consider factors that are systematically relevant for adequate predictions in a given situational context (see FRIEDMAN 1966: 3–16, 30–43). The concept of an economic man or homo oeconomicus has repeatedly been criticized because its implications are argued to be contradictory to empirical findings in some contexts (see, e.g., FALK 2003; HENRICH et al. 2005).

This criticism, however, is commonly based on the assumption that the economic man is a pure egoist (an exclusively self-interested individual). In fact, narrow self-interest is only one specific interpretation of a utility-maximizing and rational individual. In principle, preferences (motives) regarding other individuals, regarding social company, and regarding environmental protection can be included in individual utility functions. There are various possibilities to adjust theoretical utility functions to behavioral patterns that are systematically observed in empirical research (see KAHNEMAN/TVERSKY 1979). Therefore, psychological and economic methodology may be closer to each other than the criticism of the “economic man” might suggest, and there is much potential for collaboration (see, e.g., FREY 1998; KIRCHGÄSSNER 2014; STROEBE/FREY 1980).

The context of the present dissertation, the transition from the education system to the labor market, is strongly related to personality both from a theoretical and from an empirical perspective (see chapters 2–5). Therefore, it is crucial for this dissertation to consider psychological insights in (education) economics. The dissertation thereby contributes to the growing literature in behavioral economics.

Recent research and developments reflect an increasing consideration of the importance of interdisciplinarity in economics. The Nobel Memorial Prize to the behavioral economist Richard H. Thaler is a particularly notable example. While behavioral economics has originally been a separate subfield of economics, nowadays there are increasing claims and attempts to integrate and consider insights from behavioral economics within the different, traditional research areas of economics (see CHETTY 2015). An analysis of citations between 1970 and 2015 shows that economics articles increasingly refer to other social sciences, on average; nowadays, economics is more likely to cite other social sciences than psychology (see ANGRIST et al. 2017: 4, 23). At the same time, other social sciences such as psychology and sociology are now substantially more likely to

cite economics papers (see ANGRIST et al. 2017: 24).⁵ In line with these developments, the present dissertation refers to psychological and sociological research within studies in the field of education economics.

1.3 The role of personality for education economics

This subchapter explains in more detail the common topic of the dissertation. Personality, as the term is used in this dissertation, consists of different psychological individual characteristics, including personality traits, motives, and interests (see KANDLER/ZIMMERMANN/MCADAMS 2014; MCADAMS/PALS 2006; ROBERTS 2006).⁶ The construct of personality acknowledges that individuals are different and can behave differently from each other in the same situation.

Based on previous theoretical work on personality traits, Brent Roberts proposes the following definition: “Personality traits are the relatively enduring patterns of thoughts, feelings, and behaviors that reflect the tendency to respond in certain ways under certain circumstances.” (ROBERTS 2009: 140.) The present dissertation follows this definition.

The five-factor model of personality traits distinguishes the personality traits openness, conscientiousness, extraversion, agreeableness, and neuroticism (OCEAN), which are the Big Five personality traits (see COSTA/MCCRAE 1992). The HEXACO model with six personality traits has been proposed as an alternative framework and includes honesty-humility as an additional personality trait (see ASHTON et al. 2004; ASHTON/LEE 2007; LEE/ASHTON 2004; LEE/ASHTON 2006). For the purposes of this dissertation, honesty-

⁵ The results on economics in ANGRIST et al. (2017) do not include business administration. However, compared to economics, management science has an even higher probability to cite other social sciences, in particular psychology and sociology (see ANGRIST et al. 2017: 25). At the same time, psychology and (with a weaker trend) sociology are increasingly likely to cite business administration articles (see ANGRIST et al. 2017: 23).

⁶ Some authors even regard abilities (e.g., cognitive abilities) as an element of personality (see, e.g., ROBERTS 2006). Because such a very broad definition of personality is somewhat counter-intuitive, in this dissertation abilities are not defined as a part of personality (in line with KANDLER/ZIMMERMANN/MCADAMS 2014; MCADAMS/PALS 2006). Instead, abilities belong to individual characteristics, a term that is used to refer to various psychological and sociological variables, including educational achievement, cognitive abilities, personality, and socio-economic background (see in particular chapter 5).

humility does not appear to be theoretically relevant, and the five-factor model is an established model of personality that is also included in large-scale studies and available in the form of (sufficiently reliable) short scales (see GERLITZ/SCHUPP 2005; HAHN/GOTTSCHLING/SPINATH 2012). Therefore, with respect to personality traits the present study focuses on the Big Five. Narcissism is additionally included in chapter 2 because of its relevance for positional preferences.

Personality traits should be distinguished from – but are partly related to – other aspects of personality. Motives reflect what people want to do or to have in the future (see MCCLELLAND 1961; ROBERTS 2006) and together build the motivation to perform a particular behavior (see KRAPP/GEYER/LEWALTER 2014; LINNENBRINK-GARCIA/PATALL 2016). Therefore, they are more directly linked to behavior than personality traits. Chapters 3 and 4 analyze the role of motives in the transition to a specific sector (public versus private) respectively to a specific profession (teaching versus non-teaching) and additionally study how motives might change during the employment.

Interests are defined as “[...] traitlike preferences for activities, contexts in which activities occur, or outcomes associated with preferred activities that motivate goal-oriented behaviors and orient individuals toward certain environments [...]” (ROUNDS/SU 2014: 98). Therefore, they are related to behavior and – accordingly – to motivation. Characteristic of interests is their close relationship to objects (e.g., domains; one might be interested in working with machines or languages), and it is part of their definition that they connect individuals with environments. In Holland’s theory of vocational interests (see HOLLAND 1997), the following vocational interests are distinguished (RIASEC model): realistic, investigative, artistic, social, enterprising, and conventional interests. Vocational interests according the RIASEC model are considered in chapter 5 as a possible determinant of the choice of field of study at university and as a relevant predictor of later earnings on the labor market.

Empirical results from behavioral economics show that even in a given situational context with clearly defined conditions, individuals do not behave uniformly (see, e.g., BÄKER et al. 2015; CASAL et al. 2012; GÜTH/LEVATI/PLONER 2012; KAHNEMAN/KNETSCH/THALER 1986). This strongly motivates the question how differences in (revealed) preferences can be explained. This dissertation contributes to a stream of research that explains heterogeneity in economic behavior with individual differences in

personality (see, e.g., BOONE/DE BRABANDER/VAN WITTELOOSTUIJN 1999; HILBIG/ZETTLER 2009; HILBIG/ZETTLER/HEYDASCH 2012; ZETTLER/HILBIG/HEYDASCH 2013; ZHAO/SMILLIE 2015).

Education economics as a subfield of economics deals with various questions that combine education and the economy, such as the role of economic conditions for educational outcomes at the individual and societal level, the role of economic incentives in education, and effects of education on economic outcomes (see, e.g., HANUSHEK/MACHIN/WOESSMANN (Eds.) 2016). Personality is increasingly seen as an important factor in education economics, namely within the area of “behavioral economics of education” (KOCH/NAFZIGER/NIELSEN 2015; LAVECCHIA/LIU/OREOPOULOS 2016). It has been acknowledged, for example, that personality traits such as conscientiousness tend to be important for educational attainment (see DOHMEN 2014: 79; KOCH/NAFZIGER/NIELSEN 2015: 6). At the same time, personality is increasingly considered in labor economics, namely in “behavioral labor economics” (DOHMEN 2014). Personality has been found to have similar estimated effects on (early career) earnings as competencies, holding educational attainment constant (see HECKMAN/STIXRUD/URZUA 2006: 437–439). By analyzing the role of personality in the transition from the education system to the labor market in four empirical studies, the present dissertation contributes to these streams of research.

1.4 Theoretical foundation: Person-environment fit in the transition from the education system to the labor market

Different versions of person-environment fit theory have been proposed to understand the relationship between individual characteristics and social environments or jobs (see, e.g., JUDGE/FERRIS 1992; KRISTOF 1996; SUPER 1953). This subchapter applies a combination of person-environment fit theories to the role of personality in the transition from the education system to the labor market. The resulting new framework shall enhance the understanding of this transition process and thereby constitute a theoretical foundation for the empirical analyses conducted in the dissertation.

In the theoretical framework presented in this subchapter, it is assumed that students are decision makers in the education system who aim at maximizing their subjectively expected utility, while considering their perception of own characteristics such as skills, abilities, personality, and socio-economic background. It is predicted that students, on

this basis, will tend to select into specific educational programs and occupations that have the highest compatibility (or fit) with their person – in terms of similarity and suitable demands – because higher fit is expected to increase utility. Since (self-) selection is often based on similarity (or congruence) with respect to personality and because socialization processes may reinforce similarities that already exist before entering an environment, relatively homogeneous and separate groups emerge in educational and occupational contexts.⁷ The process and its results could be summarized with the term “specialization by personality”, and this specialization might have positive or negative implications for performance, dependent on the context.

1.4.1 Person-environment fit theories

One root of person-environment fit theories is the ASA model (attraction-selection-attrition) (see SCHNEIDER 1987), which states that individuals are more likely to be attracted to, to be selected by, and to stay in organizations that share their goals. Attrition in this context essentially means that “[...] people who do not fit an environment well will tend to leave it” (SCHNEIDER 1987: 442). These mechanisms increase homogeneity within environments over time. Similarly, an early version of person-environment fit theory predicts that selection mechanisms in human resource management are not fully understood by “rational” considerations – in terms of choosing the candidate with the best qualifications for a given job – but that they also have a “political” dimension, meaning that organizations aim for a high fit with respect to individual characteristics such as values (JUDGE/FERRIS 1992).⁸

Building upon these models, person-organization fit theory has been developed (see KRISTOF 1996). Person-organization fit is a specific form of person-environment fit and studies the antecedents and consequences of the compatibility between a person and the organization in which the person works. It distinguishes different forms of compatibility

⁷ See also the theory of “two cultures” – natural sciences and humanities – in SNOW (1998), as well as the subsequent theory of three cultures – natural sciences, social sciences, and humanities – in LEPENIES (2006).

⁸ Values can be understood as the normative foundation of motives (see also ROBERTS 2006). More precisely, values have been defined as “[...] criteria people use to select and justify actions and to evaluate people (including the self) and events” (SCHWARTZ 1992: 1).

or fit: Supplementary fit or congruence occurs when an individual has similar characteristics as other individuals in the organization; in contrast, complementary fit means that the individual has characteristics that the organization demands (see KRISTOF 1996: 3). A similar distinction is made between a “needs-supply perspective”, where the organization fulfills an individual’s preferences, and a “demands-abilities perspective”, where an individual fulfills the requirements that the organization demands (KRISTOF 1996: 3).

As an alternative version of person-environment fit, person-vocation fit has been proposed as a theory (“Theory of vocational development”; SUPER 1953). Rather than focusing on organizations, this theory predicts that individuals choose specific vocations (including a number of different possible occupations) based on their abilities, interests, personality traits, self-concepts, and socio-economic background.

Here an interesting similarity to Holland’s theory of vocational interests emerges (see HOLLAND 1985; HOLLAND 1997), to which person-environment fit theory and the ASA model refer (see KRISTOF 1996: 7; SCHNEIDER 1987: 441). Vocational interests, as operationalized with the RIASEC model, describe individuals on the one hand and the demands, opportunities, and people in a working environment on the other hand. Holland’s theory predicts that individuals tend to choose environments and to be selected into environments that are congruent with their interests (see STOLL/TRAUTWEIN 2017).

Person-environment fit theories do not imply that individuals or environments have fixed characteristics and become more homogeneous only through attraction, selection, and attrition. Instead, they also consider socialization as an additional way by which compatibility is achieved (see HOLLAND 1997; KRISTOF 1996; SUPER 1953): The characteristics of individuals may change in accordance with the characteristics or demands of the environment.

Along these lines, an important extension of person-environment fit theories, in particular of the ASA model, is the ASTMA model of person-organization transactions (attraction, selection, transformation, manipulation, and attrition) (see ROBERTS 2006). This theoretical framework explicitly integrates the possibility that individual characteristics are changed through organizational experiences (transformation) and thereby acknowledges the malleability of personality. It also argues that individuals are able to substantially change their environment or organization (manipulation).

It has mainly been argued that person-environment fit is beneficial both for individuals’ satisfaction and for the organization’s performance or success (see HOLLAND 1997;

KRISTOF 1996). Empirical research has found a positive relationship between person-organization fit and job satisfaction and a negative relationship between person-organization fit and intention to quit (see KRISTOF-BROWN/ZIMMERMAN/JOHNSON 2005). In addition, person-organization fit has been shown to be positively associated with organizational commitment measured one year later (see O'REILLY III/CHATMAN/CALDWELL 1991) and with contextual performance in terms of extra-role behavior beyond obligations (see LAUVER/KRISTOF-BROWN 2001). Person-organization fit partly mediates the positive link between prosocial motivation and job satisfaction in the public sector (see KIM 2012), and low person-environment fit appears to positively predict sector changes (see STEIJN 2008).

However, it has also been argued that person-environment fit might be detrimental for performance due to a suboptimal high level of homogeneity. One of the implications of the ASA model is the negative role of the occurring homogeneity for organizational changes (see SCHNEIDER 1987). It has been noted that some degree of heterogeneity may be important for innovation and may be particularly important for management positions in more mature organizations to avoid stagnation; however, this demand for heterogeneity could be captured by a form of complementary person-organization fit (see KRISTOF 1996: 29f.).

1.4.2 A theoretical framework for the role of personality in the transition from the education system to the labor market

Based on these elements of person-environment fit theories, a new theoretical framework shall be developed, which sketches the role of personality in the transition from the education system to the labor market. In this framework, it is assumed that individuals aim at maximizing their subjectively expected utility.⁹ That is, individuals shall approximately be regarded as utility maximizers. Importantly, this does not exclude the possibility that prosocial motives, social interests, etc. enter the utility function of an individual.

⁹ The expression “*subjectively* expected utility” indicates that individuals are not necessarily able to estimate probabilities correctly. The formulation “*aim* at maximizing” accounts for the possibility that there is irrational behavior (decisions that are inconsistent with preferences); the questions whether such decisions can exist and whether they actually exist are left open.

The main idea of the theoretical framework is that students choose specific educational specializations (fields of study) and subsequent occupations partly based on their personality, because a higher fit between own personality and specific fields, sectors, or professions tends to increase the expected utility of an educational and occupational career. In line with person-environment fit theories, “fit” is here understood as the compatibility between characteristics of the individual (here: personality) and characteristics of the environment (here: opportunities and demands of a study program or occupation, and the personality of fellow students or colleagues). This fit due to self-selection or choice is expected to be reinforced by selection through the educational system and human resource management: Organizations tend to select individuals that are perceived as compatible with the organization’s goals and values. This might be particularly important for skills and abilities, because the regulations and selection decisions for specific study programs and job positions may require a particular set of skills and abilities for everybody who works in this area. Moreover, socialization processes further increase the fit between an individual and the educational or occupational environment, because the adaptation to the environment with respect to personality (e.g., motives) is used as a mechanism to increase individual satisfaction.

The theoretical framework predicts that the resulting fit is more similar to the concept of supplementary fit or congruence (that is, individuals in specific professions are similar to each other) than to the concept of complementary fit (that is, individuals are chosen that fulfill specific demands of a profession and thereby close a gap). Even though education professionals and employers will search for candidates who meet the requirements and needs of the institution, their selection decisions will – not always, but in most cases – result in groups of individuals who are more similar to each other than to members of other groups with respect to their personality. Some employers may explicitly search for diversity; in general, however, if employers have a specific demand that is not fulfilled yet, they will prefer an applicant who can fill this gap but who also agrees with the standards of the profession in her/his other abilities, skills, motives, interests, and personality traits. Presumably, both employers and candidates will usually feel more comfortable with such homogeneity than with heterogeneity in selection decisions. (For empirical evidence on the positive relationship between personality-related similarity and hiring, see RIVERA 2012.) The (self-) selection of candidates with a similar personality might be particularly pronounced in the presence of a “present bias” (O’DONOGHUE/RABIN 1999),

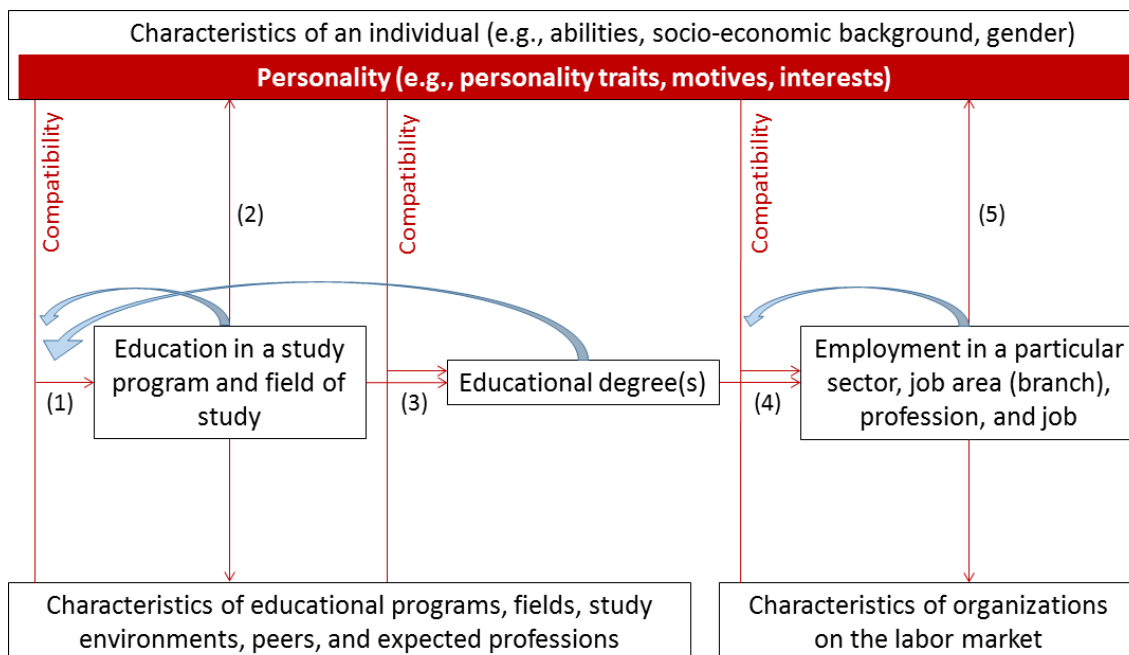
where immediate performance and satisfaction is outweighed in comparison to possible long-term gains from heterogeneity.

Figure 1.1 sketches the person-environment fit model for the transition from the education system to the labor market. It mainly focuses on personality (in particular, personality traits, motives, and interests) and has been developed for the context of post-secondary education, although it should be possible to apply the model (with some adaptations) to other educational tracks. The model concretely predicts:

- (1) An educational choice is made based upon the fit (compatibility) between individual characteristics and the characteristics of an educational environment (e.g., a study program and field of study).
- (2) Studying in a specific program and field has consequences both for the characteristics of the individual (socialization effects of education) and for the educational environment, which is shaped by the individuals.
- (3) Studying in a specific program and field can lead to an educational degree. (In case of several consecutive study programs, which are not explicitly modeled for simplicity, several degrees may be obtained.) Whether a specific degree is obtained, also depends on the fit between individual characteristics (at this point in time) and the characteristics of the study program (demands, opportunities, and fellow students).
- (4) The educational degree(s) can lead to the employment in a particular sector (e.g., private or public sector), job type (e.g., education, health, or technical jobs), profession (e.g., teaching), and job (e.g., teaching at an upper secondary school). The transition from the educational degree to the labor market depends, however, also on the fit between individual characteristics (at this point in time) and the characteristics of the respective organizations (e.g., job conditions of public versus private sector positions).
- (5) The employment, in turn, influences both the individual characteristics (socialization effects of employment) and shapes the characteristics of the organization.

As the curved arrows indicate, individuals can correct their decisions (re-selection) based on person-environment fit. Instead of obtaining a specific educational degree or after obtaining the degree, individuals can make a new educational choice (e.g., change to a new field of study). Similarly, on the labor market individuals can switch their job, the sector of employment, and job area.

Figure 1.1: A model for the role of personality in the transition from the education system to the labor market



If the decisions are mainly based upon supplementary fit (congruence), then this process will lead to rather homogeneous education-occupation environments, which tend to be distinct from each other, because individuals and environments mutually select each other and adapt to each other with respect to their personality. The performance implications of this process are not tested in the present dissertation; positive effects are plausible due to an (approximately) optimal allocation of individuals by personality and a reduction in conflicts, but negative effects might occur due to lower diversity and flexibility in the context of a changing environment with new demands and challenges.

1.4.3 Person-environment fit theory and the chapters of the dissertation

In chapter 2, the role of field of study for positional preferences among university students is investigated. As indicated in Figure 1.1, students will make their decision to study a particular field at university not only based on their skills, abilities, and earnings prospects, but also based on their personality; in particular, based on the fit between their personality and their expectations of an educational program and occupational career. It has been found that business administration and economics students overall tend to be more self-interested and that this relationship is due to (self-) selection (see BAUMAN/ROSE 2011; CADSBY/MAYNES 1998; MERTINS/WARNING 2014), although the relationship between studying economics and self-interested behavior has been critically discussed (see FARAVELLI 2007). Higher observed self-interest is a possible (not necessary)

consequence of the rationality concept; students who identify with this concept may be attracted to business/economics and might in principle experience further socialization during the study program. Moreover, self-interested behavior is in line with the idea that socially beneficial outcomes should be achieved through institutions – and should not depend on individuals' motives. It is hypothesized for chapter 2 that although students majoring in business or economics tend to be more self-interested, they will have less positional preferences than other students, on average: In a situation where positional preferences are distinguished from self-interest (that is, positional choices do not increase the own absolute payoff) and go along with lower efficiency (positional choices reduce the group payoff), business/economics students may exhibit less positional preferences than other students because of a stronger motive for efficiency.

In chapter 3, person-environment fit theory is applied to the choice of the employment sector (public versus private sector). Job positions in the public sector usually go along with directly experienced service to society. Therefore, individuals who score higher in the prosocial motive of civic virtue, the desire to contribute to society, may perceive a greater fit between their person and the public sector than other individuals. Chapter 3 concretely hypothesizes that civic virtue relates positively to public versus private sector employment when holding other motives constant (altruism, risk aversion, laziness, and financial motivation) and even within specific job branches. Furthermore, chapter 3 hypothesizes that the relationship between civic virtue and public sector employment is explained by (self-) selection – at the start of the career and during the career (sector changes) – rather than by socialization.

In chapter 4, person-environment fit theory is applied to a specific profession, the teaching profession. Given that teachers are usually public servants – in Germany even with a high probability to work as civil servants, that is, public servants with a tenured position – individuals with a stronger motive to avoid risks may be more probable to be attracted to this profession with its relatively high expected job security and rather fixed payment schemes. Moreover, the teaching profession may appear highly familiar, thereby reducing the perceived career risk in comparison to other occupations. Based on existing empirical evidence (see BOWEN et al. 2015; DOHMEN/FALK 2010), chapter 4 hypothesizes that working in the teaching profession relates positively to risk aversion. It further hypothesizes that this relationship is stronger for a specific form of risk aversion that concerns career risks (occupation-related risk aversion), that the relationship holds within a

more narrowly defined occupational group – but less so when teachers are compared to other civil servants – and that the relationship is due to both (self-) selection and socialization processes.

In chapter 5, the role of individual characteristics (including personality) for the relationship between field of study at university and later earnings is investigated. Different fields of study arguably tend to impose different demands on students' competencies and abilities as well as their personality traits (e.g., conscientiousness). Likewise, students will choose a field of study based on their interests – in particular, based on the fit between their interests and the expected characteristics (subject matter, social environment) of a specific field of study and associated occupations. Moreover, socio-economic background may influence the expected utility of studying particular fields (see VAN DE WERFHORST/SULLIVAN/CHEUNG 2003). For these reasons, students systematically self-select – and are partly selected – into different fields of study based on their individual characteristics, on average (see, e.g., ARCIDIACONO 2004; HUMBURG 2017; KINSLER/PAVAN 2015; PÄBLER/HELL 2012). The question is, then, to what extent average differences in later earnings between different fields of study can be explained by such selection effects. Chapter 5 hypothesizes that a significant part of the relationships between field of study and earnings is due to selection by individual characteristics (that is, estimated field effects decrease if individual characteristics are included): Individuals with characteristics that are more beneficial for earnings on the labor market tend to self-select into fields that are overall more demanding and financially profitable, so the effects of these fields are overestimated if individual characteristics are not included.

2 Social Preferences in Higher Education: Narcissism and Studying Economics Differentially Predict Positional Preferences¹⁰

2.1 Introduction

People do not only tend to care about their own absolute payoffs but also about their relative standing as compared to others (see, e.g., ALPIZAR/CARLSSON/JOHANSSON-STENMAN 2005; JOHANSSON-STENMAN/CARLSSON/DARUVALA 2002; SOLNICK/HEMENWAY 1998; SOLNICK/HEMENWAY 2005). Some even prefer having more than others over an egalitarian distribution if that choice comes at a social cost (see CHARNES/GROSSKOPF 2001) and/or a personal cost (see EL HARBI et al. 2015). In our paper, we attempt to enhance our understanding of these “positional preferences” (ARONSSON/JOHANSSON-STENMAN 2014; EL HARBI et al. 2015) by studying whether and how they can be explained by two different dimensions of narcissism: narcissistic admiration and narcissistic rivalry.

While there is some literature that links positional preferences with individual characteristics (see BOGAERTS/PANDELAERE 2013; BURSZTYN et al. 2017; CELSE/GALIA/MAX 2017; CHARNES/GROSSKOPF 2001; CLINGINGSMITH/SHEREMETA 2017; FRIEHE/MECHTEL/PANNENBERG 2018; LAMPI/NORDBLOM 2010; PINGLE/MITCHELL 2002; SCHRAM/BRANDTS/GËRKHANI 2018), the determinants of positional preferences at the individual level are still only poorly understood. With our study we contribute to this literature by being the first to investigate the relationship between narcissism and positional preferences. Learning more about the determinants of positional preferences at the individual level contributes to our understanding of what motivates people and thus is ultimately a pre-condition for effective performance management and personnel resource planning.

Narcissism describes the tendency to perceive oneself (or to try to perceive oneself) as grandiose, superior, and entitled (see BACK et al. 2013; BRUMMELMAN et al. 2015; PAULHUS/WILLIAMS 2002). Two different dimensions of narcissism are distinguished:

¹⁰ This chapter is based on the article “Does Narcissism Explain Positional Preferences?”, written by Adam Ayaita and Kerstin Pull. The article has been submitted for publication. Subchapter 2.5.4 has been added for the dissertation and is not part of the cooperative article.

Narcissistic admiration refers to self-enhancement through admiration seeking, and *narcissistic rivalry* concerns self-defense through antagonism (see BACK et al. 2013). Referring to the literature on narcissism, we argue that narcissistic admiration is negatively associated with positional preferences and narcissistic rivalry is positively associated with positional preferences.

To measure positional preferences, we use an experimental approach. The participants in our experiment play six mini-dictator games in a within-subjects design, which allows us (a) to achieve a comprehensive measure of positional preferences, (b) to differentiate between different facets of positional preferences, and (c) to distinguish positional preferences from other behavioral motives. In each game, participants decide whether they prefer a payoff distribution between themselves and a second player in which their own relative position in comparison to the other player is enhanced (positional choice) as opposed to an alternative distribution where their own payoff is smaller than or equal to that of the other player. The “cost” of the positional choice is a lower efficiency in terms of a reduction in the total payoff of both players (see, e.g., ENGELMANN/STROBEL 2004; GÜTH et al. 2010 for an analogous definition of efficiency), partly including a personal cost in terms of a lower own *absolute* payoff. The own absolute payoff is never increased by making the positional choice.

As predicted, we find that narcissistic admiration is negatively associated with positional preferences, while narcissistic rivalry relates positively to positional preferences, beyond other individual characteristics and personality traits. When distinguishing between different facets of positional preferences – inferiority aversion, superiority seeking, and complete positional preferences (i.e., the combination of inferiority aversion and superiority seeking) – we find that narcissistic admiration is negatively associated with superiority seeking and with complete positional preferences. To the contrary, narcissistic rivalry relates, as predicted, positively to inferiority aversion, superiority seeking, and complete positional preferences.

2.2 Related work and contribution

2.2.1 Experimental measurement of positional preferences

Starting with the ultimatum game (see GÜTH/SCHMITTBERGER/SCHWARZE 1982), the experimental economics literature provides ample evidence for the existence of (revealed) positional preferences. For instance, in the ultimatum game, the rejection of a take-it-or-

leave-it offer that allocates a much higher amount to the proposer than to the responder can be understood as an indicator of responder inferiority aversion: The responder is ready to bear personal costs in order not to be in an inferior position (see BOHNET/ZECKHAUSER 2004; OOSTERBEEK/SLOOF/KUILEN 2004). Likewise, in the so-called “envy game” (BÄKER et al. 2015; CASAL et al. 2012), where the payoff of the responder is fixed and the proposer chooses the pie size from a given interval and thus determines her own (residual) payoff, the rejection of a pie choice that would result in a disproportionately high payoff for the proposer also indicates responder inferiority aversion. Similarly, the experimental evidence on the so-called “generosity game” (GÜTH 2010; GÜTH/LEVATI/PLONER 2012), where the payoff of the proposer is fixed and where the total pie size and the (residual) payoff of the responder are chosen by the proposer, hints at inferiority aversion being in place when the responder rejects an offer that would make him be comparatively worse off as compared to the proposer.

The generosity game is of particular interest for the measurement of positional preferences. Since in the generosity game the proposer allocates money to the other player without any consequences for her own absolute payoff, positional preferences are not confounded with proposer self-interest (other than, e.g., in the standard ultimatum or dictator game). Specifically, since in the dictator variant of the generosity game, the proposer can determine the outcome alone (see KAHNEMAN/KNETSCH/THALER 1986) and does not have to take into account how the responder might react to her choice (as in the standard ultimatum game or the ultimatum game variant of the envy or generosity game), the experimental measurement of positional preferences is often based on the dictator variant of the generosity game (see, e.g., CHARNESS/GROSSKOPF 2001; CHARNESS/RABIN 2002; EL HARBI et al. 2015).

In our experimental analysis, we build on this work and use six mini-dictator games to assess positional preferences, three of which are generosity games, where the proposer payoff is fixed in advance and does not vary with the proposer’s decision. Likewise, also in the other three dictator games that we apply, positional preferences and self-interest are not confounded, since the positional choice would make the proposer even worse off in absolute terms.

2.2.2 Individual determinants of positional preferences

Not much is known on the determinants of positional preferences at the individual level. Using an experimental measurement of (revealed) positional preferences, CHARNESS/GROSSKOPF (2001) find no significant relationship between unhappiness and positional preferences. Concerning the link between positional preferences and self-esteem, BURSZTYN et al. (2017) find individuals whose self-esteem is (temporarily) boosted with a manipulation tend to show a smaller preference for status goods, which suggests that self-esteem reduces positional preferences. Experimental evidence further indicates that, on average, men are more status seeking than women (see CLINGINGSMITH/SHEREMETA 2017; SCHRAM/BRANDTS/GËRXHANI 2018).

With reference to survey evidence on (stated) positional preferences (see, e.g., ALPIZAR/CARLSSON/JOHANSSON-STENMAN 2005; CARLSSON/JOHANSSON-STENMAN/MARTINSSON 2007; CORAZZINI/ESPOSITO/MAJORANO 2012; HILLESHEIM/MECHTEL 2013; JOHANSSON-STENMAN/CARLSSON/DARUVALA 2002; LOEWENSTEIN/THOMPSON/BAZERMAN 1989; SOLNICK/HEMENWAY 1998; SOLNICK/HEMENWAY 2005; YAMADA/SATO 2013), stated positional preferences have been found to be positively associated with neuroticism and negatively with agreeableness and conscientiousness (see FRIEHE/MECHTEL/PANNENBERG 2018). Further, positional preferences are positively linked to competitiveness (see PINGLE/MITCHELL 2002), to social comparison orientation (see BOGAERTS/PANDELAERE 2013), and to having often been compared with siblings (see LAMPI/NORDBLOM 2010). Interestingly, while experimentally induced anger shows no significant effect on positional preferences, induced joy positively predicts positional preferences (see CELSE/GALIA/MAX 2017). Women have been found to report more positional preferences than men (see ANDERSON/STAHLEY/CULLEN 2014).

In our work, we contribute to the literature on the individual determinants of positional preferences by investigating a potential link between narcissism and positional preferences – controlling for other individual characteristics and personality traits that have been found to be of relevance in the literature (e.g., gender, self-esteem, and the Big Five).

2.2.3 Narcissism and social preferences

Finally, our work also relates to the literature on narcissism and how narcissism relates to different types of social preferences. Narcissism is a clinical phenomenon but also a personality trait in the common population, where people may score higher or lower (see

BACK et al. 2013; BRUMMELMAN et al. 2015). Narcissists perceive or try to perceive themselves as grandiose, superior, and entitled (see BRUMMELMAN et al. 2015; PAULHUS/WILLIAMS 2002). Not all narcissists are actually convinced that they are superior to others; some of them face self-esteem struggles and are vulnerable, being afraid that their goal of being grandiose and superior is not achieved and being afraid of inferiority. Although this type of narcissism – vulnerable narcissism in contrast to grandiose narcissism – has been described as rather or only clinically relevant (see BACK et al. 2013: 1014; JONK-MANN et al. 2012: 738), it is theoretically plausible that subclinical forms of vulnerable narcissism also exist in the general population (see, e.g., ALTMANN 2017; BRUMMELMAN et al. 2015; HART et al. 2017; HENDIN/CHEEK 1997; KRIZAN/JOHAR 2012; PINCUS et al. 2009).

Two different mechanisms have been identified by which narcissists try to maintain or achieve a feeling of grandiosity and superiority: on the one hand, self-enhancement through admiration seeking (being captured in the dimension of narcissistic admiration), and on the other hand, self-defense through antagonism (being captured in the dimension of narcissistic rivalry) (see BACK et al. 2013). Although both of these dimensions have been developed as dimensions of grandiose narcissism, it is reasonable that, in addition, vulnerable narcissists might also use rivalry as a self-defense strategy. Narcissistic rivalry is negatively associated with self-esteem and positively associated with vulnerability (see BACK et al. 2013: 1022f.).

While narcissism has not yet been linked to positional preferences, several studies indicate that narcissism is associated with social preferences. For instance, narcissists tend to give less money to the other player in a variant of the ultimatum game and they invest more money to punish the proposer in case of low offers (see BÖCKLER et al. 2017). While these findings may be explained by less perspective taking and higher anger among narcissists (see BÖCKLER et al. 2017), they might also reflect that narcissists perceive they deserve more than others. Interestingly, in a standard ultimatum game, higher scores in narcissistic rivalry are associated with a higher probability to accept low offers, which might be explained by higher self-interest and less pronounced fairness norms of narcissists (see FATFOUTA/RENTZSCH/SCHRÖDER-ABÉ 2018).

2.3 Experimental design and procedures

2.3.1 Measuring positional preferences with a series of mini-dictator games

To achieve a comprehensive measure of positional preferences, differentiate between different facets of positional preferences, and distinguish positional preferences from other behavioral motives, we employ six dictator games. Each of them is a mini-game with exactly two options for the decision maker (for the use of mini-games see also BOLTON/ZWICK 1995; GALE/BINMORE/SAMUELSON 1995). In each game, the decision maker chooses between a payoff distribution where her own payoff is smaller than or equal to that of the other player (no positional choice, option 0) and an alternative payoff distribution where her relative position in comparison to the other player is enhanced (positional choice, option 1). The positional choice is always the less efficient one in that the total payoff of both players is always smaller if the positional choice is made. Furthermore, making the positional choice never increases the decision maker's payoff in absolute terms. Rather, in three of the games, the decision maker has to bear a personal cost in terms of a lower own absolute payoff when he makes the positional choice. All games are dictator-type games, where two players are involved and the second player, a mere recipient, cannot influence the outcome (see KAHNEMAN/KNETSCH/THALER 1986). In this way strategic issues are left aside and preferences can more clearly be measured.

The first four games (in particular games 1 and 3) have a similar structure as the ones used in CHARNES/GROSSKOPF (2001: 306f.). Games 1 and 2 measure whether own superiority is preferred over equality. Game 1 offers the options 10/10 (option 0) or 10/5 (option 1, the positional choice) where the first number indicates the payoff of the decision maker and the second number indicates the payoff of the other player. Game 2 offers the options 10/10 (option 0) or 9/5 (option 1).

Games 3 and 4 measure whether equality is preferred over inferiority. Game 3 offers the options 5/10 (option 0) or 5/5 (option 1, the positional choice). Game 4 offers the options 5/10 (option 0) or 4/4 (option 1).

Games 5 and 6 identify positional preferences without an equal distribution option being available, so that equity seeking is left aside and a situation is modeled in which some sort of inequality is unavoidable. Game 5 offers the options 8/10 (option 0) or 8/6 (option 1, the positional choice). Game 6 offers the options 8/10 (option 0) or 7/5 (option

1). The structure of game 6 is comparable to the measure of positional preferences in EL HARBI et al. (2015), however without an equal distribution option being available.

Games 1, 3 and 5 are generosity games, where the proposer payoff is fixed in advance and the positional choice does not affect the proposer's payoff. In games 2, 4, and 6 the positional choice makes the proposer even worse off in absolute terms. The options in the different games are summarized in Table 2.1.

Table 2.1: Mini-dictator games used in the present study

Game number	Category	Option 0 (no positional choice)		Option 1 (positional choice)	
		Own payoff in €	Other player's payoff in €	Own payoff in €	Other player's payoff in €
1	Superiority (1) vs. Equality (0)	10	10	10	5
2		10	10	9	5
3	Equality (1) vs. Inferiority (0)	5	10	5	5
4		5	10	4	4
5	Superiority (1) vs. Inferiority (0)	8	10	8	6
6		8	10	7	5

This table presents the structure of the games in the present study. 1 euro (€) corresponds to about \$1.09 at the time of the experiment.

Our first, comprehensive, measure of positional preferences refers to the sum score of positional choices in all of the six mini-dictator games, arguing that the number of positional choices an individual makes (0 to 6) indicates the extent to which the individual is characterized by positional preferences.

2.3.2 Distinguishing different facets of positional preferences and contrasting them with alternative behavioral motives

Besides analyzing the sum score of positional choices, our design allows us to exploit individuals' choice *patterns* across the different games. Specifically, the choice patterns across the six games help us to distinguish different facets of positional preferences and contrast these with various other behavioral motives. The following behavioral motives are distinguished: complete positional preferences (POS) and its two facets inferiority aversion (INA) and superiority seeking (SUS), inequity aversion (INE) and equity seeking (EQS), efficiency seeking (EFS), maximin preferences (MM), and self-interest (SLF).

An individual is characterized by *complete positional preferences* (POS) if it makes the positional choice in all six games. An individual with *inferiority aversion* (INA) will make the positional choice whenever this prohibits a relative deprivation in comparison to the other player (games 3, 4, 5, and 6). A *superiority seeking* individual (SUS) will make the positional choice whenever this creates a superior position in comparison to the other player (games 1, 2, 5, and 6).

Inequity aversion (INE) in the sense of BOLTON/OCKENFELS (2000) and FEHR/SCHMIDT (1999) predicts that equal distributions are preferred above unequal ones.¹¹ Therefore, inequity-averse individuals will make no positional choice when the positional choice would create inequality (games 1 and 2), but make the positional choice whenever this creates an equal distribution (games 3 and 4). Further, inequity aversion as defined by FEHR/SCHMIDT (1999) predicts that, if equality cannot be achieved, people prefer inequality to their own benefit over inequality to the benefit of others. If this positional preference in case of unavoidable inequality is strong enough so that individuals are ready to incur social and/or private costs, then inequity-averse individuals will make a positional choice also in games 5 and 6. In contrast, for a purely equity seeking (EQS) individual there is no prediction for games 5 and 6. Thus, inequity-averse individuals in the sense of FEHR/SCHMIDT (1999) are identified in a way that they represent a sub-group of equity seeking individuals.

Given the specific structure of our games, where the positional choice always results in a lower overall payoff, an efficiency seeking individual (EFS) will never make the positional choice in any game. Likewise, maximin preferences (MM) – the motive to maximize the payoff of those with the smallest payoff (see ENGELMANN/STROBEL 2004) – also speak in favor of the non-positional choices in games 1, 2, 4, 5, and 6, but in game 3 they would lead to indifference between the two options. Finally, a purely self-interested individual (SLF) will make no positional choice whenever the positional choice is

¹¹ In the context of the present study, we use the terms “equity” and “equality” synonymously. Equity and equality are not generally the same: While equity refers to the equivalence of inputs on the one hand and outcomes on the other, equality means the same outcome for everybody. However, in the simplified context of anonymous experimental games where participants’ input basically refers to the time they spend in the experiment, equity is equivalent to equality: As nobody has invested any particular effort before the money is distributed, an equal outcome is presumably also the most equitable one (see FEHR/SCHMIDT 1999: 822).

costly for the decision maker (games 2, 4, and 6), while there is no prediction for games 1, 3 and 5. That is, given our specific game structure, efficiency seeking individuals represent a sub-group of individuals with maximin preferences and a sub-group of purely self-interested individuals.

The relationship between behavioral motives and choice patterns, as described above, is shown in Table 2.2. As can be seen from the last row of Table 2.2, a given sum score is compatible with different choice patterns. For instance, a sum score of 4 may result from a choice pattern hinting at inequity aversion (INA) or superiority seeking (SUS), i.e., at positional preferences, but it may also hint at inequity aversion (INE). Hence, investigating choice patterns allows for a more refined analysis of behavioral motives than only analyzing the sum score across all six games.

Table 2.2: Identification of different behavioral motives using choice patterns

Game number	Behavioral motives and corresponding choice patterns (1 = positional choice, 0 = no positional choice)							
	POS	INA	SUS	INE	EQS	EFS	MM	SLF
1	1		1	0	0	0	0	
2	1		1	0	0	0	0	0
3	1	1		1	1	0		
4	1	1		1	1	0	0	0
5	1	1	1	1		0	0	
6	1	1	1	1		0	0	0
Sum score	6	4–6	4–6	4	2–4	0	0–1	0–3

POS = complete positional preferences. INA = inferiority aversion. SUS = superiority seeking. INE = inequity aversion. EQS = equity seeking. EFS = efficiency seeking. MM = maximin preferences. SLF = self-interest. Empty cells mean that there is no prediction.

2.3.3 Procedures and personality assessment

All games are played by all participants in a within-subjects design, which makes it possible to analyze the choice patterns across games. The games are played in a random order, and the position of each game is later included as a control variable. The order of the two options is also randomized for each game and included in the form of control variables.

The games are played anonymously. All participants make the six choices described above from the perspective of the dictator, although – following the choices and post-

experimental questionnaire – only one out of two participants will be randomly determined to be in this role. After the choices, the participants are asked to estimate how the whole group of participants has decided on average (for each game, participants are asked to estimate what the modal choice across all participants will be and what share of participants will opt for this choice). Finally, participants fill out a post-experimental questionnaire with personality assessments (narcissistic admiration and narcissistic rivalry, Big Five personality traits, and self-esteem) and other individual characteristics (study major, the semester in that major, age, and gender).

After the experiment, each player is randomly matched with another player. For each pair of players, one out of the twelve choices made by these two players is randomly chosen for actual payment. For example, if two players A and B are matched, then one out of the twelve choices made by A and B (that is, of the six choices made by A and the six choices made by B) is randomly chosen for payment. If the choice of player B in game 3 is chosen, then player B is the dictator in this pair, receives the money that she chose for herself in game 3, and player A receives the money that player B chose for “the other player” in game 3. Participants are informed beforehand about this procedure and know that they receive the payment for only one game, so that wealth effects are ruled out. In addition, participants can receive a “bonus payment” for a correct expectation concerning the prevalence of positional choices of all participants in the experiment (1 euro for the correct estimation of the modal choice; and 1 euro for a sufficiently precise estimation of the percentage of this choice, if it is at most 10 percentage points different from the actual share). For each participant, one of the six games is randomly chosen for the bonus payment, and the participant’s expectations with regard to this game are paid out (total bonus payment of at most 2 euros). The participants are informed about this procedure.

The personality traits are assessed in the following way. Narcissistic admiration and narcissistic rivalry are assessed with the Narcissistic Admiration and Rivalry Questionnaire (NARQ) (see BACK et al. 2013), which consists of 18 items on a Likert scale from 1 to 6; nine items measure narcissistic admiration and the other nine items narcissistic rivalry. The NARQ is a validated measure of narcissism (see BACK et al. 2013; GROSZ et al. 2017). Compared to other measures such as the Narcissistic Personality Inventory (NPI) (see RASKIN/HALL 1979; RASKIN/TERRY 1988), the NARQ has the advantage that it distinguishes two different dimensions of narcissism, which is highly relevant for the purpose of this study. The – validated – German version of the NARQ is used (see BACK et al. 2013: 1018).

The Big Five personality traits of openness, conscientiousness, extraversion, agreeableness, and neuroticism are assessed with the – validated – short German Socio-Economic Panel (GSOEP) Big Five Inventory (see GERLITZ/SCHUPP 2005).

Self-esteem is assessed with the validated and widely used Rosenberg Self-Esteem Scale (RSES) (see GRAY-LITTLE/WILLIAMS/HANCOCK 1997; ROSENBERG 1965). As a German translation, a revised and validated version of the German scale by FERRING/FILIPP (1996) is used (see VON COLLANI/HERZBERG 2003).

The complete instructions are presented in the Appendix.

Each personality trait is calculated as the average score of the respective items. Items are recoded beforehand, if necessary, so that larger numbers always correspond to higher values on a trait. Each personality variable is z-standardized for the analysis.

2.3.4 Sample

The experiment was conducted in paper-and-pencil form as a voluntary part of a university lecture in the classroom. The lecture was on labor, human resource management, and organization (“Arbeit, Personal, Organisation”) for undergraduate students at the University of Tübingen in Germany. All of the participants studied business and/or economics as a major or minor subject. The experiment was implemented on April 24, 2017.

The sample consists of $N = 192$ participants who made all choices in the six games and filled out the whole questionnaire. The average age in the sample is 22.0 years (standard deviation = 2.2 years, minimum 19, maximum 33 years), 59.9% of participants are female. Of all participants, 64.6% have a business and/or economics major, while the others have another study major. Participants are on average in semester 4.5 in their major subject (standard deviation = 1.9, min. 2, max. 12).

2.4 Hypotheses: Narcissism and positional preferences

Based on the theoretical reasoning presented in subchapter 2.2.3, we argue that the relationship between narcissism and positional preferences crucially depends on the type of narcissism that one refers to. While narcissistic admiration is the tendency to aim for greatness through being admired, narcissistic rivalry is the tendency to defend the self and to protect it from perceived threats that could lower the desired greatness (see BACK et al. 2013). Narcissistic admiration is related to higher self-esteem, while narcissistic rivalry is associated with lower self-esteem (see BACK et al. 2013: 1022), and self-esteem

has in turn been found to be a negative predictor of status preferences (see BURSZTYN et al. 2017). Hence, while narcissistic admiration might be understood as maximizing the own self-view, narcissistic rivalry might be understood as maximizing the relative position of the self – compared to other individuals.

Narcissistic admiration is theoretically not related to negative attitudes toward other people. Example items are “I am great”, “I show others how special I am”, and “I manage to be the center of attention with my outstanding contributions” (BACK et al. 2013: 1018). Because those scoring high in narcissistic admiration want to maintain their grandiose self-view, they may have a motivation to refrain from choices that are detrimental to other individuals. Generosity might here function as a means to keep or further boost a positive self-image. Being prestige seeking, individuals scoring high on narcissistic admiration use agentic strategies to gain status (see ZEIGLER-HILL et al. 2018) and try to “move upward” rather than “pulling superior others down” (LANGE/CRUSIUS 2015; see also LANGE/CRUSIUS/HAGEMEYER 2016). Even though our study context is an anonymous game experiment, prestige seeking might be so deeply rooted in these individuals that they still might make less positional choices than others. Taken together, we predict that narcissistic admiration is negatively associated with positional preferences, where we measure positional preferences by the sum of positional choices across games.

Hypothesis 2.1: Narcissistic admiration relates negatively to positional preferences as operationalized by positional game choices (sum score).

In contrast, a defining characteristic of narcissistic rivalry is defiance toward other individuals. Example items are “Most people won’t achieve anything”, “Most people are somehow losers”, and “I secretly take pleasure in the failure of my rivals” (BACK et al. 2013: 1018). Therefore, it can be expected that those scoring high in narcissistic rivalry are often ready to create social damage. As noted above, their goal is a relatively higher position, rather than a high self-view in absolute terms. Narcissistic rivalry is associated with an antagonistic orientation to status seeking: These individuals tend to search for dominance (see ZEIGLER-HILL et al. 2018). We therefore expect that narcissistic rivalry is positively associated with positional preferences.

Hypothesis 2.2: Narcissistic rivalry relates positively to positional preferences as operationalized by positional game choices (sum score).

With respect to different choice patterns and the underlying behavioral motives, we expect those scoring high in narcissistic admiration to refrain both from inferiority aversion (INA) and from superiority seeking (SUS) when these choices would be detrimental for the payoff of others and for the group payoff – at least when it is not in their self-interest to make such choices (as is the case in all our games). We therefore predict that narcissistic admiration is negatively associated with inferiority aversion, superiority seeking, and also with complete positional preferences (POS).

Hypothesis 2.3: Narcissistic admiration relates negatively to the following choice patterns: (a) complete positional preferences (POS), (b) inferiority aversion (INA) and (c) superiority seeking (SUS).

Accordingly, the positive relationship between narcissistic rivalry and positional preferences will likely include both inferiority aversion (INA) and superiority seeking (SUS). Inferiority aversion is used to protect the self from perceived threats, and superiority seeking is conducted to maintain or achieve the desired superior self-perception. Accordingly, some items on narcissistic rivalry are indicative of inferiority aversion (“I react annoyed if another person steals the show from me”, “I often get annoyed when I am criticized”, and “I can barely stand it if another person is at the center of events”), others point to superiority seeking (“I secretly take pleasure in the failure of my rivals”, “I want my rivals to fail”, and “I enjoy it when another person is inferior to me”) (BACK et al. 2013: 1018). We therefore expect that narcissistic rivalry is associated both with more inferiority aversion and with more superiority seeking – and, consequently, also with more complete positional preferences (POS).

Hypothesis 2.4: Narcissistic rivalry relates positively to the following choice patterns: (a) complete positional preferences (POS), (b) inferiority aversion (INA) and (c) superiority seeking (SUS).

2.5 Results

2.5.1 Descriptive statistics and correlations

Table 2.3 provides the descriptive statistics of the choices and the explanatory variables. The sum score of positional choices shows how many positional choices are made across all six games (from 0 to 6). In addition, choices in the different games are separately displayed. The table also includes the descriptive statistics for the choice patterns. For example, 3.1% of participants make the positional choice in all six games (complete

positional preferences, POS) and 11.5% make the positional choice in all games where own relative deprivation can be prohibited in this way (inferiority aversion, INA). A share of 49.5% does not make any positional choice (efficiency seeking, EFS). Most choice patterns are consistent with self-interest (69.3%) and maximin (56.8%). A share of 10.4% has a choice pattern that does not correspond to any of the behavioral motives we distinguish in subchapter 2.3.2.

Narcissism is measured with a high internal consistency as indicated by Cronbach's alpha values of 0.84 (narcissistic admiration) and 0.80 (narcissistic rivalry).

Table 2.3: Descriptive statistics

	Operationalization	Mean	SD
Dependent variables: choices			
Positional choices (sum score)	Number of positional choices across all games	1.286	1.636
Game 1	1 = positional choice, 0 otherwise	0.073	0.261
Game 2	1 = positional choice, 0 otherwise	0.047	0.212
Game 3	1 = positional choice, 0 otherwise	0.406	0.492
Game 4	1 = positional choice, 0 otherwise	0.255	0.437
Game 5	1 = positional choice, 0 otherwise	0.313	0.465
Game 6	1 = positional choice, 0 otherwise	0.193	0.395
POS	1 = complete positional preferences, 0 otherwise	0.031	0.174
- INA	1 = inferiority aversion, 0 otherwise	0.115	0.319
- SUS	1 = superiority seeking, 0 otherwise	0.031	0.174
INE	1 = inequity aversion, 0 otherwise	0.078	0.269
- EQS	1 = equity seeking, 0 otherwise	0.167	0.374
EFS	1 = efficiency seeking, 0 otherwise	0.495	0.501
- MM	1 = maximin preferences, 0 otherwise	0.568	0.497
- SLF	1 = self-interest, 0 otherwise	0.693	0.463
No type	1 = choices do not correspond to any of the distinguished patterns, 0 otherwise	0.104	0.306
Explanatory variables			
Narcissistic admiration	Average over 9 items, scale from 1 to 6	3.181	0.797
Narcissistic rivalry	Average over 9 items, scale from 1 to 6	2.165	0.733
Openness	Average over 3 items, scale from 1 to 7	4.573	1.158
Conscientiousness	Average over 3 items, scale from 1 to 7	5.012	0.991
Extraversion	Average over 3 items, scale from 1 to 7	4.762	1.237
Agreeableness	Average over 3 items, scale from 1 to 7	5.285	0.849
Neuroticism	Average over 3 items, scale from 1 to 7	4.295	1.344
Self-esteem	Average over 10 items, scale from 0 to 3	2.260	0.515
Business/economics	1 = business/economics major, 0 otherwise	0.646	0.480
Female	1 = female, 0 = male	0.599	0.491
Age	In years	21.953	2.162
<i>N</i>	192		

SD = standard deviation. “Game [x]” denotes positional choice made in game [x]. POS = complete positional preferences. INA = inferiority aversion. SUS = superiority seeking. INE = inequity aversion. EQS = equity seeking. EFS = efficiency seeking. MM: maximin preferences. SLF = self-interest.

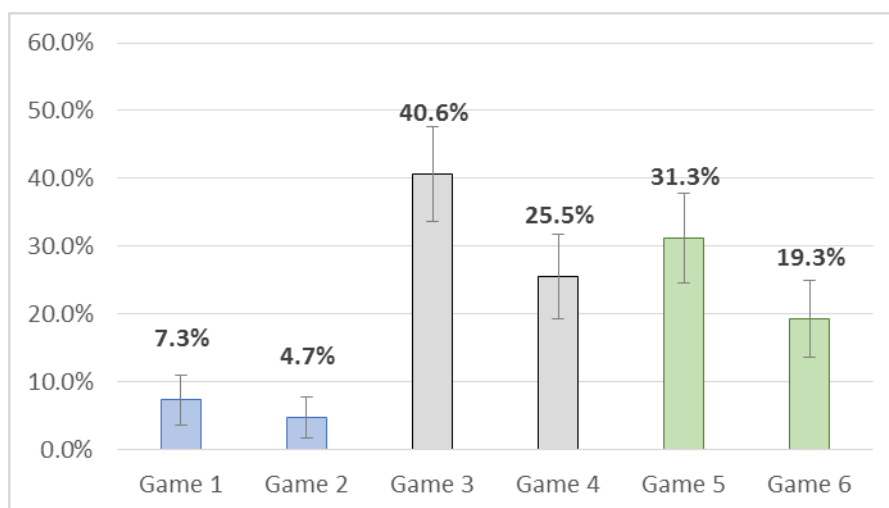
Figure 2.1 displays the shares of positional choices in the different games together with 95% confidence intervals. These descriptive results indicate that only a small percentage of individuals prefers relative superiority over equality (games 1 and 2), while a higher percentage prefers equality over relative inferiority (games 3 and 4). This is in line with previous research (see CHARNESS/GROSSKOPF 2001: 310).¹²

In the games where there is no equal distribution option (games 5 and 6), the overall percentages of positional choices are not significantly different from the two previous games (game 3 respectively game 4). A share of 31.3% prefers relative superiority over relative inferiority when the own absolute payoff is fixed (game 5), and 19.3% prefer relative superiority over relative inferiority when this is associated with a reduction in the own payoff by 1 euro (game 6).

Generally, positional choices are less often made when they are associated with own costs (in particular, game 4 versus game 3; not significant for game 2 versus game 1 and game 6 versus game 5).

Together the descriptive results suggest that inefficient choices are relatively prevalent, even though they do not increase the decision maker's own absolute payoff. These inefficient choices are primarily due to inferiority aversion: About one third of the participants is ready to reduce the total payoff to avoid a situation in which they would be relatively inferior (games 3 and 5), and about one fifth is ready to forgo own money for this purpose (games 4 and 6). Inefficient choices of this sort also hold when an equal distribution is not an option (games 5 and 6).

¹² From a theoretical perspective, a higher prevalence of inferiority aversion in comparison to superiority seeking may also be explained by prospect theory (see KAHNEMAN/TVERSKY 1979), which predicts that losses tend to be outweighed in comparison to gains. If the payoff of the other player constitutes the reference point, then receiving less than the other one is perceived as a loss and receiving more than the other one as a gain, leading inferiority aversion to be stronger than superiority seeking.

Figure 2.1: Positional choices in different games

Shares of positional choices in the different games, with 95% confidence intervals.

Table 2.4 presents the correlations between all variables. Positional choices in the different games are all significantly positively correlated: An individual that makes a positional choice in one game is more likely to make a positional choice in another game. This indicates that positional preferences may be regarded as one construct. The internal consistency of the measure, using all six games and expressed by Cronbach's alpha, is sufficiently high (0.79).¹³ Still, since correlations are not perfect, it would seem worthwhile to also explore the game choices separately, as well as different choice patterns, and to not only concentrate on the sum score.

Because some explanatory variables (individual characteristics) are correlated with each other, we test for multicollinearity by calculating variance inflation factors (VIF) with the full model used in subchapter 2.5.2 below. All individual characteristics – narcissistic admiration, narcissistic rivalry, the Big Five personality traits, self-esteem, business/economics, female, and age – have VIF values below 3. This indicates that multicollinearity is not a major concern.

¹³ We also perform a factor analysis (iterated principal-factor analysis) to explore empirical patterns of behavior. Following the convention, we retain factors with an eigenvalue of at least 1. The factor analysis yields exactly one factor that captures positional choices across all games. This supports the idea that positional preferences can be regarded as one construct.

Table 2.4: Correlations between choices and individual characteristics

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1 Positional choices (sum score)	1.00														
2 Game 1	.54**	1.00													
3 Game 2	.53**	.51**	1.00												
4 Game 3	.81**	.30**	.27**	1.00											
5 Game 4	.78**	.20**	.32**	.54**	1.00										
6 Game 5	.80**	.42**	.22**	.68**	.51**	1.00									
7 Game 6	.68**	.22**	.39**	.38**	.56**	.33**	1.00								
8 POS	.52**	.64**	.81**	.22**	.31**	.27**	.37**	1.00							
9 INA	.73**	.28**	.46**	.43**	.61**	.53**	.74**	.50**	1.00						
10 SUS	.52**	.64**	.81**	.22**	.31**	.27**	.37**	1.00**	.50**	1.00					
11 INE	.48**	-.08	-.06	.35**	.50**	.43**	.60**	-.05	.81**	-.05	1.00				
12 EQS	.57**	-.13+	-.10	.54**	.76**	.45**	.45**	-.08	.50**	-.08	.65**	1.00			
13 EFS	-.78**	-.28**	-.22**	-.82**	-.58**	-.67**	-.48**	-.18*	-.36**	-.18*	-.29**	-.44**	1.00		
14 MM	-.81**	-.32**	-.25**	-.65**	-.67**	-.77**	-.56**	-.21**	-.41**	-.21**	-.33**	-.51**	.86**	1.00	
15 SLF	-.75**	-.20**	-.33**	-.48**	-.88**	-.43**	-.73**	-.27**	-.54**	-.27**	-.44**	-.67**	.66**	.76**	1.00
16 No type	.11	.10	.09	-.07	.19**	-.08	.31**	-.06	-.12+	-.06	-.10	-.15*	-.34**	-.39**	-.51**

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
17 Narc. admiration	-.08	.09	-.02	-.13+	-.12+	-.04	-.06	.07	-.01	.07	-.04	-.11	.17*	.13+	.14+	-.10
18 Narc. rivalry	.05	.15*	.03	-.05	-.04	.15*	.02	.15*	.09	.15*	.03	-.09	.02	-.02	.07	-.07
19 Openness	.04	.05	.02	.07	.04	.01	-.03	.07	-.01	.07	-.03	.04	.01	.01	-.01	-.04
20 Conscientiousn.	.06	.02	.09	.05	.07	.04	.00	.06	-.00	.06	-.06	.03	-.07	-.06	-.08	.04
21 Extraversion	.03	.12+	.12+	-.02	-.02	-.03	.07	.11	.02	.11	-.06	-.07	.01	-.01	-.01	.04
22 Agreeableness	.03	-.05	-.01	.08	.10	-.06	.02	-.07	-.01	-.07	.03	.13+	-.02	.02	-.12+	.06
23 Neuroticism	.04	-.06	-.01	.06	.05	.06	.01	.01	.12	.01	.12+	.05	-.08	-.01	-.01	-.07
24 Self-esteem	.00	.06	-.00	-.04	.02	-.03	.03	.05	.05	.05	.05	.10	.11	.07	-.02	-.10
25 Bus./econ.	-.17*	-.09	.01	-.14+	-.19**	-.14+	-.11	.01	-.11	.01	-.15*	-.17*	.12+	.15*	.14*	-.03
26 Female	.10	-.14+	-.02	.16*	.11	.14+	.02	-.10	.06	-.10	.12+	.17*	-.15*	-.11	-.08	-.03
27 Age	.12+	.15*	.19**	.06	.02	.09	.09	.21**	.10	.21**	-.00	-.01	-.06	-.08	-.08	.02

	17	18	19	20	21	22	23	24	25	26
17 Narc. admiration	1.00									
18 Narc. rivalry	.51**	1.00								
19 Openness	.24**	.09	1.00							
20 Conscientiousn.	-.05	-.12	-.02	1.00						
21 Extraversion	.23**	-.24**	.12	.07	1.00					
22 Agreeableness	-.01	-.28**	.05	.22**	.07	1.00				
23 Neuroticism	-.17*	.18*	.04	.03	-.31**	.02	1.00			
24 Self-esteem	.35**	-.22**	-.03	.20**	.35**	.22**	-.52**	1.00		
25 Bus./econ.	.10	.05	-.02	.14+	.12	.03	.03	.09	1.00	
26 Female	-.42**	-.30**	.09	.28**	.01	.11	.26**	-.19**	-.07	1.00
27 Age	-.06	.01	.05	-.18*	-.05	-.08	.12	-.11	-.10	-.09

$N = 192$. "Game [x]" denotes positional choice made in game [x]. POS = complete positional preferences. INA = inferiority aversion. SUS = superiority seeking. INE = inequity aversion. EQS = equity seeking. EFS = efficiency seeking. MM: maximin preferences. SLF = self-interest. No type = choices do not correspond to any of the theoretically determined patterns. ** $p < .01$. * $p < .05$. + $p < .10$.

2.5.2 Narcissism and positional preferences

Table 2.5 presents the results of the tests of Hypotheses 2.1 and 2.2, using the sum of positional choices across games as the dependent variable (first model). We apply an ordinary least squares regression to estimate how narcissistic admiration and narcissistic rivalry relate to positional choices when holding other individual characteristics constant. The model has the following form:

$$\begin{aligned}
 \text{Positional choices (sum score)}_i &= b_0 + b_1 * \text{Narcissistic admiration}_i + b_2 * \text{Narcissistic rivalry}_i \\
 &+ b_3 * \text{Openness}_i + b_4 * \text{Conscientiousness}_i + b_5 * \text{Extraversion}_i \\
 &+ b_6 * \text{Agreeableness}_i + b_7 * \text{Neuroticism}_i + b_8 * \text{Self esteem}_i \\
 &+ b_9 * \text{Business or economics}_i + b_{10} * \text{Female}_i + b_{11} * \text{Age}_i + e_i
 \end{aligned}$$

where i is the individual and e_i is the error term. The model controls for the Big Five personality traits and self-esteem, so that we test whether narcissism explains positional preferences beyond these factors, which have already been shown to be relevant for positional preferences (see BURSZTYN et al. 2017; FRIEHE/MECHTEL/PANNENBERG 2018). We further control for the study major (where we distinguish the two main groups: business/economics as a major subject and business/economics as a minor subject), gender, and age. In addition, the position of each game in the questionnaire and the order of the two options in each game (both are randomized) are included as control variables. Heteroscedasticity-robust standard errors are used, because the assumption of homoscedasticity is rejected with a Breusch-Pagan / Cook-Weisberg test ($p < .01$).

The main coefficients of interest b_1 and b_2 indicate how a higher value in narcissistic admiration by one unit, respectively a higher value in narcissistic rivalry by one unit, relates to the sum of positional choices made by a particular individual across the six games, holding the other factors constant. Because each personality variable is z-standardized, one unit in a personality trait corresponds to one standard deviation.

In line with Hypothesis 2.1, narcissistic admiration relates negatively to positional preferences, as measured by the sum score of positional choices across all six games. A higher value in narcissistic admiration by one standard deviation is associated with 0.42 less positional choices, on average, when the other individual characteristics are held constant. The standardized effect size (Cohen's d), calculated by dividing the coefficient by the standard deviation of the dependent variable (1.64), amounts to -0.26 .

As predicted in Hypothesis 2.2, narcissistic rivalry is positively associated with positional preferences (sum score). A higher value in narcissistic rivalry by one standard deviation is associated with 0.50 more positional choices, on average, holding the other individual characteristics constant. The standardized effect size amounts to $d = 0.31$.

In our study with an experimental assessment of positional preferences and including narcissism in the model, it is notable that the Big Five personality traits – except for extraversion – and self-esteem do not show significant relationships with positional preferences (sum score of positional choices). While previous literature with a survey-based measure of positional preferences and without including narcissism suggests that conscientiousness and agreeableness relate negatively and neuroticism positively to positional preferences (see FRIEHE/MECHTEL/PANNENBERG 2018), these associations are not found in our study. The negative relationship between self-esteem and positional preferences, as suggested by previous literature without narcissism (see BURSZTYN et al. 2017), is not found either. It should also be noted that men's higher average positional preferences (see CLINGINGSMITH/SHEREMETA 2017; SCHRAM/BRANDTS/GËRKHANI 2018) are not found when narcissism is included. These differences to the existing literature further suggest that it is important to consider narcissism as a determinant of positional preferences.

We complement our analysis of the sum score by a set of probit regressions that use the choice in each different game (1 = positional choice, 0 = no positional choice) as the dependent variable (see Table 2.5). This allows us to see whether our results on the sum score are driven by the positional choices in certain games. We present average marginal effects, that is, the coefficients estimate how the probability of making the positional choice in a specific game changes on average if a certain explanatory variable increases by one unit (standard deviation), holding the other factors constant.

For narcissistic admiration, it turns out that the point estimates are negative for positional choices in each game, but the effect is significant only in game 1 and marginally significant in games 2, 4, and 5. For narcissistic rivalry, the point estimates are positive in each game, but the results are significant only in games 1 and 5 and marginally significant in game 6.

Table 2.5: Narcissism and positional choices (sum score and different games)

	Positional choices (sum score)	Game 1	Game 2	Game 3	Game 4	Game 5	Game 6
Narcissistic admiration	-0.423* (0.183)	-0.060* (0.024)	-0.039+ (0.021)	-0.086 (0.054)	-0.094+ (0.048)	-0.086+ (0.049)	-0.073 (0.047)
Narcissistic rivalry	0.501** (0.187)	0.091** (0.024)	0.032 (0.022)	0.058 (0.051)	0.058 (0.046)	0.163** (0.047)	0.077+ (0.045)
Openness	0.091 (0.117)	0.017 (0.018)	0.011 (0.016)	0.046 (0.036)	0.032 (0.030)	-0.004 (0.034)	-0.015 (0.032)
Conscientiousness	0.102 (0.134)	0.010 (0.015)	0.028+ (0.015)	0.010 (0.038)	0.020 (0.033)	0.020 (0.035)	0.003 (0.031)
Extraversion	0.228+ (0.130)	0.063** (0.020)	0.047** (0.016)	0.021 (0.038)	0.012 (0.033)	0.035 (0.035)	0.061+ (0.033)
Agreeableness	0.101 (0.130)	-0.001 (0.016)	-0.002 (0.013)	0.037 (0.037)	0.042 (0.031)	0.001 (0.033)	0.016 (0.030)
Neuroticism	0.076 (0.130)	-0.013 (0.017)	-0.001 (0.013)	0.014 (0.042)	0.037 (0.036)	-0.002 (0.038)	0.014 (0.033)
Self-esteem	0.220 (0.167)	0.021 (0.020)	-0.001 (0.017)	0.030 (0.049)	0.066+ (0.040)	0.058 (0.047)	0.047 (0.039)
Business/economics	-0.619* (0.253)	-0.057+ (0.034)	-0.004 (0.028)	-0.131+ (0.072)	-0.171** (0.059)	-0.133* (0.064)	-0.096+ (0.057)
Female	0.236 (0.293)	-0.062+ (0.034)	-0.021 (0.023)	0.098 (0.086)	0.012 (0.075)	0.170* (0.080)	0.009 (0.065)
Age	0.108 (0.068)	0.013+ (0.007)	0.014** (0.005)	0.013 (0.017)	0.002 (0.015)	0.019 (0.014)	0.014 (0.013)
Constant	-5.622 (3.551)						
Observations	192	192	192	192	192	192	192
(Pseudo) R-squared	0.159	0.327	0.293	0.057	0.105	0.109	0.059

First model (left): OLS regression. All other models: probit models, average marginal effects. All personality variables are z-standardized (mean 0 and standard deviation 1). Robust standard errors in parentheses. ** $p < .01$. * $p < .05$. + $p < .10$.

2.5.3 Narcissism and choice patterns

Table 2.6 presents the results when analyzing choice patterns, thereby testing Hypotheses 2.3 and 2.4 (first three models). In each of the models presented in Table 2.6, the dependent variable is a particular choice pattern (POS, INA, SUS, INE, EQS, EFS, MM, SLF), where the value is 1 if the pattern is fulfilled and 0 otherwise. For these analyses we again use probit models and present average marginal effects, that is, the coefficients estimate how the probability of fulfilling a particular choice pattern changes on average if a certain explanatory variable increases by one unit (standard deviation), holding the other factors constant.

The results indicate that narcissistic admiration is negatively related to those choice patterns that reflect positional preferences. While the point estimates are negative for all three choice patterns that reflect positional preferences (POS, INA, and SUS), the effect is not statistically significant for inferiority aversion (INA), but is significant for complete positional preferences (POS) and superiority seeking (SUS). These results constitute support for Hypotheses 2.3a and 2.3c, but not for Hypothesis 2.3b. Rather than showing positional preferences, individuals scoring high in narcissistic admiration are – according to their choice patterns – more likely to be characterized by the following behavioral motives: efficiency seeking (EFS), maximin preferences (MM), and self-interest (SLF).

In contrast, narcissistic rivalry is, as predicted in Hypothesis 2.4, positively associated with complete positional preferences (POS), inferiority aversion (INA), and superiority seeking (SUS). Hence, Hypotheses 2.4a, 2.4b, and 2.4c are all supported. Concerning the other behavioral motives, individuals scoring high in narcissistic rivalry are less likely to be characterized by maximin preferences (MM).

Table 2.6: Narcissism and choice patterns

	Positional preferences			Other choice patterns					
	POS	INA	SUS	INE	EQS	EFS	MM	SLF	No type
Narcissistic admiration	-0.042** (0.015)	-0.050 (0.035)	-0.042** (0.015)	-0.017 (0.027)	-0.050 (0.043)	0.099+ (0.054)	0.111* (0.054)	0.101+ (0.051)	-0.014 (0.032)
Narcissistic rivalry	0.053** (0.015)	0.072* (0.033)	0.053** (0.015)	0.034 (0.025)	0.028 (0.041)	-0.071 (0.053)	-0.107* (0.052)	-0.055 (0.053)	-0.026 (0.035)
Openness	0.024** (0.009)	-0.005 (0.024)	0.024** (0.009)	-0.008 (0.019)	0.022 (0.025)	0.000 (0.037)	-0.003 (0.037)	-0.016 (0.035)	-0.010 (0.023)
Conscientiousness	0.029* (0.012)	-0.009 (0.024)	0.029* (0.012)	-0.035+ (0.019)	-0.024 (0.026)	-0.041 (0.038)	-0.041 (0.037)	-0.038 (0.035)	0.039+ (0.022)
Extraversion	0.043** (0.015)	0.037 (0.023)	0.043** (0.015)	0.002 (0.017)	-0.025 (0.027)	-0.048 (0.040)	-0.054 (0.040)	-0.032 (0.037)	0.023 (0.025)
Agreeableness	-0.023 (0.015)	-0.000 (0.024)	-0.023 (0.015)	0.003 (0.020)	0.027 (0.025)	-0.020 (0.038)	-0.008 (0.038)	-0.058+ (0.034)	0.035+ (0.021)
Neuroticism	-0.001 (0.011)	0.060* (0.026)	-0.001 (0.011)	0.046* (0.022)	0.035 (0.031)	-0.006 (0.043)	0.027 (0.042)	0.001 (0.039)	-0.057* (0.023)
Self-esteem	0.024 (0.016)	0.085* (0.033)	0.024 (0.016)	0.074** (0.024)	0.107** (0.032)	0.016 (0.050)	-0.004 (0.050)	-0.035 (0.045)	-0.087** (0.028)
Business/economics	-0.007 (0.016)	-0.085+ (0.045)	-0.007 (0.016)	-0.082* (0.039)	-0.112* (0.051)	0.128+ (0.074)	0.149* (0.072)	0.143* (0.067)	-0.028 (0.045)
Female	-0.022 (0.017)	0.055 (0.051)	-0.022 (0.017)	0.096* (0.048)	0.108 (0.066)	-0.063 (0.089)	-0.069 (0.088)	0.004 (0.083)	-0.092+ (0.055)
Age	0.015** (0.005)	0.010 (0.009)	0.015** (0.005)	-0.004 (0.007)	-0.004 (0.011)	-0.013 (0.018)	-0.018 (0.017)	-0.017 (0.016)	0.004 (0.010)
Observations	192	192	192	192	192	192	192	192	192
Pseudo R-squared	0.519	0.127	0.519	0.181	0.124	0.051	0.055	0.062	0.115

Probit models, average marginal effects. POS = complete positional preferences. INA = inferiority aversion. SUS = superiority seeking. INE = inequity aversion. EQS = equity seeking. EFS = efficiency seeking. MM: maximin preferences. SLF = self-interest. In the last model (right side), the dependent variable is 1 if the choices do not correspond to any of the theoretically determined patterns (and 0 otherwise). All personality variables are z-standardized (mean 0 and standard deviation 1). Robust standard errors in parentheses. ** $p < .01$. * $p < .05$. + $p < .10$.

2.5.4 Field of study and positional preferences¹⁴

As Table 2.5 shows, studying business/economics as a major subject is apparently negatively related to positional choices across games, holding the other individual characteristics constant. It could be argued that this result stems from a multicollinearity problem (suppressor effect): Having a business/economics major may be correlated with narcissism, which is in turn related to positional preferences. Including both business/economics major and narcissism might then bias the result for business/economics, as narcissism is artificially held constant. However, a suppressor effect is unlikely, first because the correlations between business/economics major and each narcissism measure are insignificant, and second because even if no control variables are included, the overall correlation between business/economics and positional choices is indeed significantly negative (see Table 2.4).

The results for choice patterns (Table 2.6) suggest that business/economics is negatively related to inferiority aversion (INA), inequity aversion (INE), and equity seeking (EQS) and positively to efficiency seeking (EFS), maximin preferences (MM), and self-interest (SLF). This pattern might partly be explained by rational choices and efficiency being important foundations in the economics curriculum (note that the students are in their fourth to fifth semester, on average). In addition, self-selection into the economic field might play a role, for example those who value equity more strongly might have a tendency to choose another major, on average.

Higher average values of self-interest among business and economics students are known from the literature (see BAUMAN/ROSE 2011; CADSBY/MAYNES 1998; MERTINS/WARNING 2014). Most of the measured differences, in fact, appear to be due to self-selection rather than a result of training and socialization (see BAUMAN/ROSE 2011; MERTINS/WARNING 2014). Also, differences in social preferences between economics students and students from other majors have been found to be highly context-dependent (see FARAVELLI 2007). Our specific context studies positional preferences beyond self-interest, and we find evidence that studying business or economics as a major subject is related to higher self-interest, but overall less positional preferences.¹⁵

¹⁴ This subchapter is only part of the dissertation and not part of the cooperatively written journal article.

¹⁵ Of the students in our sample, 5.2% have a business and/or economics major and additionally

We note that in our sample, the students with a non-economic major all study business administration or economics as a minor subject – or as a supplementary element of their studies – otherwise they would not have been in the lecture on labor, personnel, and organization, where the experiment was conducted. These students are therefore not representative for non-economic students in general.

2.5.5 Robustness checks

We perform several additional estimations to check the robustness of our main results. As the detailed results of the robustness checks in Tables 2.7 and 2.8 show, our results are qualitatively robust.

First, we test whether the results are robust with respect to an alternative generation of the personality variables. Instead of using the average scores of the respective items, we use factor scores, where each latent personality variable (such as *Narcissistic Admiration*) is predicted based on the manifest variables (items of the Narcissistic Admiration and Rivalry Questionnaire) with an iterated principal-factor analysis (IPF). For narcissistic admiration, the negative association with the sum of positional choices remains significant, while the associations with the choice patterns of complete positional preferences (POS) and superiority seeking (SUS) are not significant anymore. The results for narcissistic rivalry are equivalent to the baseline results. (See Table 2.7.)

one other major. They are counted as business/economics majors. If they are not included in the analysis, then the results for business/economics as presented in the first model of Table 2.5 as well as in Table 2.6 do not change.

Table 2.7: Robustness check: Factor scores instead of average scores to build personality variables

	Sum score	POS	INA	SUS	INE	EQS	EFS	MM	SLF	No type
Narcissistic admiration	-0.301* (0.145)	-0.017 (0.011)	-0.029 (0.026)	-0.017 (0.011)	-0.015 (0.021)	-0.053 (0.033)	0.081+ (0.043)	0.085* (0.043)	0.082* (0.041)	-0.019 (0.027)
Narcissistic rivalry	0.388* (0.156)	0.044** (0.015)	0.062* (0.027)	0.044** (0.015)	0.039+ (0.021)	0.015 (0.033)	-0.052 (0.042)	-0.087* (0.041)	-0.032 (0.041)	-0.016 (0.026)
Openness	0.098 (0.115)	0.019 (0.013)	-0.010 (0.024)	0.019 (0.013)	-0.006 (0.017)	0.036 (0.026)	-0.001 (0.037)	0.003 (0.037)	-0.007 (0.036)	-0.023 (0.022)
Conscientiousness	0.044 (0.130)	0.030* (0.013)	-0.010 (0.021)	0.030* (0.013)	-0.036* (0.016)	-0.024 (0.024)	-0.014 (0.037)	-0.004 (0.035)	-0.024 (0.034)	0.021 (0.020)
Extraversion	0.192 (0.121)	0.045** (0.015)	0.022 (0.021)	0.045** (0.015)	-0.012 (0.015)	-0.031 (0.026)	-0.046 (0.038)	-0.057 (0.038)	-0.025 (0.036)	0.031 (0.024)
Agreeableness	-0.004 (0.140)	-0.026+ (0.014)	-0.007 (0.021)	-0.026+ (0.014)	0.006 (0.013)	0.018 (0.022)	0.011 (0.035)	0.016 (0.035)	-0.027 (0.032)	0.021 (0.017)
Neuroticism	0.101 (0.130)	-0.013 (0.012)	0.047+ (0.026)	-0.013 (0.012)	0.037 (0.023)	0.046 (0.031)	-0.020 (0.042)	0.004 (0.041)	-0.008 (0.040)	-0.052* (0.024)
Self-esteem	-0.281 (0.172)	-0.010 (0.013)	-0.079* (0.033)	-0.010 (0.013)	-0.077** (0.024)	-0.122** (0.033)	0.009 (0.049)	0.033 (0.049)	0.053 (0.046)	0.069** (0.026)
Business/economics	-0.538* (0.254)	-0.007 (0.020)	-0.079+ (0.045)	-0.007 (0.020)	-0.074* (0.037)	-0.110* (0.050)	0.113 (0.074)	0.131+ (0.071)	0.130+ (0.067)	-0.024 (0.045)
Female	0.255 (0.291)	-0.004 (0.022)	0.055 (0.051)	-0.004 (0.022)	0.093* (0.047)	0.102 (0.067)	-0.076 (0.089)	-0.082 (0.089)	-0.017 (0.084)	-0.064 (0.055)
Age	0.116+ (0.066)	0.019** (0.006)	0.014 (0.009)	0.019** (0.006)	-0.002 (0.007)	-0.004 (0.011)	-0.014 (0.018)	-0.019 (0.017)	-0.016 (0.015)	0.003 (0.010)
Constant	-6.087 (3.767)									
Observations	192	192	192	192	192	192	192	192	192	192
(Pseudo) R-squared	0.164	0.505	0.123	0.505	0.183	0.127	0.050	0.060	0.049	0.078

First model (left side): OLS regression. All other models: probit models, average marginal effects. POS = complete positional preferences. INA = inferiority aversion. SUS = superiority seeking. INE = inequity aversion. EQS = equity seeking. EFS = efficiency seeking. MM: maximin preferences. SLF = self-interest. All personality variables are z-standardized. Robust standard errors in parentheses. ** $p < .01$. * $p < .05$. + $p < .10$.

The inclusion of additional personality-related factors beyond narcissism (Big Five personality traits and self-esteem) might create multicollinearity issues, because they are (weakly to moderately) correlated with narcissism (see BACK et al. 2013: 1022; see also Table 2.4). Although the VIF values do not point to a multicollinearity problem (see subchapter 2.5.1), we perform a second robustness check, where the Big Five personality traits and self-esteem are not included in the model, to rule out possible remaining multicollinearity issues. The point estimates for the effects of narcissistic admiration remain negative and those for narcissistic rivalry remain positive, but the estimated effect sizes and their statistical significance decrease. The associations of narcissistic rivalry with positional choices across games (sum score) as well as with the choice patterns of complete positional preferences (POS) and superiority seeking (SUS) remain (marginally) significant. (See Table 2.8.)

Table 2.8: Robustness check: Big Five personality traits and self-esteem not included

	Sum score	POS	INA	SUS	INE	EQS	EFS	MM	SLF	No type
Narcissistic admiration	-0.149 (0.137)	-0.002 (0.012)	-0.005 (0.029)	-0.002 (0.012)	-0.002 (0.026)	-0.004 (0.035)	0.078+ (0.043)	0.069 (0.044)	0.046 (0.041)	-0.037 (0.028)
Narcissistic rivalry	0.256+ (0.152)	0.020+ (0.012)	0.035 (0.027)	0.020+ (0.012)	0.022 (0.025)	-0.010 (0.036)	-0.048 (0.041)	-0.061 (0.041)	0.003 (0.042)	-0.015 (0.028)
Business/economics	-0.503* (0.247)	0.008 (0.024)	-0.060 (0.046)	0.008 (0.024)	-0.076+ (0.039)	-0.111* (0.053)	0.105 (0.073)	0.127+ (0.071)	0.115+ (0.067)	-0.013 (0.046)
Female	0.372 (0.265)	-0.016 (0.021)	0.063 (0.047)	-0.016 (0.021)	0.082+ (0.047)	0.113+ (0.063)	-0.106 (0.078)	-0.087 (0.078)	-0.031 (0.074)	-0.067 (0.052)
Age	0.098 (0.074)	0.010* (0.005)	0.012 (0.011)	0.010* (0.005)	-0.002 (0.008)	-0.004 (0.012)	-0.011 (0.018)	-0.014 (0.018)	-0.012 (0.016)	0.000 (0.010)
Constant	-5.592 (3.728)									
Observations	192	192	192	192	192	192	192	192	192	192
(Pseudo) R-squared	0.122	0.191	0.050	0.191	0.077	0.060	0.041	0.040	0.032	0.031

First model (left side): OLS regression. All other models: probit models, average marginal effects. POS = complete positional preferences. INA = inferiority aversion. SUS = superiority seeking. INE = inequity aversion. EQS = equity seeking. EFS = efficiency seeking. MM: maximin preferences. SLF = self-interest. All personality variables are z-standardized. Robust standard errors in parentheses. ** $p < .01$. * $p < .05$. + $p < .10$.

2.6 Discussion and conclusion

Our study aims to add to our understanding on basic behavioral motives by investigating the relationship between positional preferences and narcissism. Across six mini-dictator games, we find that narcissistic admiration is a negative predictor and narcissistic rivalry is a positive predictor of (revealed) positional preferences, holding other individual characteristics constant. Narcissistic admiration relates negatively to inferiority aversion and to what we call “complete” positional preferences, i.e., preferences that are characterized by both, inferiority aversion *and* superiority seeking, and narcissistic rivalry is positively associated with inferiority aversion, superiority seeking, and complete positional preferences. The results indicate that striving for being admired, for a grandiose self-view or self-image, is negatively related to positional preferences, while the desire to protect the self from perceived threats and to maintain or achieve a superior self-view is positively related to positional preferences.

One potential mechanism linking narcissism and positional preferences might be participants’ expectations on the behavior of others. Exploring whether the link between narcissism and positional preferences is driven by participants’ expectations on the behavior of others, we find that, on average, participants expect positional preferences to be significantly more prevalent than they actually are. While narcissistic admiration is negatively associated with the expected share of positional choices, narcissistic rivalry relates positively to the expected share of positional choices. This suggests that those who score high on narcissistic admiration tend to expect positional preferences to be less widely spread and those who score higher in narcissistic rivalry tend to expect positional preferences to be more widely spread. In turn, higher expectations of positional choices predict own positional choices. Hence, the effects of narcissistic admiration and narcissistic rivalry mostly become insignificant when participants’ expectations are included. While our exploratory investigation therefore speaks in favor of a strong mediation effect, it is to be interpreted with great caution since we elicited participants’ expectations *after* the choices had been made, so that expectations might have been stated to justify own decisions. (See Tables 2.9 and 2.10 for the results of the exploratory mediation analysis.)

Table 2.9: Exploratory analysis: Narcissism and expected shares of positional choices

	Expected positional choices (sum score)	Expect. game 1	Expect. game 2	Expect. game 3	Expect. game 4	Expect. game 5	Expect. game 6
Narcissistic admiration	-0.312* (0.142)	-0.048 (0.031)	-0.012 (0.027)	-0.076* (0.030)	-0.045 (0.034)	-0.087** (0.030)	-0.053+ (0.029)
Narcissistic rivalry	0.360* (0.141)	0.075** (0.028)	0.014 (0.024)	0.067* (0.029)	0.044 (0.034)	0.101** (0.029)	0.042 (0.033)
Openness	0.080 (0.083)	-0.015 (0.019)	0.004 (0.013)	0.028 (0.020)	0.029 (0.019)	0.030 (0.018)	0.001 (0.019)
Conscientiousness	0.066 (0.081)	0.017 (0.016)	-0.003 (0.015)	0.019 (0.020)	-0.005 (0.020)	0.015 (0.020)	-0.001 (0.019)
Extraversion	0.125 (0.086)	0.030+ (0.017)	-0.009 (0.013)	0.030 (0.020)	0.006 (0.021)	0.024 (0.018)	0.019 (0.020)
Agreeableness	0.206* (0.081)	0.048** (0.017)	0.008 (0.013)	0.041* (0.018)	0.033+ (0.020)	0.050** (0.019)	0.024 (0.018)
Neuroticism	0.024 (0.098)	-0.008 (0.020)	-0.012 (0.015)	0.006 (0.022)	0.014 (0.024)	-0.010 (0.022)	0.027 (0.022)
Self-esteem	0.098 (0.109)	0.017 (0.023)	-0.003 (0.020)	0.027 (0.025)	0.026 (0.027)	0.033 (0.026)	0.016 (0.026)
Business/economics	-0.557** (0.182)	-0.060 (0.037)	-0.073* (0.031)	-0.094* (0.038)	-0.128** (0.042)	-0.075+ (0.038)	-0.086* (0.039)
Female	0.423* (0.211)	0.034 (0.041)	0.016 (0.028)	0.108* (0.048)	0.092+ (0.050)	0.091+ (0.049)	0.060 (0.048)
Age	0.052 (0.041)	0.003 (0.008)	0.010 (0.007)	0.007 (0.009)	0.008 (0.011)	0.006 (0.009)	0.007 (0.009)
Constant	-1.287 (2.540)	0.191 (0.196)	0.005 (0.167)	0.371+ (0.211)	0.197 (0.252)	0.308 (0.209)	0.182 (0.207)
Observations	189	189	189	189	189	189	189
R-squared	0.218	0.110	0.089	0.185	0.140	0.176	0.120

OLS regressions. In the first model (left), the dependent variable “Expected positional choices (sum score)” denotes the aggregate number of expected positional choices over the six games (sum of the following six variables, scale from 0 to 6). The dependent variables “Expect. game [x]” denote the expected share of positional choices made in game [x] (expected by the decision maker). All personality variables are z-standardized (mean 0 and standard deviation 1). Robust standard errors in parentheses. ** $p < .01$. * $p < .05$. + $p < .10$.

Table 2.10: Exploratory analysis: Narcissism, expectations, and positional choices

	Positional choices (sum score)	Game 1	Game 2	Game 3	Game 4	Game 5	Game 6
Expected positional choices (sum score)	1.075** (0.082)						
Expect. game 1		0.292** (0.050)					
Expect. game 2			0.223** (0.065)				
Expect. game 3				1.158** (0.062)			
Expect. game 4					0.744** (0.051)		
Expect. game 5						0.923** (0.080)	
Expect. game 6							0.590** (0.073)
Narcissistic admiration	-0.104 (0.127)	-0.067** (0.025)	-0.031+ (0.016)	0.008 (0.043)	-0.059+ (0.032)	0.013 (0.039)	-0.029 (0.036)
Narcissistic rivalry	0.132 (0.126)	0.081** (0.025)	0.021 (0.016)	-0.033 (0.038)	0.020 (0.032)	0.067 (0.046)	0.044 (0.034)
Openness	-0.001 (0.089)	0.023 (0.016)	0.014 (0.011)	0.013 (0.030)	0.002 (0.023)	-0.039 (0.030)	-0.024 (0.030)
Conscientiousness	0.029 (0.090)	-0.016 (0.014)	0.022* (0.011)	-0.013 (0.026)	0.009 (0.024)	0.003 (0.030)	0.002 (0.027)
Extraversion	0.085 (0.090)	0.061** (0.019)	0.043** (0.016)	-0.031 (0.029)	-0.001 (0.026)	0.019 (0.030)	0.047 (0.030)
Agreeableness	-0.117 (0.098)	-0.020 (0.014)	0.001 (0.011)	-0.006 (0.030)	0.006 (0.023)	-0.050+ (0.029)	-0.007 (0.026)
Neuroticism	0.053 (0.092)	-0.022 (0.021)	0.003 (0.011)	0.018 (0.031)	0.024 (0.028)	0.007 (0.030)	-0.017 (0.030)
Self-esteem	0.132 (0.111)	0.011 (0.015)	0.010 (0.016)	0.004 (0.037)	0.028 (0.027)	0.029 (0.039)	0.021 (0.028)
Business/economics	-0.014 (0.188)	-0.051+ (0.027)	0.006 (0.026)	-0.002 (0.053)	-0.046 (0.044)	-0.073 (0.054)	-0.033 (0.053)
Female	-0.202 (0.206)	-0.061* (0.027)	-0.031 (0.022)	-0.057 (0.069)	-0.044 (0.067)	0.099 (0.076)	-0.028 (0.060)
Age	0.053 (0.050)	0.012* (0.005)	0.010** (0.004)	-0.002 (0.013)	-0.009 (0.010)	0.010 (0.011)	0.011 (0.011)
Constant	-4.532+ (2.409)						
Observations	189	189	189	189	189	189	189
(Pseudo) R-squared	0.589	0.613	0.509	0.424	0.458	0.372	0.260

First model (left): OLS regression. All other models: probit models, average marginal effects. The variable “Expected positional choices (sum score)” denotes the aggregate number of expected positional choices over the six games (sum of the following six variables, scale from 0 to 6), and the variables “Expect. game [x]” denote the expected share of positional choices made in game [x]. All personality variables are z-standardized (mean 0 and standard deviation 1). Robust standard errors in parentheses. ** $p < .01$. * $p < .05$. + $p < .10$.

Of course, our study does not come without limitations. Besides the general issue of external validity, our study might also suffer from a common method bias (see, e.g., ANTONAKIS et al. 2010), because game behavior and narcissism were evaluated at the same time. The current mood, for example, could theoretically affect both the dependent and the explanatory variables, leading to spurious associations that are not robust. We note that personality traits, although they develop over the lifespan, are relatively stable constructs (see in particular the high temporal consistency of narcissistic admiration and rivalry, as found in BACK et al. 2013: 1018f.), so we think this risk is not too high. Nevertheless, future research might increase the time distance between the measurements of positional preferences and personality traits or find other ways of assessing personality.

Likewise, future research might build on a design where participants are *ex ante* allocated to the two different roles (proposer vs. recipient) and where only those that know they are allocated to the role of the proposer are then asked to make a choice. Our design in which all participants decide in the role of the proposer offers the benefit of a larger sample size, but as participants know they have a 50% chance to end up as recipients, their expectations with regard to other players' choices might affect their own choices. While our exploratory analysis on the role of expectations renders support for this potential transmission channel, future studies might want to dig deeper into the mechanisms that drive the links between narcissism and positional preferences.

3 Transition to the Labor Market, Part I: Civic Virtue and Public Sector Employment¹⁶

3.1 Introduction

A considerable amount of research has investigated what motivates individuals to work in the public versus private sector. Some studies focus on prosocial motivation, the desire to support other people's well-being (see BATSON 1987; GRANT 2008; LEBEL/PATIL 2018), because public sector employment may often be accompanied by directly serving other individuals and the community (see, e.g., DUR/VAN LENT 2018). Research on prosocial motivation has largely focused on altruism (see, e.g., ANDREONI 1990; KHALIL 2004; KONOW 2010), which has been found to relate positively to public sector employment (see DUR/ZOUTENBIER 2014; DUR/ZOUTENBIER 2015; TEPE/VANHUYSSSE 2017).¹⁷

Different questions remain open in this literature. First, does civic virtue as another form of prosocial motivation relate positively to public sector employment, or only altruism, a specific form of prosocial motivation? Although altruism is sometimes understood in a general way, essentially equating it with prosocial motivation (see DUR/ZOUTENBIER 2014: 145; DUR/ZOUTENBIER 2015: 347), measures of altruism in empirical research rather concentrate on a specific form of prosocial motivation, namely, the motive to be there for others nearby (see DUR/ZOUTENBIER 2014: 145; similarly, BECKER et al. March 2012: 463; DUR/VAN LENT 2018: 17; DUR/ZOUTENBIER 2015: 349). Consistent with these measures used in the relevant literature, we define altruism in this more specific form, concentrating on the motive to care (in the closer environment), and distinguish it from civic virtue, the motive to contribute to society as a whole.¹⁸ While altruism is assessed

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¹⁷ Some articles in this research area study intrinsic motivation (see CREWSON 1997; FRANK/LEWIS 2004; GEORGELLIS/IOSSA/TABVUMA 2011; HOUSTON 2000; SERRA/SERNEELS/BARR 2011) and interpret the findings in the context of public service motivation, a construct that is related to prosocial motivation (see PERRY 1996; PERRY/HONDEGHEM/WISE 2010; PERRY/WISE 1990).

¹⁸ We borrow the term "civic virtue" from the organizational citizenship behavior (OCB) literature

in our study with the item “How important are the following things to you? – Being there for others” (see BECKER et al. March 2012; DUR/VAN LENT 2018; DUR/ZOUTENBIER 2015), civic virtue is assessed with the item “How important are the following things to you? – Being politically and/or socially committed” (see GRUND/THOMMES 2017; LUECHINGER/STUTZER/WINKELMANN 2010).

In contrast to altruism, the relationship between civic virtue and public sector employment has barely been investigated; two exceptions are GRUND/THOMMES (2017) and LUECHINGER/STUTZER/WINKELMANN (2010). This lack of literature is particularly interesting considering the high relevance of civic virtue for good government (see BOWLES/HWANG 2008). While many public sector jobs (e.g., in education and social care) may require the prosocial motive to directly help other individuals, as it is captured by altruism, this motive may be less relevant for other public sector jobs (e.g., administration in a back office). Altruism may also be important for many positions in the private sector (e.g., private education or counseling). In contrast, the direct contribution to society as a main mission of the organization may be more specific to the public sector and highly important for many public sector jobs. This aspect is captured by the motive of civic virtue, and so it is a practically relevant question whether individuals with higher civic virtue are indeed sorted into the public sector.

The present study contributes to the existing research by analyzing how civic virtue relates to public sector employment in addition to other relevant motives (altruism, risk aversion, laziness, and financial motivation). We extend previous work on the role of civic virtue for public sector employment (see GRUND/THOMMES 2017; LUECHINGER/STUTZER/WINKELMANN 2010) by considering a large set of motives in a large data set. Only employers who understand the entire set of motives of their employees will be able to attract and retain suitable individuals and to design appropriate incentive structures (see DELFGAAUW/DUR 2007; DELFGAAUW/DUR 2008; DELFGAAUW/DUR 2010).

A problem in this investigation is that motives may in fact not explain working in a particular sector (public versus private) but rather working in particular jobs or branches (such as caring jobs in education, health, and social care), which are often associated with a particular sector. Individuals who are interested in technical jobs, for example, might

(ORGAN 1988: 12f.).

take a private sector position not because of a preference for the private sector but because there are just less of these jobs in the public sector. The importance of this problem has regularly been discussed in the literature (see, e.g., BRIGHT 2007; DUR/VAN LENT 2018), and in particular, it has been found that the relationship between motives and public sector employment depends on the job type under consideration (see DUR/ZOUTENBIER 2015; GREGG et al. 2011; KJELDSSEN/JACOBSEN 2013; TONIN/VLASSOPOULOS 2015). The present study takes on this line of reasoning. To our knowledge, our study is the first to distinguish different branches in the analysis of civic virtue and public sector employment.

In addition to the relationship between civic virtue and public sector employment, another open question is whether this relationship is due to selection, including self-selection (individuals with higher civic virtue tend to be sorted into the public sector), and/or due to socialization (civic virtue tends to change during the employment in a specific sector). With respect to selection, DUR/ZOUTENBIER (2015) find that public sector employees are higher in altruism, on average, even at zero years of work experience, TEPE/VANHUYSSE (2017) find a positive selection effect for experimentally observed altruism, and HOLT (2018) finds a positive selection effect for prosocial motivation in general. To estimate socialization effects, some studies analyze the effects of changes between the private and public sector on prosocial motivation or behavior. The results of these studies are mixed, pointing either to no socialization effects (see GREGG et al. 2011), a decrease in volunteer work among older workers in the public sector (see DUR/VAN LENT 2018), or an increase in altruism in the public sector and a decrease in civic virtue in the private sector (see GRUND/THOMMES 2017). We exploit the longitudinal dimension of our data to account for causality problems and thereby extend the existing research on civic virtue and public sector employment (see GRUND/THOMMES 2017; LUECHINGER/STUTZER/WINKELMANN 2010). We separately study selection effects – using the year before the career start and the year before sector changes – and socialization effects – using fixed effects regressions. This helps to increase the understanding of the relationship between motives and sector of employment.

The theoretical basis of our study is the person-organization (P-O) fit theory (see KRISTOF 1996). According to this theory, individuals rather choose and are chosen by organizations that match their characteristics to maximize the fit between the person and the organization. Better fit is typically associated with a decrease in turnover (see KRISTOF-BROWN/ZIMMERMAN/JOHNSON 2005; O'REILLY III/CHATMAN/CALDWELL 1991) and an

increase in organizational commitment (see KIM 2012; O'REILLY III/CHATMAN/CALDWELL 1991), contextual performance or extra-role behavior (see LAUVER/KRISTOF-BROWN 2001), and job satisfaction (see KIM 2012; KRISTOF 1996; LAUVER/KRISTOF-BROWN 2001; O'REILLY III/CHATMAN/CALDWELL 1991; STEIJN 2008). In line with this theory, it can be expected that individuals with higher prosocial motivation tend to be sorted into the public sector because their motives fit the nature of public sector employment more than private sector employment. We argue that this may not only hold for altruism but also – and particularly – for civic virtue.

We use representative, longitudinal data from the German Socio-Economic Panel (see WAGNER/FRICK/SCHUPP 2007) with 63,180 observations of 13,683 different individuals, including a large number of control variables. We first use pooled data from 2005 to 2014 and then concentrate on the year before the first employment and the year before sector changes during the employment to study selection effects without reverse causality. Finally, we employ fixed effects regressions to identify changes in motives over time.

The results show that civic virtue is significantly and positively related to public sector employment beyond altruism, risk aversion, laziness, and (low) financial motivation (that is, when holding these other motives constant). This result holds within various branches. Concerning selection, the results show that individuals with higher civic virtue are attracted to (or selected by) the public sector directly before the start of their career and that higher civic virtue also predicts changes to the public sector during the career. In contrast, we do not find differences in socialization between public sector employment and private sector employment with respect to civic virtue. In an exploratory analysis, we find evidence that civic virtue is also positively associated with self-employment in comparison to private sector employment. Nevertheless, civic virtue relates positively to public sector employment even when compared to self-employment.

3.2 Theoretical framework and related literature

3.2.1 Person-organization fit and (self-) selection

According to the person-organization (P-O) fit theory (see JUDGE/FERRIS 1992; KRISTOF 1996), employees tend to be more satisfied, show more organizational commitment and are more likely to stay in an organization when there is a fit between the fundamental characteristics of the employed person and the organization (see KRISTOF 1996: 4f., 25;

KRISTOF-BROWN/ZIMMERMAN/JOHNSON 2005: 310). A good P-O fit can be achieved either in a complementary way, that is, the employee has characteristics that the organization demands, or in a supplementary way, which means that the person and the organization are similar in their fundamental characteristics (see KRISTOF 1996: 3; KJELDSEN/JACOBSEN 2013: 902).

The latter type of P-O fit – the similarity between the person and the organization – relies on the attraction-selection-attrition (ASA) model (see SCHNEIDER 1987). The ASA model states that individuals are attracted to and selected by organizations with which they have similar overall characteristics. The similarity between employees and the organization is reinforced by the phenomenon that individuals with less similarity to the organization rather leave the organization (see SCHNEIDER 1987: 442).

For this reason, individuals with specific motives may tend to be employed in those organizations that fit their personality. One mechanism through which such a fit can be realized is the following. Individuals may enter an organization (and stay there) to realize a self-concept. Those with a particular set of values and moral goals rather work in an organization that fits this self-concept than in an organization where other values may be dominant.

3.2.2 Civic virtue and public sector employment

Prosocial motivation can be defined as the desire to support other people's well-being by contributing to society or in the closer environment (see BATSON 1987; GRANT 2008: 49; LEBEL/PATIL 2018: 725). As explained above, civic virtue is directed toward society as a whole and not toward specific individuals in the closer environment (altruism; see, e.g., BECKER et al. March 2012: 463; DUR/VAN LENT 2018: 17; DUR/ZOUTENBIER 2014: 145; DUR/ZOUTENBIER 2015: 349).

The construct of prosocial motivation – and civic virtue in particular – is closely related to the construct of mission preferences (see BESLEY/GHATAK 2005; CARPENTER/GONG 2016; CASSAR 2016; CASSAR 2018; CASSAR/MEIER 2017). A mission has been defined as a non-profit goal of an organization, in particular the goal of producing public goods, and is closely related to the construct of intrinsic motivation (see BESLEY/GHATAK 2005; CARPENTER/GONG 2016). Mission preferences are the preferences of individuals to work in organizations with specific missions (see CARPENTER/GONG 2016). Missions can also be more broadly defined as the financial and social targets of an organization (see CASSAR

2016), while the term “prosocial mission” is then concretely used for the social purpose of an organization beyond profit maximization (CASSAR 2018).¹⁹

(Many) work activities in the public sector serve the community. Of course, there are also private sector jobs that are important for society, and private sector employees can have prosocial motives (see VAN WITTELOOSTUIJN/ESTEVE/BOYNE 2017: 20). However, in the public sector, service to society is often the primary goal of the organization and is directly experienced in job activities, which is less common in private sector positions (see also PERRY/HONDEGHEM/WISE 2010: 681f.). Consequently, public sector employees have been found to manifest more civic participation (see BREWER 2003) and to be more likely to vote in elections (see GARAND/PARKHURST/SEOUD 1991; WATSON 1997; WOLFINGER/ROSENSTONE 1980). Students who are about to enter the public sector tend to donate more money to the Red Cross in Indonesia (see BANURI/KEEFER 2016).

The role of civic virtue for public sector employment should be distinguished from the role of other motives – beyond altruism – that may also be relevant for sector choice. Considering benefits such as high job security and secured pensions, which are usually associated with the public sector, it is plausible that risk aversion increases the probability to work in the public sector. Such a positive association has been found in several studies (see, e.g., BELLANTE/LINK 1981; DOHMEN/FALK 2010; DUR/ZOUTENBIER 2015; PFEIFER 2011; ROSZKOWSKI/GRABLE 2009), although it could not be replicated with an experimental measure of risk aversion (see TEPE/PROKOP 2018). Moreover, due to overall less performance assessments and rather fixed payment schemes compared to the private sector, laziness has been determined as a possible motive for public sector employment (see DUR/ZOUTENBIER 2015). It is also reasonable that financial motivation – the subjective importance of earning money – affects sector choice, because high earnings may rather be expected in the private than in the public sector.

In addition to these motives, personality traits have been shown to be relevant for sector of employment. While motives reflect what people want to do or to have in the future

¹⁹ Despite the close relationship between civic virtue and mission preferences, we prefer the term “civic virtue” for the purpose of the present study, rather than “mission preferences” or “civic mission preference”. The construct of mission preferences is only related to the organizational and work domain, while our conceptualization of civic virtue captures a general motive of human beings in their life. Arguably, this makes it a particularly open and interesting question whether this individual characteristic indeed predicts sector choice.

(see MCCLELLAND 1961; ROBERTS 2006), personality traits reflect general tendencies of thinking, feeling, and acting (see ROBERTS 2009: 140). The Big Five personality traits as a common model of personality, which include openness, conscientiousness, extraversion, agreeableness, and neuroticism (see COSTA/MCCRAE 1992), have been found to be relevant for public versus private sector employment (see DOHMEN/FALK 2010). We note that personality traits are not entirely distinct from motives, which becomes evident in the fact that the motive of laziness is – in inverted form – part of the personality trait conscientiousness in the SOEP measure (see GERLITZ/SCHUPP 2005; HAHN/GOTTSCHLING/SPINATH 2012). The inclusion of personality traits allows us to find out whether the motive of civic virtue explains sector choice when controlling for these general tendencies of thinking, feeling, and acting.

Based on person-organization fit theory, we predict that civic virtue is positively related to public sector employment beyond altruism, risk aversion, laziness, (low) financial motivation, and personality traits. Although existing evidence suggests that the relationship between prosocial motivation and public sector employment depends on the job type (see, e.g., DUR/ZOUTENBIER 2015; GREGG et al. 2011), the arguments explained above – in particular the non-profit nature and different mission of public sector organizations in comparison to most private sector organizations – lead us to the prediction that the positive relationship between civic virtue and public sector employment holds within different branches.

Hypothesis 3.1: Civic virtue relates positively to public sector employment.

3.2.3 Selection versus socialization

Based on P-O fit theory and the existing evidence (see, e.g., DUR/ZOUTENBIER 2015; GREGG et al. 2011; HOLT 2018), we expect that more prosocial individuals tend to be sorted into the public sector (selection effects). We predict that this holds for civic virtue in particular, as individuals expect that their motive to contribute to society can usually be fulfilled in the public sector more strongly or more directly than in the private sector.

On the other hand, there is little reason to expect that socialization processes during the career drive the potential differences between public and private sector employees with respect to civic virtue. Previous literature hints to a “reality shock”, that is, declines in prosocial motivation after the job is entered (BLAU 1960; KJELDSSEN/JACOBSEN 2013: 915). This phenomenon is not unique for the public sector (see BLAU 1960; VAN MAANEN 1975) but has been found to occur in the private sector as well (see KJELDSSEN/JACOBSEN

2013). There is evidence that the decline in prosocial motivation is stronger in the private sector (see KJELDSEN/JACOBSEN 2013) but also evidence that the decline is stronger in the public sector, when a behavioral measure is used and a longer time span is considered (see BUURMAN et al. 2012; DUR/VAN LENT 2018). Overall, the existing evidence does not suggest that prosocial motivation tends to increase over careers in the public sector compared to private sector employment.

Hypothesis 3.2: The association between civic virtue and public sector employment is explained by selection and not by socialization during the career.

3.2.4 Civic virtue and entrepreneurship

The motive of civic virtue might not only be relevant for sector choice but also for entrepreneurship (self-employment). Several individual characteristics have been shown to be positively associated with self-employment: readiness to take risks (low risk aversion) (see MINER/RAJU 2004; STEWART JR./ROTH 2001; STEWART JR./ROTH 2004; ZHAO/SEIBERT/LUMPKIN 2010), openness, conscientiousness, extraversion, low agreeableness, and low neuroticism (see BRANDSTÄTTER 2011; SHANE et al. 2010; ZHAO/SEIBERT 2006; ZHAO/SEIBERT/LUMPKIN 2010). Civic virtue might also relate to self-employment, considering the opportunity to influence society through entrepreneurship (in particular social entrepreneurship). We explore this question in an additional analysis (see subchapter 3.4.6).

3.3 Method

3.3.1 Sample

We test our hypotheses by analyzing longitudinal data from the Socio-Economic Panel (SOEP) (see WAGNER/FRICK/SCHUPP 2007), a representative data set of the population in Germany. This data set offers detailed information on individuals' biographies, occupational development, and personality over time. Germany is a particularly good institutional example for our analysis: It is a large developed country with an extensive public sector, and several branches in Germany include both public and private sector positions.

We merged data from several SOEP files to construct our sample. We gathered information on employment status, sector of employment, nationality, education level, employment branch, and other basic characteristics from the SOEP generated person data.

More specific data about the individuals, especially their prosocial motivation, risk aversion, laziness, and financial motivation, were taken and built from the extensive SOEP person files. Our analysis includes the years 2005–2014.

To guarantee a relatively homogenous sample, our analysis of employees is restricted to those who work either full- or part-time and have at least an upper secondary school degree or a vocational degree. In the baseline analyses we do not consider self-employed individuals. We leave out apprentices, interns, and those who work in special programs for unemployed. Our choices follow the literature (see DOHMEN/FALK 2010: 264). After these restrictions, the final sample consists of 63,180 observations of 13,683 different individuals.

To extend our analysis beyond employees in the workforce and to investigate sorting at the start of the career, we build an additional sample based on the SOEP data where we observe individuals in the year before the first labor market entry.²⁰ In this way we gather information on their motives that are not influenced by job-market experiences. This sample has 878 observations (each individual is observed only once).

To go beyond public versus private sector employment and analyze the role of civic virtue for entrepreneurship, we build an additional, extended sample, which includes self-employed individuals in addition to employees. This extended sample has 67,225 observations, of which 4,045 are self-employed.

3.3.2 Measures

The dependent variable *Public sector* captures whether an individual is employed in the public or private sector. It is a dummy variable with possible values of 1 (public sector) or 0 (private sector). The item in the SOEP questionnaire is formulated as follows: “Do you work for a public sector employer?” (see Table 3.1).²¹

²⁰ This sample is constructed in the following way. We only keep the observations of individuals for which all of the following criteria hold: (1) no full-time work experience, (2) not regularly employed, (3) regularly employed and not self-employed in the next year, (4) upper secondary school degree or vocational degree by next year, no training status, and no unemployment program in the next year.

²¹ In this article, we present the formulations from the English version of SOEP. The English and the original German version are available at DIW BERLIN/SOEP (2017).

The main explanatory variable *Civic virtue* captures how important it is for the individual to be politically and/or socially committed (see GRUND/THOMMES 2017; LUECHINGER/STUTZER/WINKELMANN 2010) (see Table 3.1).²² We also consider another form of prosocial motivation with the variable *Altruism*, which captures how important it is for the individual to be there for others (see BECKER et al. March 2012; DUR/VAN LENT 2018; DUR/ZOUTENBIER 2014; DUR/ZOUTENBIER 2015). Both measures are originally on a Likert scale from 1 to 4, ranging from “Very important” to “Not at all important”. We use the inverse of each variable so that higher values correspond to higher prosocial motivation.

A further motive that we consider is *Risk aversion*, which is measured with one (inverted) item asking for the individuals’ readiness to take risks. We hereby follow DOHMEN/FALK (2010), DUR/ZOUTENBIER (2015), and PFEIFER (2011). This variable is also recoded so that higher values correspond to higher risk aversion. The variable *Laziness* is assessed with an item asking to which extent the respondent considers her- of himself to be somewhat lazy (see DUR/ZOUTENBIER 2015). The variable *Financial motivation* captures with one item the subjective importance of earning money (“Being able to afford things for myself”), where we recode the scale (originally ranging from “Very important” to “Not at all important”) so that higher values mean higher financial motivation.

Each motive variable is z-standardized for the analysis (mean = 0 and standard deviation = 1).

²² Here we deviate slightly from the official translation offered by the German Institute for Economic Research (see DIW BERLIN/SOEP (Ed.) 2013: 42), because this translation does not fully capture the contribution to society as it is included in the original German item (5), to which the respondents answered (38).

Table 3.1: Operationalization of main variables

Variable	Item	Scale
<u>Dependent variable</u>		
Public sector	<ul style="list-style-type: none"> Do you work for a public sector employer? 	Dummy
<u>Main explanatory variables</u>		
Prosocial motivation		
Civic virtue	<ul style="list-style-type: none"> Different things are important to different people. How important are the following things to you? <ul style="list-style-type: none"> Being politically and/or socially committed 	Ordinal (1–4)
Altruism	<ul style="list-style-type: none"> Different things are important to different people. How important are the following things to you? <ul style="list-style-type: none"> Being there for others 	Ordinal (1–4)
Other motives		
Risk aversion	<ul style="list-style-type: none"> Would you describe yourself as someone who tries to avoid risks (risk-averse) or as someone who is willing to take risks (risk-prone)? 	Ordinal (0–10)
Laziness	<ul style="list-style-type: none"> People can have many different qualities. Please answer on a scale from 1 to 7, where 1 means “does not describe me at all”, and 7 meaning “describes me perfectly”. I am: <ul style="list-style-type: none"> somewhat lazy 	Ordinal (1–7)
Financial motivation	<ul style="list-style-type: none"> Different things are important to different people. How important are the following things to you? <ul style="list-style-type: none"> Being able to afford things for myself 	Ordinal (1–4)

We use a wide range of control variables to hold factors constant that could otherwise bias the findings because they may be associated with both the explanatory variables and the dependent variable. Our choices with respect to the control variables largely follow DOHMEN/FALK (2010) and DUR/ZOUTENBIER (2015), who analyze public sector employment using the SOEP data.

On the one hand, we include biographical information and data on education and experience: age, female (1 = yes), married (1 = yes), German citizenship (1 = yes), migration background (1 = yes), college degree (1 = yes), experience in full-time jobs (years), and experience in part-time jobs (years). Here we note that the experience variables capture the whole work experience of an individual and are not restricted to the work experience that is accumulated during the time frame of observation (2005–2014). On the other hand, we include the Big Five personality traits of openness, conscientiousness, extraversion,

agreeableness, and neuroticism, which are computed through a factor analysis of 15 SOEP items designed for this purpose.²³ Each personality variable is z-standardized. (See Table 3.2 for a full overview of the control variables.)

For a robustness check, we use behavioral measures of prosocial motivation. The variable *Voluntary activities* captures the frequency of “Volunteer work in clubs or social services”. *Helping behavior* captures the frequency of “Helping out friends, relatives or neighbors”. Both variables are scaled from 1 to 4 (“At least once a week”; “At least once a month”; “Less often”; “Never”). They are recoded for the analysis, so that higher values correspond to more frequent prosocial behavior, and z-standardized.

Previous literature shows that a specific form of risk aversion, namely, risk aversion with respect to occupational career, is considerably related to working in the public sector PFEIFER (2011). Our study focuses on general motives of individuals in their life (civic virtue, altruism, risk aversion, laziness, and financial motivation), but as a robustness check, we test the relevance of the more specific motive *Occupation-related risk aversion* as an alternative to the original risk aversion variable. Occupation-related risk aversion is assessed with the item “How would you rate your willingness to take risks in the following areas? – in your occupational career?” (see PFEIFER 2011).²⁴ The measure is recoded for the analysis, so that higher values correspond to higher occupation-related risk aversion, and z-standardized.

Previous literature on public versus private sector employment considers specific personality traits (beyond the Big Five), such as locus of control, trust, and reciprocity (see BREWER 2003; DOHMEN/FALK 2010; HEYWOOD/JIRJAHN/STRUEWING 2017). Therefore we perform a third robustness check where we include locus of control, trust, positive reciprocity, and negative reciprocity. Locus of control is gathered through a factor analy-

²³ In addition, we check what happens if each Big Five variable is constructed as the average score (instead of a factor score) of the three respective items. All items that are negatively related to the construct are inversed beforehand. We find no major changes in our results.

²⁴ We deviate slightly from the official English translation (see TNS INFRATEST SOZIALFORSCHUNG 2014: 68), because it does not explicitly state the career context as it is included in the original German item, which asks for the readiness to take risks in the occupational career (31).

sis of nine items in the SOEP (see HEYWOOD/JIRJAHN/STRUEWING 2017), trust is computed through a factor analysis of the three respective SOEP items (see DOHMEN/FALK 2010), and positive and negative reciprocity are generated based on the ten respective items in the SOEP (see DOHMEN/FALK 2010). Each personality variable is z-standardized for the analysis.

For another robustness check, we consider different branches or job types. The groups that we build are based on the classification of the Federal Statistical Office of Germany, the KldB 92 (see STATISTISCHES BUNDESAMT/DESTATIS 1992). We make sure, on the one hand, to consider those branches that have a large number of employees both in the public and in the private sector. On the other hand, we build groups that are in line with the existing literature (see, e.g., DUR/ZOUTENBIER 2015; GREGG et al. 2011). The first group that we consider are caring jobs (education, health, and social care; see GREGG et al. 2011: 759; similarly, DUR/ZOUTENBIER 2015: 357). We additionally split the caring jobs into two subgroups: education on the one hand, health and social care on the other hand. Then we consider non-caring jobs (such as agriculture, fabrication, technical jobs, and service jobs except education, health, and social care; see also DUR/ZOUTENBIER 2015; GREGG et al. 2011). We additionally consider the subgroup of service jobs within the non-caring jobs, as this group entails many public and private sector positions.

For a full overview of the variables used in the robustness checks, see Table 3.2.

Table 3.2: Operationalization of control variables and additional variables

Variable	Item	Scale
<u>Control variables</u>		
Biographical/education/experience		
Age	• Your birth year	Metric
Female	• Your sex	Dummy
Married	• What is your marital status?	Dummy
German citizenship	• Do you have German citizenship?	Dummy
Migration background	• Do you have direct or indirect migration background?	Dummy
College degree	• Did you obtain a college degree?	Dummy
Experience (full-time)	• Are you currently employed full-time?	Metric
Experience (part-time)	• Are you currently employed part-time?	Metric
Big Five personality traits		
Openness	• I am original, someone who comes up with new ideas. • I am someone who values artistic, aesthetic experiences. • I am imaginative.	Ordinal (1–7)
Conscientiousness	• I am a thorough worker. • I am somewhat lazy. • I am effective and efficient in completing tasks.	Ordinal (1–7)
Extraversion	• I am communicative, talkative. • I am outgoing, sociable. • I am reserved.	Ordinal (1–7)
Agreeableness	• I am forgiving. • I am reserved. • I am considerate and kind to others.	Ordinal (1–7)
Neuroticism	• I am a worrier. • I am nervous. • I am relaxed, able to deal with stress.	Ordinal (1–7)
<u>Robustness checks</u>		
Prosocial behavior		
Voluntary activities	• Volunteer work in clubs or social services	Ordinal (1-4)
Helping behavior	• Helping out friends, relatives or neighbors	Ordinal (1-4)

Alternative measure of risk aversion

Occupation-related risk aversion	<ul style="list-style-type: none"> • How would you rate your willingness to take risks in the following areas? – in your occupational career? 	Ordinal (0-10)
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Additional personality traits

Locus of control	<ul style="list-style-type: none"> • How my life goes depends on me • Compared to other people, I have not achieved what I deserve • What a person achieves in life is above all a question of fate or luck • I frequently have the experience that other people have a controlling influence over my life • One has to work hard in order to succeed • If I run up against difficulties in life, I often doubt my own abilities • The opportunities that I have in life are determined by the social conditions • Inborn abilities are more important than any efforts one can make 	Ordinal (1–7)
Trust	<ul style="list-style-type: none"> • I have little control over the things that happen in my life • People can generally be trusted • Nowadays one can't rely on anyone • If you are dealing with strangers, it is better to be careful before trusting them 	Ordinal (1–4)
Positive reciprocity	<ul style="list-style-type: none"> • If someone does me a favor, I am prepared to return it • I go out of my way to help somebody who has been kind to me before • I am ready to undergo personal costs to help somebody who helped me before 	Ordinal (1–7)
Negative reciprocity	<ul style="list-style-type: none"> • If I suffer a serious wrong, I will take revenge as soon as possible, no matter what the cost • If somebody puts me in a difficult position, I will do the same to him/her • If somebody offends me, I will offend him/her back • I tend to bear grudges • When other people wrong me I try to just forgive and forget 	Ordinal (1–7)

Branches

Caring jobs	<ul style="list-style-type: none"> • What sector of business or industry is your company or institution active in for the most part? 	Dummy
Caring: education		Dummy
Caring: health and social care		Dummy
Non-caring jobs		Dummy
Non-caring: service		Dummy

3.3.3 Analyses

Because different motivational and personality variables are only available in specific, different years (for example, importance of life domains, including civic virtue, altruism, and financial motivation, in 2004, 2008, and 2012, and the Big Five personality traits in 2005, 2009, and 2013), we use these information from a particular year also for the next 3 years. The assumption is that motives and personality traits are relatively stable over a few number of years. More precisely, our study examines how public sector employment is associated with certain motives 0–3 years *before* the observed employment. We do not take motives or personality variables from the future because we want to avoid reverse causality (it would look as if motives influence the employment sector, when in fact motives have changed following work experiences).

It is not possible to test how stable civic virtue and altruism are over one, two, and three years, as they are only observed every four years. But we perform a robustness check where the main analysis is only conducted with the years in which civic virtue is directly observed. Therefore, this analysis is restricted to the years 2008 and 2012. (Civic virtue is observed in 2004 as well, but our analyses are based on the years 2005–2014 because the inclusion of personality traits in the SOEP starts in 2005.) This robustness check is also performed for the socialization analysis, where the original assumption of short-term motive stability over up to three years might be particularly critical.

In our main model, we regress public sector employment on different motives and the control variables. As the dependent variable is dichotomous (public versus private sector employment), multiple logistic regressions are used (probit models). The probability that an individual i is employed in the public sector in a particular year t is modeled as:

$$\Pr(\text{Public sector}_{it} = 1 | X_{it}) = G(X_{it}B)$$

where X_{it} is a vector containing the explanatory variables, G is the cumulative distribution function of the error term, which, in the probit model, is assumed to follow a standard normal distribution, and the vector B contains the coefficients. We have:

$$X_{it}B = b_1 * \text{Civic virtue}_{it} + b_2 * \text{Altruism}_{it} + b_3 * \text{Risk aversion}_{it} + C \\ * \text{Bio Educ Exp}_{it} + D * \text{Big Five}_{it} + E * \text{Region}_{it} + F * \text{Year}_t$$

where Bio Educ Exp_{it} is a vector containing the control variables with biographical, education, and experience information and Big Five_{it} is a vector containing the Big Five personality traits. The vector Region_{it} contains dummies for the state of residence (one

variable for each German state, with Schleswig-Holstein as the baseline category), and $Year_t$ contains year dummies (one variable for each year from 2005 to 2013, while 2014 is used as the baseline year).

Marginal effects are estimated, showing how the probability of public sector employment increases on average if a particular explanatory variable increases by one unit (one standard deviation), holding the other explanatory variables constant.²⁵ The interpretation of the coefficients is therefore equivalent to the interpretation of coefficients from a linear probability model with ordinary least squares. Heteroscedasticity-robust standard errors are used, because the assumption of homoscedasticity is rejected with a Breusch-Pagan / Cook-Weisberg test ($p < .01$). The standard errors are clustered at the individual level to account for the fact that the same individual is observed over several years.

Based on the main model presented above, two different methods are used to analyze whether the relationship between civic virtue and public sector employment is due to selection (including self-selection). First, we focus on selection at the start of the career by analyzing how motives in the year before the first labor market entry relate to the probability of entering the public versus private sector in the next year. Second, we focus on selection during the career by analyzing how civic virtue predicts sector changes in the next year: changes from the private to the public sector compared to staying in the private sector, and changes from the public to the private sector compared to staying in the public sector (for analyses of sector changes, see also DUR/VAN LENT 2018; GRUND/THOMMES 2017). In our sample, there are 883 changes from the private to the public sector and 923 changes from the public to the private sector.²⁶ When individuals report their (new) sector, they have already gathered some work experience in this sector, so the motives in that year may be influenced by socialization. We relate motives to the

²⁵ We use average marginal effects, calculated over all values of the explanatory variables. If we calculate the marginal effects at the means of the explanatory variables, we do not find any major differences to our results.

²⁶ Because the shares of individuals who change their sector are small, the distributions of the sector change variables are highly asymmetric, so that marginal effects of probit regressions cannot be computed. For this reason, we use linear models (ordinary least squares) in this analysis. The interpretation of the coefficients is equivalent.

sector outcome in the subsequent year to make sure that only selection effects are captured.

For the socialization analysis, a different model is used, where a z-standardized measure of a particular motive (civic virtue, altruism, risk aversion, laziness, or financial motivation) is the dependent variable. The main explanatory variables are public sector work experience and private sector work experience: The generated variable *Public sector work experience* counts the years of employment in the public sector for each individual cumulatively between 2005 and 2014, and the generated variable *Private sector work experience* counts the years of employment in the private sector for each individual in this time interval.²⁷ Individual fixed effects are included so that changes within each individual are estimated. Because the individual is already held constant, the baseline model does not include control variables. Nevertheless, we perform a robustness check where the control variables are included (biographical variables, education, the Big Five personality traits, and region dummies) to account for the possibility that even within individuals there are changes in factors that affect both the main explanatory variables and the dependent variable (compare GREGG et al. 2011: 764). Age is not included in this analysis, because changes in age are highly collinear with changes in the main explanatory variables (sector-specific experience) within individuals. For the same reason, year dummies are not included. The baseline fixed effects model has the following form, here shown for civic virtue:

$$\begin{aligned} \text{Civic virtue}_{it} & \\ &= \beta_0 + \beta_1 * \text{Public sector work experience}_{it} + \beta_2 \\ & * \text{Private sector work experience}_{it} + \alpha_i + \varepsilon_{it} \end{aligned}$$

where α_i is the individual fixed effect and ε_{it} is the error term. Again, heteroscedasticity-robust standard errors are used as the assumption of homoscedasticity is rejected with a Breusch-Pagan / Cook-Weisberg test ($p < .01$).

For the additional analysis of civic virtue and entrepreneurship, we use models that are equivalent to the main probit model presented above, but the dependent variable now

²⁷ We do not consider quadratic terms of public or private sector work experience because we only have up to three years in which we observe, for example, civic virtue and altruism (we use values from 2004, 2008, and 2012), which limits the possibility to examine more complex patterns of changes.

captures self-employment. First, we explain self-employment versus any other employment. Second, the dependent variable is self-employment versus working as an employee in the public sector. In the third model, we explain self-employment versus working as an employee in the private sector.

3.4 Results

3.4.1 Descriptive statistics and correlations

Table 3.3 reports the descriptive statistics and pairwise correlations. As shown, 30.8% of the individuals in our sample are employed in the public sector. On average, civic virtue is regarded as “Less important” by the individuals (mean of 2.08 on the scale from 1 to 4), while altruism is regarded as “Important” (mean of 3.20 on the scale from 1 to 4). The correlation between civic virtue and altruism amounts to $r = .15$, so these two forms of prosocial motivation are empirically rather distinct from each other.²⁸ (Table 3.4 reports summary statistics of all variables, separately for the public and private sector.)

²⁸ We additionally check whether there are considerable correlations between our main explanatory variables and any of the Big Five personality traits. Except for laziness, all these correlations are rather small (magnitude of coefficients $|r| < .25$). This supports the idea that civic virtue, altruism, risk aversion, and importance of money capture distinct dimensions of personality (motives).

Table 3.3: Descriptive statistics and bivariate correlations of main variables

Variables	<i>M</i>	<i>SD</i>	1	2	3	4	5
1 Public sector	0.308	0.462					
<u>Prosocial motivation</u>							
2 Civic virtue	2.082	0.714	.15***				
3 Altruism	3.200	0.547	.04***	.15***			
<u>Other motives</u>							
4 Risk aversion	5.334	2.150	.06***	-.09***	.00		
5 Laziness	2.365	1.516	.01*	.01***	-.05***	-.03***	
6 Financial motivation	3.048	0.573	-.06***	-.07***	.11***	-.02***	-.02***

This table reports the means (*M*) and standard deviations (*SD*) of our dependent variable (public sector employment) and main explanatory variables, as well as the correlations between them. The sample size is 63,180 observations. * denotes statistical significance at the 10% level, ** at the 5% level, and *** at the 1% level.

Table 3.4: Descriptive statistics of all variables, separately for the public and private sector

Variables	Public sector ($n_1 = 19,468$ observations)		Private sector ($n_2 = 43,712$ observations)		<i>p</i> -value of mean difference (two-sided <i>t</i> -tests)
	Mean	Std. dev.	Mean	Std. dev.	
<u>Prosocial motivation</u>					
Civic virtue	2.247	0.722	2.008	0.699	.000
Altruism	3.234	0.546	3.185	0.547	.000
<u>Other motives</u>					
Risk aversion	5.532	2.123	5.245	2.156	.000
Laziness	2.382	1.508	2.357	1.520	.061
Financial motivation	2.994	0.561	3.071	0.576	.000
<u>Control variables</u>					
Biographical/education/experience					
Age	46.108	10.407	43.558	10.617	.000
Female	0.566	0.496	0.428	0.495	.000
Married	0.678	0.467	0.646	0.478	.000
German citizenship	0.984	0.125	0.959	0.197	.000
Migration background	0.084	0.277	0.131	0.337	.000
College degree	0.425	0.494	0.223	0.416	.000
Experience (full-time)	17.882	11.778	17.404	11.409	.000
Experience (part-time)	4.074	6.472	2.856	5.567	.000
Big Five personality traits					
Openness	0.073	0.778	0.014	0.784	.000
Conscientiousness	0.053	0.773	0.089	0.754	.000
Extraversion	0.054	0.852	0.015	0.851	.000
Agreeableness	-0.011	0.786	-0.061	0.816	.000
Neuroticism	-0.078	0.813	-0.097	0.808	.005
<u>Robustness checks</u>					
Prosocial behavior					
Voluntary activities	1.828	1.086	1.620	0.998	.000
Helping behavior	2.476	0.738	2.504	0.736	.000
Alternative measure of risk aversion					
Occupation-related risk aversion	6.336	2.445	6.021	2.458	.000
Additional personality traits					
Locus of control	0.170	0.764	0.083	0.810	.000
Trust	0.166	0.791	0.010	0.812	.000
Positive reciprocity	-0.032	0.836	-0.004	0.820	.000

Negative reciprocity	-0.073	0.851	0.070	0.900	.000
Branches					
Caring jobs	0.467	0.499	0.115	0.319	.000
Caring: education	0.266	0.442	0.018	0.133	.000
Caring: health and social care	0.200	0.400	0.097	0.295	.000
Non-caring jobs	0.533	0.499	0.885	0.319	.000
Non-caring: service	0.496	0.500	0.436	0.496	.000

3.4.2 Civic virtue and public sector employment

In Table 3.5, we report how civic virtue – in addition to altruism, risk aversion, laziness, and financial motivation – relates to public sector employment. Civic virtue, the motive to contribute to society, is significantly positively associated with public sector employment. Specifically, an increase in civic virtue by one standard deviation – which amounts to approximately 0.7 points on the scale from 1 to 4 (see Table 3.3) – is associated with an increase in the probability of public sector employment by 0.049, which are $(0.049 * 100) = 4.9$ percentage points, when all other factors are held constant (Model 5). Relating this marginal effect to the overall probability of public sector employment (30.8%), the increase by 4.9 percentage points corresponds to $(4.9 / 30.8) = 15.9\%$. The results support Hypothesis 3.1.

The effect of altruism – when civic virtue is included in the model – is much weaker and is estimated to 0.7 percentage points. (We note that because all explanatory variables are z-standardized, their coefficients can be compared to each other.)²⁹

As expected, risk aversion also relates positively to public sector employment (2.2 percentage points). The finding is in line with previous research on the role of risk aversion in public sector employment (see, e.g., BELLANTE/LINK 1981; DUR/ZOUTENBIER 2015: 354; PFEIFER 2011). There is also a positive, although relatively small association between laziness and public sector employment (1.1 percentage points, Model 4), in line with DUR/ZOUTENBIER (2015). Because laziness is part of the construction of conscientiousness, laziness is not considered as an own variable in the final Model 5, which includes the Big Five personality traits as control variables. Financial motivation shows a

²⁹ If civic virtue is dropped from the regression, then the coefficient for altruism increases to 1.5 percentage points and is significant at the 1% level. This may explain why other literature finds robust and considerable effects for altruism (see DUR/ZOUTENBIER 2014; DUR/ZOUTENBIER 2015).

small negative association with public sector employment (−1.0 percentage points in Model 5).

When comparing the coefficients of Model 5 with a chi-squared test, we find that the association between civic virtue and public sector employment is significantly larger than each of the coefficients for altruism, risk aversion, and financial motivation.³⁰ Therefore, the motive of societal engagement (civic virtue) is apparently more important for public sector employment than the motive to be there for others (altruism), to avoid risks, and financial considerations.

³⁰ Because the coefficient for financial motivation is negative, its size is not comparable to civic virtue. We therefore compare the coefficients for low financial motivation (inverted variable) and civic virtue. The coefficient for civic virtue is indeed significantly larger.

Table 3.5: Civic virtue and public sector employment

Variables	Model 1	Model 2	Model 3	Model 4	Model 5
<u>Prosocial motivation</u>					
Civic virtue	0.071*** (0.004)	0.070*** (0.004)	0.070*** (0.004)	0.051*** (0.004)	0.049*** (0.004)
Altruism		0.009** (0.004)	0.012*** (0.004)	0.008** (0.003)	0.007** (0.004)
<u>Other motives</u>					
Risk aversion			0.035*** (0.003)	0.020*** (0.003)	0.022*** (0.003)
Laziness			0.004 (0.004)	0.011*** (0.004)	
Financial motivation			-0.025*** (0.004)	-0.011*** (0.004)	-0.010*** (0.004)
<u>Control variables</u>					
Age				0.001 (0.001)	0.001 (0.001)
Female				0.111*** (0.010)	0.112*** (0.010)
Married				-0.001 (0.009)	-0.001 (0.009)
German citizenship				0.089*** (0.028)	0.091*** (0.028)
Migration background				-0.046*** (0.015)	-0.046*** (0.015)
College degree				0.169*** (0.009)	0.166*** (0.009)
Experience (full-time)				0.002*** (0.001)	0.003*** (0.001)
Experience (part-time)				0.003*** (0.001)	0.003*** (0.001)
Openness					0.010** (0.005)
Conscientiousness					-0.020*** (0.005)
Extraversion					0.002 (0.005)
Agreeableness					0.005 (0.005)
Neuroticism					-0.005 (0.004)
Region dummies				✓	✓
Year dummies	✓	✓	✓	✓	✓
Observations	63,180	63,180	63,180	63,180	63,180
Pseudo R-squared	0.020	0.020	0.027	0.076	0.077

This table reports average marginal effect estimates of probit regressions. In all models, the binary dependent variable is public sector employment. The main explanatory variables are standardized variables on civic virtue, altruism, risk aversion, laziness, and financial motivation. Robust standard errors clustered at the individual level in parentheses. * denotes statistical significance at the 10% level, ** at the 5% level, and *** at the 1% level.

3.4.3 Robustness checks

We perform several robustness checks based on the main results (Model 5 of Table 3.5). First, we use behavioral measures of prosocial motivation (voluntary activities in clubs or social services, and helping behavior toward friends, relatives, or neighbors) instead of civic virtue and altruism. We are aware that these behavioral variables are not ideal measures of prosocial behavior, as they only capture prosocial behavior outside of the workplace and not prosocial behavior at work or through working (see DUR/VAN LENT 2018). Nevertheless, the results are similar to our main results. Voluntary activities relate significantly and positively to public sector employment (3.7 percentage points, $p < .01$, all control variables included). In contrast, helping behavior is not significantly related to public sector employment. The results for risk aversion and financial motivation remain virtually unchanged. (See Table 3.6.)

Table 3.6: Robustness check: Behavioral measures of prosocial motivation

Variables	Model 1
<u>Prosocial behavior</u>	
Voluntary activities	0.037*** (0.004)
Helping behavior	0.002 (0.004)
<u>Other motives</u>	
Risk aversion	0.021*** (0.003)
Financial motivation	-0.009*** (0.004)
<u>Control variables</u>	
Age	0.002 (0.001)
Female	0.113*** (0.010)
Married	-0.004 (0.009)
German citizenship	0.097*** (0.029)
Migration background	-0.046*** (0.016)
College degree	0.180*** (0.009)
Experience (full-time)	0.002** (0.001)
Experience (part-time)	0.003** (0.001)
Openness	0.013** (0.005)
Conscientiousness	-0.020*** (0.005)
Extraversion	0.003 (0.005)
Agreeableness	0.008 (0.005)
Neuroticism	-0.004 (0.004)
Region dummies	✓
Year dummies	✓
Observations	61,069
Pseudo R-squared	0.072

* denotes statistical significance at the 10% level, ** at the 5% level, and *** at the 1% level.

Second, we check whether the results change if a more specific form of risk aversion is included (risk aversion with respect to occupational career) instead of general risk aversion. Occupation-related risk aversion is positively associated with public sector employment (2.7 percentage points, $p < .01$, all control variables included), and the estimated size of the coefficient is (slightly) larger than for general risk aversion (see above). This result is in line with previous research (see PFEIFER 2011). As it is the case for general risk aversion, the coefficient for occupation-related risk aversion is significantly smaller than civic virtue. (See Table 3.7.)

Table 3.7: Robustness check: Occupation-related risk aversion instead of general risk aversion

Variables	Model 1
<u>Prosocial motivation</u>	
Civic virtue	0.051*** (0.004)
Altruism	0.007* (0.004)
<u>Other motives</u>	
Occupation-related risk aversion	0.027*** (0.004)
Financial motivation	-0.010*** (0.004)
<u>Control variables</u>	
Age	0.001 (0.001)
Female	0.113*** (0.010)
Married	-0.001 (0.009)
German citizenship	0.096*** (0.029)
Migration background	-0.048*** (0.016)
College degree	0.167*** (0.010)
Experience (full-time)	0.002** (0.001)
Experience (part-time)	0.003** (0.001)
Openness	0.010* (0.005)
Conscientiousness	-0.018*** (0.005)
Extraversion	0.000 (0.005)
Agreeableness	0.004 (0.005)
Neuroticism	-0.003 (0.004)
Region dummies	✓
Year dummies	✓
Observations	60,418
Pseudo R-squared	0.078

* denotes statistical significance at the 10% level, ** at the 5% level, and *** at the 1% level.

Third, we include further personality traits beyond the Big Five: locus of control, trust, positive reciprocity, and negative reciprocity. The inclusion of these more extensive measures reduces the final sample to 55,681 observations. While locus of control and trust show small positive associations with public sector employment, positive reciprocity is slightly negatively related to public sector employment (all $p < .05$). The results for our motive variables remain virtually unchanged. (See Table 3.8.)

Table 3.8: Robustness check: Inclusion of additional personality traits

Variables	Model 1
<u>Prosocial motivation</u>	
Civic virtue	0.049*** (0.004)
Altruism	0.006* (0.004)
<u>Other motives</u>	
Risk aversion	0.025*** (0.004)
Financial motivation	-0.010*** (0.004)
<u>Control variables</u>	
Age	0.001 (0.001)
Female	0.106*** (0.011)
Married	-0.001 (0.010)
German citizenship	0.102*** (0.031)
Migration background	-0.045*** (0.017)
College degree	0.154*** (0.010)
Experience (full-time)	0.002** (0.001)
Experience (part-time)	0.003** (0.001)
Openness	0.010* (0.005)
Conscientiousness	-0.017*** (0.005)
Extraversion	0.001 (0.006)
Agreeableness	0.003 (0.005)
Neuroticism	-0.000 (0.005)
Locus of control	0.010** (0.004)
Trust	0.009** (0.004)
Positive reciprocity	-0.008** (0.004)
Negative reciprocity	-0.006 (0.004)

Region dummies	✓
Year dummies	✓
Observations	55,681
Pseudo R-squared	0.078

* denotes statistical significance at the 10% level, ** at the 5% level, and *** at the 1% level.

Fourth, we check whether our main results hold for differently educated individuals, in particular for those without a college degree and those with a college degree (all individuals in the sample have at least an upper secondary school degree or vocational degree). The results in the different education groups are similar to the main results. Civic virtue relates positively to public sector employment for college graduates and for other employees. The estimated marginal effect is larger in the group of college graduates (7.1 percentage points, $p < .01$) than among non-graduates (4.0 percentage points, $p < .01$). This is similar to previous findings on the relationship between motives and public sector employment in differently educated groups (see DUR/ZOUTENBIER 2015: 357f.). It should be noted, however, that in the group of college graduates the baseline (overall percentage of public sector employees) is also nearly double as large (45.9%) as among non-graduates (24.8%). The coefficient for altruism is not significant in any of the two groups. Risk aversion relates positively to public sector employment in both groups, and the negative effect of financial motivation is only significant in the less educated group. (See Table 3.9.)

Table 3.9: Robustness check: Different education levels

Variables	(1) Full sample	(2) Without college degree	(3) With college de- gree
<u>Prosocial motivation</u>			
Civic virtue	0.049*** (0.004)	0.040*** (0.004)	0.071*** (0.008)
Altruism	0.007** (0.004)	0.006 (0.004)	0.009 (0.007)
<u>Other motives</u>			
Risk aversion	0.022*** (0.003)	0.018*** (0.004)	0.036*** (0.007)
Financial motivation	-0.010*** (0.004)	-0.009** (0.004)	-0.011 (0.007)
<u>Control variables</u>			
Age	0.001 (0.001)	0.001 (0.001)	0.002 (0.002)
Female	0.112*** (0.010)	0.091*** (0.011)	0.152*** (0.019)
Married	-0.001 (0.009)	0.005 (0.010)	-0.019 (0.019)
German citizenship	0.091*** (0.028)	0.115*** (0.029)	-0.027 (0.071)
Migration background	-0.046*** (0.015)	-0.036** (0.016)	-0.083** (0.034)
College degree	0.166*** (0.009)		
Experience (full-time)	0.003*** (0.001)	0.002* (0.001)	0.003 (0.002)
Experience (part-time)	0.003*** (0.001)	0.002 (0.001)	0.009*** (0.003)
Openness	0.010** (0.005)	0.011** (0.005)	0.005 (0.010)
Conscientiousness	-0.020*** (0.005)	-0.017*** (0.005)	-0.027*** (0.010)
Extraversion	0.002 (0.005)	0.005 (0.006)	-0.007 (0.011)
Agreeableness	0.005 (0.005)	0.001 (0.005)	0.019* (0.010)
Neuroticism	-0.005 (0.004)	-0.003 (0.005)	-0.009 (0.009)
Region dummies	✓	✓	✓
Year dummies	✓	✓	✓
Observations	63,180	45,164	18,016
Pseudo R-squared	0.077	0.039	0.077

* denotes statistical significance at the 10% level, ** at the 5% level, and *** at the 1% level.

As a fifth robustness check, we run our main regression separately for employees with different levels of work experience: job starters (fewer than 2 years of work experience), employees with a relatively short or moderate duration of work experience (between 2 and 20 years), and highly experienced employees (at least 20 years).³¹ The positive association between civic virtue and public sector employment holds at all these levels of work experience. The estimated coefficients are similar across experience levels. The positive association between altruism and public sector employment is concentrated among job starters and highly experienced employees. The positive role of risk aversion and the negative role of financial motivation tend to be more pronounced at higher levels of experience compared to lower levels. (See Table 3.10.)

³¹ For building different experience groups, we use a variable that approximately captures the total work experience in years, combining experience in full-time jobs and experience in part-time jobs. One year of part-time experience is treated as equivalent to half a year of full-time experience. The variable considers the whole work experience of an individual, not only the experience accumulated in the time span of observation (2005–2014).

Table 3.10: Robustness check: Different work experience levels

Variables	(1) Full sample	(2) Experience <2 years	(3) Experience ≥2 and <20 years	(4) Experience ≥20 years
<u>Prosocial motivation</u>				
Civic virtue	0.049*** (0.004)	0.050*** (0.011)	0.050*** (0.005)	0.048*** (0.005)
Altruism	0.007** (0.004)	0.023** (0.010)	0.002 (0.005)	0.012** (0.005)
<u>Other motives</u>				
Risk aversion	0.022*** (0.003)	0.016 (0.011)	0.021*** (0.004)	0.026*** (0.005)
Financial motivation	-0.010*** (0.004)	-0.005 (0.010)	-0.009* (0.005)	-0.011** (0.005)
<u>Control variables</u>				
Age	0.001 (0.001)	-0.001 (0.003)	-0.000 (0.001)	0.004** (0.002)
Female	0.112*** (0.010)	0.089*** (0.025)	0.109*** (0.013)	0.113*** (0.015)
Married	-0.001 (0.009)	0.054 (0.037)	0.007 (0.011)	-0.004 (0.014)
German citizenship	0.091*** (0.028)	-0.048 (0.066)	0.109*** (0.032)	0.070 (0.047)
Migration background	-0.046*** (0.015)	-0.091** (0.037)	-0.016 (0.018)	-0.095*** (0.027)
College degree	0.166*** (0.009)	0.175*** (0.028)	0.155*** (0.012)	0.170*** (0.015)
Experience (full-time)	0.003*** (0.001)	-0.014 (0.016)	0.001 (0.001)	0.000 (0.002)
Experience (part-time)	0.003*** (0.001)	0.007 (0.012)	0.004*** (0.002)	0.001 (0.002)
Openness	0.010** (0.005)	-0.016 (0.015)	0.012* (0.007)	0.008 (0.007)
Conscientiousness	-0.020*** (0.005)	-0.018 (0.013)	-0.018*** (0.006)	-0.022*** (0.007)
Extraversion	0.002 (0.005)	-0.003 (0.015)	-0.001 (0.007)	0.006 (0.008)
Agreeableness	0.005 (0.005)	0.039*** (0.015)	0.004 (0.006)	0.003 (0.007)
Neuroticism	-0.005 (0.004)	-0.002 (0.012)	-0.006 (0.005)	-0.005 (0.006)
Region dummies	✓	✓	✓	✓
Year dummies	✓	✓	✓	✓
Observations	63,180	2,163	32,070	28,947
Pseudo R-squared	0.077	0.101	0.074	0.082

* denotes statistical significance at the 10% level, ** at the 5% level, and *** at the 1% level.

Sixth, we restrict the analysis to the years in which civic virtue is directly observed (2008 and 2012). In this way, we avoid possible problems arising from imputation, when data from a specific year are also used for up to three subsequent years. The concentration on two waves reduces the sample to 11,299 observations, of which 30.4% are employed in the public sector. A dummy variable for the year (2008 versus 2012) is included as a control variable. The results are robust: Civic virtue remains significantly positively related to public sector employment (4.7 percentage points, $p < .01$), while altruism and risk aversion show smaller estimated effects and financial motivation a small negative association with public sector employment. (See Table 3.11.)

Table 3.11: Robustness check: Analysis restricted to the years in which civic virtue is assessed (2008 and 2012)

Variables	Model 1
<u>Prosocial motivation</u>	
Civic virtue	0.047*** (0.005)
Altruism	0.009* (0.005)
<u>Other motives</u>	
Risk aversion	0.019*** (0.005)
Financial motivation	-0.014*** (0.005)
<u>Control variables</u>	
Age	0.001 (0.001)
Female	0.096*** (0.012)
Married	-0.005 (0.011)
German citizenship	0.099*** (0.037)
Migration background	-0.042** (0.019)
College degree	0.161*** (0.011)
Experience (full-time)	0.003** (0.001)
Experience (part-time)	0.004** (0.002)
Openness	0.010 (0.006)
Conscientiousness	-0.016*** (0.006)
Extraversion	-0.003 (0.006)
Agreeableness	0.008 (0.006)
Neuroticism	-0.007 (0.005)
Region dummies	✓
Year dummy	✓
Observations	11,299
Pseudo R-squared	0.074

* denotes statistical significance at the 10% level, ** at the 5% level, and *** at the 1% level.

As a last and perhaps most important robustness check, we estimate our main regression (Model 5 of Table 3.5) for different branches. This is particularly motivated by the extensive literature regarding a possible confounding of sectors and job types or branches (see BRIGHT 2007; DUR/VAN LENT 2018; DUR/ZOUTENBIER 2015; GREGG et al. 2011; KJELDSSEN/JACOBSEN 2013; TONIN/VLASSOPOULOS 2015).

Table 3.12 presents the results of this robustness check. We distinguish the following branches (job types), which include a considerable number of both public and private sector positions: caring jobs, including education, health, and social care (13,930 observations, of which 64.7% are employed in the public sector), education jobs within the caring jobs (5,918 observations, 86.9% public sector), health and social care jobs within the caring jobs (8,012 observations, 48.3% public sector), non-caring jobs (e.g., agriculture, fabrication, technical jobs, and service jobs except education, health, and social care) (48,256 observations, 21.3% public sector), and service jobs within the non-caring jobs (28,282 observations, 33.8% public sector).

We find a positive association between civic virtue and public sector employment in all considered branches. The estimated effect is considerably smaller in the education branch (1.3 percentage points or 1.5%), where it only holds at the significance level $p < .10$. This indicates that in the education branch other factors may be more important in determining whether an individual works in the public sector (e.g., public school) or in the private sector (e.g., private school). A significant effect of altruism – beyond civic virtue – is not found in any of the branches. Risk aversion is positively related to public sector employment in each branch except health and social care, and the negative association between financial motivation and public sector employment is apparently driven by the service branch.

Relating these findings to previous results from the literature, it becomes evident that while altruism – without including civic virtue – is positively related to public sector employment only within the caring jobs (see DUR/ZOUTENBIER 2015), the relationship between civic virtue and public sector employment holds more generally. This difference may be explained in the way that direct care for others is rather specific to caring jobs in the public sector, while contribution to society is a more general characteristic of public sector jobs. The low importance of civic virtue for public sector employment in the education branch may be explained in the way that almost all education professionals – regardless of their civic virtue – try to work in the public sector (e.g., as teachers in public

schools, often with tenure position and relatively comfortable payment and pensions). The private sector is here usually a less attractive and atypical situation, which is only accepted if a public sector position is not available.

Table 3.12: Robustness check: Public sector employment in different branches

Variables	(1) Caring jobs	(2) Caring jobs: education	(3) Caring jobs: health and social care	(4) Non-caring jobs	(5) Non-caring jobs: service
<u>Prosocial motivation</u>					
Civic virtue	0.030*** (0.007)	0.013* (0.007)	0.028*** (0.010)	0.043*** (0.004)	0.055*** (0.005)
Altruism	0.001 (0.007)	0.004 (0.007)	-0.004 (0.010)	-0.001 (0.004)	-0.005 (0.005)
<u>Other motive</u>					
Risk aversion	0.018*** (0.006)	0.013** (0.007)	0.007 (0.009)	0.019*** (0.003)	0.028*** (0.005)
Financial motivation	-0.006 (0.012)	0.005 (0.011)	-0.015 (0.018)	-0.009 (0.006)	-0.016* (0.009)
<u>Control variables</u>					
Age	-0.001 (0.002)	-0.003* (0.002)	-0.004 (0.002)	-0.003** (0.001)	-0.005*** (0.002)
Female	-0.054** (0.022)	-0.021 (0.019)	-0.076** (0.031)	0.059*** (0.011)	0.008 (0.015)
Married	-0.019 (0.017)	-0.014 (0.018)	-0.033 (0.024)	0.010 (0.009)	0.031** (0.014)
German citizenship	0.132*** (0.051)	0.115** (0.050)	0.138** (0.067)	0.079** (0.031)	0.140*** (0.045)
Migration background	0.089*** (0.029)	0.080** (0.031)	0.129*** (0.037)	-0.083*** (0.017)	-0.081*** (0.026)
College degree	0.220*** (0.016)	0.143*** (0.017)	0.011 (0.028)	0.077*** (0.011)	0.094*** (0.015)
Experience (full-time)	0.005*** (0.002)	0.004*** (0.002)	0.008*** (0.002)	0.006*** (0.001)	0.010*** (0.001)
Experience (part-time)	0.005** (0.002)	0.005** (0.002)	0.007** (0.003)	0.005*** (0.001)	0.005** (0.002)
Openness	0.022** (0.009)	-0.004 (0.010)	0.014 (0.013)	-0.002 (0.005)	0.001 (0.008)
Conscientiousness	-0.013 (0.009)	-0.000 (0.008)	0.014 (0.014)	-0.018*** (0.005)	-0.018** (0.007)
Extraversion	-0.010 (0.010)	-0.005 (0.010)	-0.014 (0.014)	0.007 (0.005)	-0.002 (0.008)
Agreeableness	-0.011 (0.010)	-0.007 (0.010)	-0.022 (0.014)	0.001 (0.005)	-0.006 (0.007)
Neuroticism	-0.005 (0.008)	-0.003 (0.008)	-0.008 (0.011)	-0.003 (0.004)	-0.007 (0.006)
Region dummies	✓	✓	✓	✓	✓
Year dummies	✓	✓	✓	✓	✓
Observations	13,930	5,918	8,012	48,256	28,282
Pseudo R-squared	0.096	0.131	0.043	0.052	0.056

In all models, the binary dependent variable is public sector employment. Each model is restricted to employees working in a specific type of job. * denotes statistical significance at the 10% level, ** at the 5% level, and *** at the 1% level.

3.4.4 Selection: civic virtue before the career start and before sector changes

To investigate how the positive association between civic virtue and public sector employment occurs, in the next step we relate the motives in the year before the labor market is entered the first time to the probability of public versus private sector employment in the next year. We complement this analysis of labor market entry by an additional analysis of sector changes during the career, investigating the association between motives and a change to the public respectively private sector in the subsequent year.

Table 3.13 presents all results of the selection analysis. As model (1) shows, a part of the pattern that we observe for the whole sample is already visible and significant in the year prior to initial employment. On average, graduates with a civic virtue score that is higher by one standard deviation are 3.4 percentage points more likely to enter the public versus private sector when all other factors are equal. Relating this marginal effect to the overall probability of entering the public versus private sector in the next year (27.4%), the effect amounts to 12.4%. The result is a first support for Hypothesis 3.2 and indicates that selection drives the positive association between civic virtue and public sector employment. There is a similarity to DUR/ZOUTENBIER (2015: 360f.), who find a positive association between altruism and public sector employment at zero years of work experience, when civic virtue is not included.

Models (2) and (3) show that civic virtue is also relevant for (new) sector selection during the career. In particular, civic virtue positively predicts changes from the private to the public sector in comparison to staying in the private sector (0.5 percentage points) (model (2)). Considering that the overall probability of such changes is 2.0%, the increase by 0.5 percentage points corresponds to an increase by 25.0%. The result further supports Hypothesis 3.2. We additionally find a small negative association between financial motivation and changes to the public sector.

Changes to the private sector are not significantly predicted by (low) civic virtue (model (3)). In contrast, lower risk aversion (higher readiness to take risks) positively predicts changes from the public to the private sector (−0.6 percentage points). Relating this effect to the baseline share of such changes (4.7%), the effect amounts to −12.8%.

Table 3.13: Selection into the public versus private sector by civic virtue

Variables	Selection at labor market entry	Selection during the career	
	(1) Public sector employment in the next year	(2) Change from private to public sector in the next year	(3) Change from public to private sector in the next year
<u>Prosocial motivation</u>			
Civic virtue	0.034** (0.015)	0.005*** (0.001)	-0.003 (0.002)
Altruism	0.025 (0.015)	0.000 (0.001)	-0.000 (0.002)
<u>Other motives</u>			
Risk aversion	0.028* (0.015)	-0.000 (0.001)	-0.006*** (0.002)
Financial motivation	-0.022 (0.015)	-0.001* (0.001)	0.001 (0.002)
<u>Control variables</u>			
Age	-0.008** (0.003)	0.000* (0.000)	0.000 (0.000)
Female	0.075** (0.034)	0.011*** (0.002)	-0.002 (0.004)
Married	0.045 (0.061)	-0.001 (0.002)	-0.008** (0.004)
German citizenship	0.049 (0.091)	-0.003 (0.005)	-0.039** (0.018)
Migration background	-0.110** (0.046)	0.002 (0.003)	0.003 (0.007)
College degree		0.003 (0.002)	-0.027*** (0.004)
College degree by next year	0.195*** (0.034)		
Experience (full-time)		-0.001*** (0.000)	-0.002*** (0.000)
Experience (part-time)		-0.001** (0.000)	-0.001** (0.001)
Openness	0.001 (0.019)	0.002* (0.001)	-0.002 (0.002)
Conscientiousness	-0.014 (0.020)	-0.001 (0.001)	0.004** (0.002)
Extraversion	0.011 (0.021)	-0.000 (0.001)	0.003 (0.002)
Agreeableness	0.025 (0.019)	0.002** (0.001)	0.002 (0.002)
Neuroticism	-0.028 (0.017)	0.001 (0.001)	0.003 (0.002)

Region dummies	✓	✓	✓
Year dummies	✓	✓	✓
Constant		0.001 (0.009)	0.065*** (0.024)
Observations	878	43,712	19,468
(Pseudo) R-squared	0.082	0.016	0.040

Model (1) reports marginal effect estimates of probit regressions, with public sector employment in the next year as the dependent variable. Models (2) and (3) present results from linear regressions, with sector changes (from the private to the public sector and vice versa) as the dependent variables, relative to staying in the respective sector. In all models, the main explanatory variables are standardized variables on civic virtue, altruism, risk aversion, laziness, and financial motivation. Robust standard errors in parentheses, clustered at the individual level in models (2) and (3). * denotes statistical significance at the 10% level, ** at the 5% level, and *** at the 1% level.

3.4.5 Socialization: changes in civic virtue during the career

We test socialization effects with the help of fixed effects regressions: By holding each individual constant, only intra-individual changes – changes within individuals over time – are considered. The dependent variable is now a z-standardized motive measure (civic virtue, altruism, risk aversion, laziness, and financial motivation), and the explanatory variables are public sector work experience and private sector work experience. These variables are generated based on the employment history in the time 2005–2014; for example, if an individual works the whole time in the public sector, then public sector work experience will increase by one unit in each year.

As Table 3.14 shows, we find a small negative trend of civic virtue both for public sector employment and for private sector employment. For each additional year of experience in the public sector, civic virtue decreases by approximately 0.008 standard deviations, and for each year of private sector employment, the decrease amounts to 0.005 standard deviations, on average. This finding is in line with the “reality shock” found in previous studies, with decreasing levels of prosocial motivation over the career (BLAU 1960; KJELDSEN/JACOBSEN 2013: 915). The coefficients for public sector work experience and private sector work experience are not significantly different from each other (*F*-test). The results suggest that differences in socialization cannot explain the positive association between civic virtue and public sector employment, as the motive appears to develop similarly in both sectors (and the estimated trend is even negative in the public sector compared to the private sector). This further supports Hypothesis 3.2, meaning that selection and not socialization explains public sector employees’ higher civic virtue.

The trend of altruism is not significant in the public sector and is significantly and weakly positive in the private sector. These results are in line with the finding that prosocial motivation (as measured with behavioral variables) is largely stable over time (see CARLSSON/JOHANSSON-STENMAN/NAM 2014). The difference between public and private sector employment is not significant.

Risk aversion tends to increase over the career in both sectors. While the estimated effect is slightly larger in the public sector, this difference is not significant. The same pattern of results is found for the trend of laziness (compare DUR/ZOUTENBIER 2015). Financial motivation tends to decrease with work experience similarly in both sectors.

Table 3.14: Fixed effects regressions: Socialization effects with increasing sector-specific experience

Variables	Prosocial motivation		Other motives		
	(1) Civic virtue	(2) Altruism	(3) Risk aversion	(4) Laziness	(5) Financial motivation
<u>Public sector work experience</u>	-0.008** (0.004)	0.001 (0.004)	0.018*** (0.003)	0.019*** (0.004)	-0.020*** (0.004)
<u>Private sector work experience</u>	-0.005** (0.003)	0.008*** (0.003)	0.015*** (0.002)	0.017*** (0.003)	-0.021*** (0.003)
Constant	0.024*** (0.008)	-0.021** (0.009)	-0.062*** (0.006)	-0.067*** (0.009)	0.081*** (0.009)
Observations	63,180	63,180	63,180	63,180	63,180
R-squared	0.001	0.001	0.003	0.005	0.007

This table reports coefficients of linear regressions with individual fixed effects. The dependent variable is a standardized measure of (1) civic virtue, (2) altruism, (3) risk aversion, (4) laziness, and (5) financial motivation, respectively. The main explanatory variables are work experience in the public sector (years) and work experience in the private sector (years). Robust standard errors in parentheses. * denotes statistical significance at the 10% level, ** at the 5% level, and *** at the 1% level.

As a first robustness check, we estimate the different models of Table 3.14 using only the waves in which the respective motive is directly observed. This implies that the analyses of civic virtue, altruism, and financial motivation are now restricted to the years 2008 and 2012, risk aversion to all years except 2005 and 2007 (the variable is not observed in exactly these two years), and the analysis of laziness is now restricted to 2005, 2009, and 2013. In this smaller sample, a positive trend of civic virtue emerges both in the public sector (0.045 standard deviations per year, $p < .01$) and, with a larger estimated effect, in

the private sector (0.055 standard deviations, $p < .01$). The only explanation we have for this change is the fact that the civic virtue values from 2004 are now not included anymore. Nevertheless, the relation between the estimated effects of public sector employment and private sector employment is similar to the baseline results, and the difference between the two sectors is again insignificant. There are some other minor differences (positive trend of altruism in the public sector and no significant trend of risk aversion anymore in the public sector), but we still find no significant differences between the effects of public sector employment and private sector employment. (See Table 3.15.)

Table 3.15: Robustness check: Socialization analysis restricted to the years in which the respective motive is assessed

Variables	Prosocial motivation		Other motives		
	(1) Civic virtue	(2) Altruism	(3) Risk aversion	(4) Laziness	(5) Financial motivation
<u>Public sector work experience</u>	0.045*** (0.007)	0.022*** (0.008)	0.003 (0.003)	0.018*** (0.004)	-0.039*** (0.008)
<u>Private sector work experience</u>	0.055*** (0.005)	0.014** (0.006)	0.004* (0.002)	0.016*** (0.003)	-0.029*** (0.006)
Constant	-0.301*** (0.020)	-0.091*** (0.022)	0.012 (0.008)	-0.052*** (0.008)	0.130*** (0.021)
Observations	11,299	11,299	49,479	20,872	11,299
R-squared	0.041	0.004	0.000	0.006	0.015

Individual fixed effects included. * denotes statistical significance at the 10% level, ** at the 5% level, and *** at the 1% level.

As a second robustness check, we use a variant of the baseline analysis presented in Table 3.14, where we additionally include the control variables: biographical variables, education, Big Five personality traits, and region dummies (state of residence); only age and year dummies are not included, as changes in these variables are highly collinear with changes in experience within individuals. The results are all equivalent to the baseline results. (See Table 3.16.)

Table 3.16: Robustness check: Socialization analysis with control variables

Variables	Prosocial motivation		Other motives		
	(1) Civic virtue	(2) Altruism	(3) Risk aversion	(4) Laziness	(5) Financial motivation
<u>Public sector work experience</u>	-0.008** (0.004)	0.001 (0.004)	0.016*** (0.003)	0.018*** (0.003)	-0.020*** (0.004)
<u>Private sector work experience</u>	-0.005* (0.003)	0.008*** (0.003)	0.014*** (0.002)	0.017*** (0.002)	-0.021*** (0.003)
<u>Control variables</u>					
Female	-	-	-	-	-
Married	-0.046** (0.023)	0.001 (0.027)	0.055*** (0.019)	-0.034* (0.020)	-0.006 (0.025)
German citizenship	0.028 (0.079)	0.235* (0.141)	0.117 (0.106)	0.198 (0.123)	-0.106 (0.154)
Migration background	-	-	-	-	-
College degree	0.095* (0.054)	0.135** (0.067)	0.002 (0.055)	-0.056 (0.047)	-0.059 (0.068)
Openness	0.012 (0.011)	0.024** (0.012)	-0.054*** (0.010)	0.325*** (0.015)	-0.005 (0.011)
Conscientiousness	-0.013 (0.010)	0.007 (0.010)	0.023*** (0.008)	-0.399*** (0.014)	0.007 (0.010)
Extraversion	0.009 (0.012)	0.005 (0.013)	-0.032*** (0.011)	-0.154*** (0.016)	0.028** (0.012)
Agreeableness	0.005 (0.010)	0.026** (0.011)	0.013 (0.009)	-0.081*** (0.013)	-0.018* (0.010)
Neuroticism	-0.013 (0.010)	0.003 (0.010)	0.026*** (0.009)	0.087*** (0.012)	-0.011 (0.010)
Region dummies	✓	✓	✓	✓	✓
Constant	-0.068 (0.145)	-0.328 (0.209)	-0.091 (0.178)	-0.245 (0.191)	0.315 (0.212)
Observations	63,180	63,180	63,180	63,180	63,180
R-squared	0.002	0.003	0.007	0.216	0.008

Individual fixed effects included. * denotes statistical significance at the 10% level, ** at the 5% level, and *** at the 1% level.

3.4.6 Exploratory analysis: civic virtue and entrepreneurship

In a last step, we explore whether civic virtue is also empirically relevant for entrepreneurship (self-employment), against the background of the literature on individual determinants of self-employment (see, e.g., STEWART JR./ROTH 2001; ZHAO/SEIBERT/LUMPKIN 2010). Table 3.17 shows the results of this additional analysis, using an extended sample that includes self-employed workers.

Overall, there is no significant association between civic virtue and self-employment in our data (model (1)). Only risk aversion is significantly related to self-employment, and this association is negative (−1.6 percentage points), meaning that higher readiness to take risks is positively associated with self-employment. Relating this marginal effect to the overall probability of self-employment in the sample (6.0%), the marginal effect of −1.6 percentage points corresponds to −26.7%.

When comparing self-employment only to working as an employee in the public sector (model (2)) – that is, private sector employees are dropped – then it turns out that civic virtue is negatively related to self-employment compared to public sector employment (−0.016 percentage points or −9.3%). That is, civic virtue is overall less typical for entrepreneurs than for public sector employees. A similar, although smaller effect is estimated for altruism. Risk aversion is again negatively related to self-employment, and financial motivation is (weakly) positively associated with self-employment versus public sector employment.

Model (3) compares self-employment only to working as an employee in the private sector. Civic virtue is positively related to self-employment versus private sector employment (0.8 percentage points or 9.4%). This suggests that entrepreneurship, when compared to private sector employment, tends to go along with the motive to contribute to society. In addition, risk aversion is negatively related to self-employment versus private sector employment.

Table 3.17: Exploratory analysis: Civic virtue and entrepreneurship

Variables	(1) Self-employment versus any other employment	(2) Self-employment versus public sector employees	(3) Self-employment versus private sector employees
<u>Prosocial motivation</u>			
Civic virtue	0.002 (0.002)	-0.016*** (0.004)	0.008*** (0.002)
Altruism	-0.002 (0.002)	-0.009** (0.004)	-0.002 (0.002)
<u>Other motives</u>			
Risk aversion	-0.016*** (0.002)	-0.045*** (0.004)	-0.019*** (0.002)
Financial motivation	0.001 (0.002)	0.007* (0.004)	0.001 (0.002)
<u>Control variables</u>			
Age	0.003*** (0.000)	0.006*** (0.001)	0.004*** (0.001)
Female	-0.025*** (0.005)	-0.103*** (0.012)	-0.019*** (0.007)
Married	-0.002 (0.004)	-0.002 (0.011)	-0.003 (0.006)
German citizenship	-0.006 (0.012)	-0.052 (0.034)	-0.006 (0.015)
Migration background	-0.004 (0.007)	0.018 (0.020)	-0.012 (0.010)
College degree	0.024*** (0.004)	-0.004 (0.011)	0.053*** (0.006)
Experience (full-time)	-0.001 (0.000)	-0.003** (0.001)	-0.000 (0.001)
Experience (part-time)	-0.003*** (0.001)	-0.008*** (0.002)	-0.003*** (0.001)
Openness	0.004* (0.002)	0.006 (0.006)	0.007** (0.003)
Conscientiousness	-0.001 (0.002)	0.007 (0.006)	-0.003 (0.003)
Extraversion	0.009*** (0.003)	0.021*** (0.007)	0.012*** (0.003)
Agreeableness	-0.001 (0.002)	-0.004 (0.006)	-0.001 (0.003)
Neuroticism	-0.002 (0.002)	-0.003 (0.005)	-0.002 (0.003)
Region dummies	✓	✓	✓
Year dummies	✓	✓	✓
Observations	67,225	23,513	47,757
Pseudo R-squared	0.134	0.173	0.160

This table reports average marginal effect estimates of probit regressions. In model (1), the binary dependent variable takes the value 1 if self-employed and 0 if working as an employee. In model (2), the dependent variable takes the value 1 if self-employed and 0 if working as an employee in the public sector. In model (3), the dependent variable takes the value 1 if self-employed and 0 if working as an employee in the private sector. The main explanatory variables are standardized variables on civic virtue, altruism, risk aversion,

laziness, and financial motivation. Robust standard errors clustered at the individual level in parentheses. * denotes statistical significance at the 10% level, ** at the 5% level, and *** at the 1% level.

3.5 Conclusion

Based on representative longitudinal data with employees in Germany, the present study shows that civic virtue relates positively to public sector employment even more strongly than altruism, risk aversion, laziness, and (low) financial motivation. Interestingly, higher scores in civic virtue increase the probability of entering the public sector or changing from the private to the public sector in the next year (selection), whereas no significant differences in career trends between the sectors are found (socialization). Civic virtue is also positively related to entrepreneurship, when self-employed workers are compared to employees of the private sector, but civic virtue predicts public sector employment more strongly than self-employment.

Our study is limited in different respects. First, the motive and personality measures in the SOEP data set are based on a rather small number of items, which may be disadvantageous for the precision of these measures. However, an important advantage of the SOEP is that it allows a detailed analysis of both selection and socialization effects, as individuals are observed before and after labor market entry.

Second, although we use the longitudinal nature of the data set, it was not possible to approximate causality even better by exploiting, e.g., a reform or using an instrumental variable approach. Future research might aim at extending the research by searching for such opportunities.

Related to this, our selection analysis includes the year before employment starts, but the decision on the employment sector has possibly already been made or is at least relatively fixed at an earlier time (for example, through the field chosen in vocational or college education). Therefore, for the detection of causal effects it is preferable to capture civic virtue at an early point in time, when relevant career decisions have not been made yet. We also note that sector changes during the career, which we use to extend our selection analysis, are endogenous (only specific individuals decide to switch the sector), so we cannot exclude the possibility that these individuals differ from the whole population in unobserved respects.

Although we differentiate between different branches in a robustness check, our analysis of public versus private sector employment is still relatively broad. The jobs that are compared, such as service jobs in the public sector with service jobs in the private sector,

are perhaps still so different that they may not have the same target group of applicants. Future studies may focus on branches that are more specific and that nevertheless have both public and private sector positions (see KJELDSSEN/JACOBSEN 2013).

There is additional potential for future research. The present study is based on employees in Germany. In other countries, the situation may be different for cultural reasons (see KIM et al. 2013; RITZ/BREWER 2013). For example, the structure of the public sector can be sensitive to historical developments in specific countries. Future studies may seek to investigate whether the results hold in a more general manner and what the determinants of possible differences between countries are.

Our study suggests that a person-organization fit in the public sector exists, but only to a limited extent. The association between civic virtue and public sector employment is significant, but not very strong: For a higher value in civic virtue by one standard deviation, the probability of public sector employment increases by 4.9 percentage points, on average, holding the other explanatory variables constant. The standardized effect size, calculated by dividing this coefficient (0.049) by the standard deviation of the dependent variable (0.462), amounts to $d = 0.11$ and is thus a small effect (see COHEN 1988). Consequently, employers in the public sector for whom civic virtue is particularly important can investigate mechanisms to attract applicants with high civic virtue more consistently. Merely offering job security may not be the best mechanism, as it might attract those who have a high risk aversion, but not necessarily those who score high in civic virtue – we note that risk aversion and civic virtue are negatively correlated (see Table 3.4). Moreover, the average values of civic virtue in the population – both in the public and in the private sector – are relatively low (2.25 respectively 2.01 on a scale from 1 to 4) and much lower than the averages of altruism (see Tables 3.3 and 3.4). A practical question is how to support the civic virtue of employees during the career, thereby strengthening good person-organization fit, organizational commitment, and the contribution of public sector organizations to society.

4 Transition to the Labor Market, Part II: Risk Aversion and the Teaching Profession³²

4.1 Introduction

In the present study, we investigate the relationship between risk aversion and the teaching profession and analyze both whether risk-averse individuals are attracted to teaching (selection effects) and how teaching experience relates to the development of risk aversion (socialization effects). Risk aversion can be described as the tendency to avoid risks and to favor secure options over less secure options; highly risk-averse individuals prefer secure options even they have a lower expected value (see HOLT/LAURY 2002; KAHNEMAN/TVERSKY 1979). Self-reported risk aversion predicts behavioral measures of risk aversion, including the choice of activities that are associated with risks (see DOHMEN et al. 2005). Risk aversion has been argued to be relevant for the reaction to performance pay systems (see BOWEN et al. 2015) and is thus an important factor to consider when designing teacher payment reforms. Insofar as teachers' higher average risk aversion is a selection effect and explained by fixed payment schemes, changing the payment schemes would attract differently motivated workers to the teaching profession (see DOHMEN/FALK 2010). In addition, risk aversion has been found to be negatively related to the implementation of innovations (see ABADI GHADIM/PANNELL/BURTON 2005) and, in particular, to the use of technology in teaching (see HOWARD 2013). In this vein, the analysis of teachers' risk aversion may also help to understand many teachers' resistance to educational reforms (see TERHART 2013).

To understand whether teachers are, on average, more risk-averse than other employees, it is necessary to compare them to other professions, rather than focusing on teachers or prospective teachers alone (see, e.g., HEINZ 2015; RICHARDSON/WATT 2005; WATT et al. 2012; WATT/RICHARDSON 2007). The relationship between risk aversion and teaching in comparison to other occupations has previously been analyzed by DOHMEN/FALK (2010), who find a positive association (a negative relationship between readiness to take

³² This chapter is based on the article "Risk Aversion and the Teaching Profession: An Analysis Including Different Forms of Risk Aversion, Different Control Groups, Selection and Socialization Effects", written by Adam Ayaita and Kathleen Stürmer. The article has been submitted for publication.

risks and teaching), which holds for teachers at the primary and secondary school track. Moreover, BOWEN et al. (2015) find that graduate students in teacher education programs are more risk-averse, on average, than graduate students in business administration or law.

We extend this stream of research in three ways. First, in addition to general risk aversion we consider risk aversion with respect to occupational career (see, e.g., PFEIFER 2011). This measure was also used in AYAITA/GÜLAL/YANG (2018), where we studied motives of public sector employees compared to private sector employees. Occupation-related risk aversion may be an even more important motive in a labor market context than general risk aversion, as we are interested in teachers' motives at work. Readiness to take risks in spare time activities or other dimensions of private life is arguably not relevant for occupation-related behavior, while readiness to take risks in the occupation should be more strongly related to teachers' behavior at work. Therefore, we consider occupation-related risk aversion in addition to the established construct of (general) risk aversion.

Second, we compare teachers not only with all other employees who have a comparable education level, but also choose more specific reference groups. In particular, analogously to AYAITA/GÜLAL/YANG (2018), we compare teachers to those who work in a similar area: in caring jobs, which include education, health, and social care (see GREGG et al. 2011: 759; DUR/ZOUTENBIER 2015: 357). Then – differently than in previous work on the public sector (see AYAITA/GÜLAL/YANG 2018) – we compare teachers to those who have a similar occupational status: civil servants (public servants with a tenured position; see, e.g., BATTIS (Ed.) 2017; GERMAN CIVIL SERVICE FEDERATION (DBB) 2017) and public servants without civil servant status. These analyses enhance our understanding of the motivational basis of teaching, because they help to understand whether higher risk aversion is specific to teachers even among narrower groups of employees.

The third extension in our study is the investigation of changes over the career, which allows us to estimate whether individuals tend to become more risk-averse during their employment as teachers or whether higher risk aversion of teachers is only due to selection, including self-selection, before the employment start. In AYAITA/GÜLAL/YANG (2018), we analyzed selection and socialization effects for public versus private sector employees. Selection and socialization effects have different policy implications. If tea-

chers' risk aversion is relevant for their performance, then selection effects would possibly raise the question whether a differently motivated workforce should be attracted to teaching and whether teacher education programs should be updated, while socialization effects would possibly point to motivational challenges during teachers' employment.

Our study is based on the waves 2005–2016 of the Socio-Economic Panel (SOEP), a representative data set of the population in Germany. This data set allows a comparison between a large number of teachers and employees from other professions. We extend previous teacher research that uses a single wave of the SOEP (see DOHMEN/FALK 2010) by including several waves. Multiple linear regression analyses are applied to test for differences in risk aversion between teachers and other professions, holding other personal characteristics constant (compare ROLOFF HENOCH et al. 2015). We include the interaction of experience and teaching in the multiple linear regressions as a first test of possible socialization versus selection effects (compare BUURMAN et al. 2012; DUR/ZOUTENBIER 2015). Because most individuals are observed over several years, we are able to add a fixed effects analysis to investigate pure career developments, holding the individual constant (compare AYAITA/GÜLAL/YANG 2018).

The results demonstrate that teachers on average score significantly higher in risk aversion than observationally equivalent other employees. For general risk aversion, the difference amounts to 0.15 standard deviations (0.32 points on an eleven-point Likert scale). For risk aversion with respect to occupational career, the difference between teachers and others is significantly larger (0.33 standard deviations or 0.77 points on an eleven-point Likert scale). The association of teaching with occupation-related risk aversion also holds within more narrowly defined groups; teachers' general risk aversion, in contrast, is only slightly higher than it is among other civil servants. With regard to the question of selection and socialization effects, we find that higher scores of teachers in general risk aversion and occupation-related risk aversion, compared to similarly educated non-teaching employees, already hold for individuals with no year of work experience. We find tentative evidence that teachers additionally tend to become more risk-averse over their career in comparison to non-teaching employees, particularly in occupation-related risk aversion, so that differences in socialization may reinforce the differences due to selection.

4.2 Theoretical background

The theoretical fundament of our analysis is the person-organization fit theory (see KRISTOF 1996), which relies on the attraction-selection-attrition model (see SCHNEIDER 1987; VANDENABEELE 2008). This model predicts that individuals are attracted to, selected by, and more likely to stay in organizations that fit their own preferences (see SCHNEIDER 1987: 440; VANDENABEELE 2008: 1091), so increasing homogeneity within organizations over time (see KRISTOF 1996: 5). Based on this model, person-organization fit theory states that an organization's attractiveness increases if the characteristics of the individual and the organization are similar ("supplementary fit") or if the organization has need of that individual's characteristics ("complementary fit") (KRISTOF 1996: 3; VANDENABEELE 2008: 1091).

A positive relationship between teaching and risk aversion can be expected based on the idea of supplementary fit. In previous research we argued that prosocially motivated individuals, in particular those with higher civic virtue, may be attracted to the public sector because of the fit between their motives and the nature of public sector work (see AYAITA/GÜLAL/YANG 2018). Similarly, more risk-averse individuals may be systematically attracted to the teaching profession, because the conditions of this profession overall match the characteristics and preferences of risk-averse workers.

Working as a teacher is often accompanied by relatively high job security. Most teachers are public servants (employees of the public sector), and in some countries such as Germany, teachers have the opportunity to become civil servants (lifetime public servants with a tenured position and special amenities). In contrast to other employees, civil servants do not have to pay for public pension insurance or unemployment insurance; they cannot be dismissed in normal circumstances, and they receive a secured and relatively comfortable pension. In comparison to most other jobs, then – and especially compared to the private sector – most teaching positions can be described (and are widely perceived) as relatively safe jobs.

In line with this reasoning, both general risk aversion and – with a slightly larger estimated effect – occupation-related risk aversion are empirically found to be positively related to public versus private sector employment in Germany (see AYAITA/GÜLAL/YANG 2018; PFEIFER 2011). It has been shown that for German preservice teachers, the perceived job security is generally an important factor in choosing to become a teacher (see

POHLMANN/MÖLLER 2010: 75, 80).³³ When comparing teachers to other occupations, a positive relationship between (general) risk aversion and teaching is found in the German context (see DOHMEN/FALK 2010).

In other countries, the situation may be different, as the special civil servant status is a German phenomenon. Nevertheless, most teachers are public servants in all OECD countries (OECD 2017: 183). Even without civil servant status, a public sector position may entail higher job security than in the private sector – first because payment schemes tend to be fixed rather than flexible, and second because public sector organizations are less likely to crash (see DOHMEN/FALK 2010: 257). Unsurprisingly, then, the evidence across different countries suggests that more risk-averse individuals are more likely to work in the public sector (see, e.g., BELLANTE/LINK 1981; ROSZKOWSKI/GRABLE 2009).

There is an additional theoretical argument for an attraction of risk-averse individuals particularly to the teaching profession: This profession may appear highly familiar, so reducing the perceived risk as compared to other jobs (even compared to other jobs in the public sector with civil service positions). In this vein, WATT/RICHARDSON (2007: 180, 192) show that positive prior teaching and learning experiences as a student at school are an important factor in preservice teachers' own choice of career.

Empirical evidence supports the expectation that risk-averse individuals tend to be attracted to the teaching profession in an international context. The expectation of high job security has been identified in various countries as a relevant factor in choosing a teaching career (see WATT et al. 2012). For example, preservice teachers in Australia rate the importance of job security for their career choice as relatively high (see WATT/RICHARDSON 2007: 177, 192). In the United States, graduate students in teacher education programs have been shown to be more risk-averse, on average, than graduate students in business administration or law (see BOWEN et al. 2015).

The attraction of risk-averse individuals to the teaching profession may be even stronger for a specific form of risk aversion that concerns the labor market (risk aversion with respect to occupational career), because individuals may expect that choosing the

³³ We use the term “preservice teachers” for university students in teacher education programs who do not teach yet (e.g., BLOMBERG/STÜRMER/SEIDEL 2011; WATT et al. 2012; WATT/RICHARDSON 2007) and “prospective teachers” more generally for all stages of the teaching career before becoming an expert teacher (e.g., WATT et al. 2012).

teaching profession minimizes career risks. Moreover, based on person-organization fit theory and the concrete assumption that risk-averse individuals tend to choose jobs with a secure occupational status, we expect teachers to be overall more risk-averse than employees in other professions, but less so when comparing them to employees with a similar occupational status. In particular, when we compare teachers to other employees in caring jobs, who work in relatively similar areas (education, health, and social care), we still expect teachers to be more risk-averse, on average. In contrast, when teachers are compared to other employees with similar occupational status (that is, teaching civil servants to other civil servants, or teaching public servants to other public servants), then the relationship between risk aversion and teaching should decrease – higher risk aversion may be a general characteristic of employees with this status and not be entirely specific to the teaching profession.

It has long been discussed whether differences in personality between occupations are the result of selection, including self-selection, and/or socialization (see, e.g., AYAITA/GÜLAL/YANG 2018; BUURMAN et al. 2012; DUR/ZOUTENBIER 2015; KJELDSEN/JACOBSEN 2013; ROLOFF HENOCH et al. 2015; SCHNEIDER 1987). A selection effect is plausible, as person-organization fit theory would predict that more risk-averse individuals are attracted to a profession that corresponds to their needs in terms of being a rather secure option. Such a selection effect is also empirically supported (see BOWEN et al. 2015).

However, socialization effects are an integral part of person-organization fit theory, as well: Individuals tend to adapt their personality to the organization in order to increase the fit between person and organization (see CHATMAN 1991; KRISTOF 1996). There is some evidence of socialization processes among preservice teachers in their educational trainings (see BLOMBERG/STÜRMER/SEIDEL 2011), which may suggest that socialization processes occur during the teaching employment as well.

4.3 Method

4.3.1 Sample

The present study is based on the 2005–2016 waves of the Socio-Economic Panel (SOEP) (see WAGNER/FRICK/SCHUPP 2007). The SOEP is a representative longitudinal data set of Germany's population that includes personal biographies and occupational trajectories. The survey is conducted by the German Institute for Economic Research

(DIW). In 1984, a large number of households in West Germany, encompassing approximately 12,000 individuals, have been randomly selected for the survey. Each person in the household independently answers person-related questions. In principle, the same households and individuals answer the survey each year. To compensate for sample attrition and to include the East part of Germany since 1990, new households and individuals have been added to the SOEP data set since then.

Motives and personality traits have been systematically included in the SOEP since 2005, which is the starting point of our analysis. Due to its sample size and representativeness, the SOEP is a useful data set for the present analysis of differences between teachers and other employees. We used the same data set (waves 2005–2014) to analyze public versus private sector employment (see AYAITA/GÜLAL/YANG 2018). The longitudinal nature of the data set and the use of twelve waves make it possible to extend the important contribution by DOHMEN/FALK (2010) on risk aversion and the teaching profession, which is mainly based on the 2004 wave of the SOEP.

To achieve a sample that is sufficiently homogenous with respect to basic work-related and biographical characteristics of teachers and other individuals, we use for our analysis only observations of those who are employed full- or part-time, not self-employed, and holding an upper secondary school degree and college degree. We also exclude apprentices, interns, and those people working in special programs for unemployed. The choices are based on existing precedent (see AYAITA/GÜLAL/YANG 2018: 12; DOHMEN/FALK 2010: 264). With respect to the sample restrictions, we differ from AYAITA/GÜLAL/YANG (2018) only by excluding individuals who have no upper secondary school degree or no college degree. An upper secondary school degree and a college degree is the regular educational pathway to be allowed to teach at school in Germany: The two conditions are fulfilled by 83.5% of teachers in the representative data set.

In contrast to our study on public sector employment, where public and private sector employees are compared within different branches (see AYAITA/GÜLAL/YANG 2018), in the present study we must precisely operationalize who counts as a teacher. We define teachers as those teaching at primary, secondary, or vocational school. Higher education teachers (e.g., professors), teachers for adult education, and other teachers such as skiing instructors are not counted as teachers for the purposes of this study. To make sure that college teachers and professors are not counted as teachers, all not further specified teachers who have a doctoral degree (PhD degree) are excluded from the analyses; these are

1.21% of the not further specified teachers. Teachers with a PhD degree are included only if the school track at which they work is denoted (primary, secondary, or vocational).

The final sample comprises 16,170 observations of 3,213 different employees. Each individual is observed over several years – 5.0 years on average – with each year counting as an additional observation (see also subchapter 4.3.3 for details of the analysis). Of all observations, 2,553 relate to teachers (15.8%).

4.3.2 Measures

The first dependent variable *Risk aversion* captures the extent to which an individual is generally willing to take risks or tends to avoid risks (on an eleven-point Likert scale). This is an accepted measure of risk aversion (see DOHMEN et al. 2005; DOHMEN/FALK 2010), which we also used in previous research (see AYAITA/GÜLAL/YANG 2018). An additional variable, *Occupation-related risk aversion*, captures the tendency to avoid risks specifically in the context of one's occupational career (also on an eleven-point Likert scale). The same measure is used in PFEIFER (2011) and AYAITA/GÜLAL/YANG (2018). Both variables are recoded so that higher values correspond to higher risk aversion.

The main explanatory variable *Teaching* is a binary variable and captures whether an individual is working in the teaching profession at school (value 1) or in another occupation (value 0). The respondents first specified their exact current occupation in open response format. The answers were then classified into different occupations, including teaching occupations, by the German Institute for Economic Research.

As control variables we include several factors that may reasonably be related both to risk aversion and to teaching profession. First, we consider work experience in full-time jobs (in years) and work experience in part-time jobs (in years). These variables capture the whole work experience of an individual up to a certain year and are not restricted to work experience that is accumulated during the time span of observation (2005–2016). Second, we consider biographical data: age, gender, marital status, German citizenship, and migration background. These choices are identical to those made in AYAITA/GÜLAL/YANG (2018).

Analogously to AYAITA/GÜLAL/YANG (2018), we also include some other motives as control variables. On the one hand, prosocial motivation is considered as a counterpart to risk aversion. Prosocial motivation describes the willingness to support the well-being of others (see GRANT 2008) and captures an important aspect of intrinsic motivation as a

driver for a career (see, e.g., WATT et al. 2012; WATT/RICHARDSON 2007). Two types of prosocial motivation are included, which have been shown to be significantly related to public sector employment (see AYAITA/GÜLAL/YANG 2018; DUR/ZOUTENBIER 2015): “civic virtue” (ORGAN 1988: 12f.), the willingness to be socially and/or politically committed, and altruism, the desire to be there for others. On the other hand, financial motivation is included (the subjective importance of being able to afford things for oneself), because some individuals may choose the teaching career for financial reasons or, vice versa, choose a non-teaching career for financial reasons. Financial motivation has been shown to be slightly negatively related to public sector employment in comparison to private sector employment (see AYAITA/GÜLAL/YANG 2018).

Furthermore – again equivalently to AYAITA/GÜLAL/YANG (2018) – we consider the Big Five personality traits as control variables, which constitute a coherent measure of personality traits, consisting of the traits openness, conscientiousness, extraversion, agreeableness, and neuroticism (see GOLDBERG 1993). Personality traits are relatively enduring patterns of thinking, feeling, and acting (see ROBERTS 2009: 140). The Big Five personality traits have been shown to be relevant for public sector employment (see AYAITA/GÜLAL/YANG 2018; DOHMEN/FALK 2010) and for working in the teaching profession (see DOHMEN/FALK 2010). The SOEP includes short measures of the Big Five traits (see GERLITZ/SCHUPP 2005; HAHN/GOTTSCHLING/SPINATH 2012). The shortness of the scales comes at the expense of moderate internal consistencies, but these scales have been shown to be highly correlated with more comprehensive scales (see DENISSEN et al. 2018; HAHN/GOTTSCHLING/SPINATH 2012). Each trait is built by calculating the average of the three items that measure this trait. Items that are negatively related to the construct are recoded beforehand.

The operationalization of each variable is shown in Table 4.1.³⁴

³⁴ The original items are in German. All items and recommended English translations are accessible at DIW BERLIN/SOEP (2017). As in AYAITA/GÜLAL/YANG (2018), we deviate from the official translations, offered by the German Institute for Economic Research, in two cases. First, we slightly deviate from the official translation of occupation-related risk aversion (see TNS INFRATEST SOZIALFORSCHUNG 2014: 68), because this translation does not explicitly state the career context as it is included in the original German item, which asks for the readiness to take risks in the occupational career (31). Second, we slightly deviate from the official translation of

Table 4.1: Operationalization of variables

Variable	Item	Scale
<u>Dependent variables</u>		
Risk aversion	<ul style="list-style-type: none"> • Would you describe yourself as someone who tries to avoid risks (risk-averse) or as someone who is willing to take risks (risk-prone)? 	Ordinal (0–10)
Occupation-related risk aversion	<ul style="list-style-type: none"> • How would you rate your willingness to take risks in the following areas? – in your occupational career? 	Ordinal (0–10)
<u>Main explanatory variable</u>		
Teaching	<ul style="list-style-type: none"> • What is your current position/occupation? Please state the exact title in German. 	Dummy
<u>Control variables</u>		
Experience (full-time)	<ul style="list-style-type: none"> • Are you currently employed full-time? 	Metric
Experience (part-time)	<ul style="list-style-type: none"> • Are you currently employed part-time? 	Metric
Age	<ul style="list-style-type: none"> • Your birth year 	Metric
Female	<ul style="list-style-type: none"> • Your sex 	Dummy
Married	<ul style="list-style-type: none"> • What is your marital status? 	Dummy
German citizenship	<ul style="list-style-type: none"> • Do you have German citizenship? 	Dummy
Migration background	<ul style="list-style-type: none"> • Do you have direct or indirect migration background? 	Dummy
Civic virtue	<ul style="list-style-type: none"> • Different things are important to different people. How important are the following things to you? – Being politically and/or socially committed 	Ordinal (1–4)
Altruism	<ul style="list-style-type: none"> • How important are the following things to you? – Being there for others 	Ordinal (1–4)
Financial motivation	<ul style="list-style-type: none"> • How important are the following things to you? – Being able to afford things for myself 	Ordinal (1–7)
Openness	<ul style="list-style-type: none"> • I am original, someone who comes up with new ideas. • I am someone who values artistic, aesthetic experiences. • I am imaginative. 	Ordinal (1–7)
Conscientiousness	<ul style="list-style-type: none"> • I am a thorough worker. • I am somewhat lazy. • I am effective and efficient in completing tasks. 	Ordinal (1–7)
Extraversion	<ul style="list-style-type: none"> • I am communicative, talkative. • I am outgoing, sociable. • I am reserved. 	Ordinal (1–7)
Agreeableness	<ul style="list-style-type: none"> • I am forgiving. • I am reserved. • I am considerate and kind to others. 	Ordinal (1–7)
Neuroticism	<ul style="list-style-type: none"> • I am a worrier. • I am nervous. • I am relaxed, able to deal with stress. 	Ordinal (1–7)

civic virtue (see DIW BERLIN/SOEP (Ed.) 2013: 42), because this translation does not fully capture the contribution to society as it is included in the original German item (5).

Different variants of the experience variables are used for the analysis of socialization versus selection effects. First, to test whether experience moderates the association between teaching and risk aversion, we aim at one coherent measure of work experience. For this purpose, we build a variable for overall work experience (*Experience*) that sums up the experience in full-time jobs and the experience in part-time jobs for each individual (again the whole work experience, not only experience accumulated between 2005 and 2016). Hereby, each year of full-time experience is counted fully, while each year of part-time experience is counted as half a year of work experience. The measure of overall work experience is also used in AYAITA/GÜLAL/YANG (2018).

Second, for the socialization analysis with individual fixed effects, we aim at distinguishing the effects of teaching experience and the effects of experience in non-teaching occupations. For this reason, we build the variable *Teaching experience*, which counts, for each individual, the years of experience in teaching occupations from 2005 to 2016 cumulatively. Analogously, the variable *Non-teaching experience* counts the years of experience in non-teaching occupations in this time interval. For example, if an individual is always working as a teacher, then the value of teaching experience increases by 1 unit in each year. The construction of these variables is equivalent to the construction of the variables for public sector work experience and private sector work experience used in previous research (see AYAITA/GÜLAL/YANG 2018).³⁵

4.3.3 Analyses

To test for differences between teaching and other occupations, we first regress risk aversion and occupation-related risk aversion (in two separate regressions) on teaching and the control variables in a multiple linear regression, using the pooled sample with data from 2005 to 2016.³⁶ The model has the following form:

³⁵ These variables can only be used to analyze the effects of increasing experience in teaching and in non-teaching occupations. Absolute values of teaching experience or non-teaching experience are not available, because the complete employment history of individuals is not included in the data set.

³⁶ We do not regress teaching on risk aversion (which would be analogous to AYAITA/GÜLAL/YANG 2018, where we regressed public sector employment on civic virtue), because the distribution of the variable *Teaching* is highly asymmetric: There are much less teachers than non-teachers. Due to the small baseline share of teachers, the marginal effects on teaching would be

$$\begin{aligned}
& \text{Risk aversion}_{it} \\
& = b_0 + b_1 * \text{Teaching}_{it} + b_2 * \text{Experience full time}_{it} + b_3 \\
& * \text{Experience part time}_{it} + b_4 * \text{Age}_{it} + b_5 * \text{Female}_{it} + b_6 \\
& * \text{Married}_{it} + b_7 * \text{German citizenship}_{it} + b_8 \\
& * \text{Migration background}_{it} + b_9 * \text{Civic virtue}_{it} + b_{10} * \text{Altruism}_{it} \\
& + b_{11} * \text{Financial motivation}_{it} + b_{12} * \text{Openness}_{it} + b_{13} \\
& * \text{Conscientiousness}_{it} + b_{14} * \text{Extraversion}_{it} + b_{15} \\
& * \text{Agreeableness}_{it} + b_{16} * \text{Neuroticism}_{it} + b_{17} * \text{Region}_{it} + b_{18} \\
& * \text{Year}_t + e_{it}
\end{aligned}$$

where i is the individual, t is the year, b_0 is the intercept, the different b_k with $1 \leq k \leq 18$ capture the coefficients, and e_{it} is the error term. The vector $Region_{it}$ captures the state of residence (one dummy variable for each German state, with Schleswig-Holstein as the reference category), and the vector $Year_t$ contains year dummies (one dichotomous variable for each year from 2005 to 2015, with 2016 as the baseline year). Both sets of dummy variables are also included in AYAITA/GÜLAL/YANG (2018). In this way, we account for the possibility that both the share of the teaching profession and values of risk aversion may vary across regions and/or across years, which could bias the findings if not controlling for region and year. By including both age and year, we also capture possible cohort effects, because the cohort (year of birth) follows directly from year and age.

All motives and personality traits are z-standardized for the regression analyses so that each has the mean 0 and the standard deviation 1. Heteroscedasticity-robust standard errors are used, because the assumption of homoscedasticity is rejected by a Breusch-Pagan/Cook-Weisberg test ($p < .01$). Standard errors are clustered at individual level to account for the fact that the same individual is observed over several years (see ANTONAKIS et al. 2010: 1098f.).

very small in magnitude, even if the relative increases in the probability of teaching are large. From our experience, this hinders the interpretation of the coefficients. Therefore, we use risk aversion as the dependent variable. From an econometric perspective, this does not make a difference, because no causal direction between risk aversion and teaching is proposed in this analysis. There are separate analyses for selection and socialization effects.

While risk aversion is assessed in every year of the considered time span, except 2005 and 2007, other motives and the personality traits are only assessed in specific and different years (for example, occupation-related risk aversion in 2004, 2009, and 2014, civic virtue and altruism in 2004, 2008, and 2012, and Big Five personality traits in 2005, 2009, and 2013). For this reason, we use the information of those variables from one year also for the following 1–4 years (see also AYAITA/GÜLAL/YANG 2018). For example, for each individual, the value on occupation-related risk aversion from 2004 is used for 2005–2008, until a new value is assessed in 2009. The underlying assumption is that motives and personality traits are relatively stable over a few years. Our approach is conservative in the sense that we do not assume a change in motives before the motive is assessed.³⁷

To test whether teachers tend to differ from other employees even within more homogenous groups of occupations and positions, we use different variations of the model above: In a second pair of regressions (for risk aversion and occupation-related risk aversion), we restrict the sample to individuals in caring jobs (education, health, and social care), so that we compare teachers to others only within this job type. A total of 5,675 observations assigns themselves to caring jobs, of which 44.2% are teaching. Next, we alternatively restrict the sample to those who have a similar occupational status. We use a sample of civil servants (public servants with lifetime tenure), which has 4,076 observations (48.5% of them teaching), and compare teachers to other employees within this sample. Although most teachers are civil servants in Germany (77.5% in our final sample), some are employed as employees of the state without civil servant status (20.0%). This latter case may be an internationally more comparable situation than the civil servant status, which is rather specific to the German context. We therefore use a sample that is

³⁷ We test the assumption of short-term motive stability, using the variable of general risk aversion, which is assessed in almost every year between 2005 and 2016. Risk aversion of an individual is strongly correlated with risk aversion of the same individual in the previous 1–4 years: The correlation with risk aversion one year ago amounts to $r = .65$, with risk aversion two years ago $r = .54$, with risk aversion three years ago $r = .51$, and with risk aversion four years ago $r = .52$ (in each case, $p < .01$). These results suggest that motives are largely stable, although not completely stable, in the short term. As a robustness check, we perform the analyses using only the years in which risk aversion and occupation-related risk aversion are both assessed, so that the assumption of short-term motive stability is not needed (subchapter 4.4.5).

restricted to public servants without civil servant status, which has 3,491 observations (of these, 14.6% are teaching).

Lastly, two different analyses are used to test whether differences between teachers and others are due to selection and/or socialization over the career. In both of these analyses, teachers are compared to all other employees with upper secondary school and college degree – instead of using the different more specific control groups – in order to not overload the analyses.

Because of the small number of individuals that we observe in the year before they start teaching, we cannot make use of these observations to study selection into the teaching profession (in contrast to an analogous method used in AYAITA/GÜLAL/YANG 2018). Likewise, because of the small number of individuals who change from the teaching profession to another profession or vice versa, we cannot make use of these cases either to study selection effects (again in contrast to AYAITA/GÜLAL/YANG 2018). Instead, we use another method to study selection and socialization effects: We include the interaction of experience and teaching in the first model outlined above, separately for general risk aversion and occupation-related risk aversion. Here we use the measure of overall work experience, combining experience in full-time jobs and experience in part-time jobs. Note that work experience captures the whole work experience of an individual until a certain year and is not restricted to work experience during the time frame of observation (2005–2016). The coefficient for the variable *Experience x Teaching* estimates how the association between teaching and risk aversion changes with more experience, holding the control variables constant. The coefficient for *Teaching* then only estimates how teaching relates to risk aversion at zero years of experience, that is, when entering the labor market the first time. The approach is comparable to BUURMAN et al. (2012: 284f.) and DUR/ZOUTENBIER (2015: 360f.).

We use a second method to estimate socialization effects (analogously to AYAITA/GÜLAL/YANG 2018). By holding each individual constant with a fixed effect, we can focus on trends over the career and avoid the problem that more experienced individuals may differ from less experienced individuals in unobserved characteristics. Moreover, in the career trend analysis we can clearly distinguish between (increasing) experience in teaching occupations and (increasing) experience in non-teaching occupations, using newly generated variables based on the time span of observation, 2005–2016. The fixed effects analysis calculates how risk aversion of one and the same individual changes with each

additional year of teaching respectively non-teaching experience. We use the following model (see WOOLDRIDGE 2010: 300):

$$\begin{aligned} \text{Risk aversion}_{it} & \\ &= \beta_0 + \beta_1 * \text{Teaching experience}_{it} + \beta_2 \\ & * \text{Non teaching experience}_{it} + \alpha_i + \varepsilon_{it} \end{aligned}$$

where α_i is the individual fixed effect and ε_{it} is the error term. In contrast to the other models, this model does not include year dummies, because year is highly correlated with the main explanatory variables of this model (experience) when focusing on one and the same individual.

This model is used for general risk aversion and occupation-related risk aversion separately. Both variables are z-standardized. Heteroscedasticity-robust standard errors are used, as the assumption of homoscedasticity is (marginally) rejected by a Breusch-Pagan/Cook-Weisberg test ($p < .10$).

4.4 Results

4.4.1 Descriptive statistics and correlations

Summary statistics of all variables are shown in Table 4.2. Overall, teachers score higher in risk aversion and occupation-related risk aversion than other employees (with comparable education level, that is, only considering those with an upper secondary school degree and college degree). Furthermore, teachers tend to score slightly higher in the measures of prosocial motivation (civic virtue and altruism), and these differences are significant according to t -tests ($p < .01$ in both cases). In contrast, teachers show slightly less financial motivation than other employees, on average ($p < .05$). Teachers also tend to be slightly more open, less conscientious, more extraverted, more agreeable, and more neurotic (emotionally instable) ($p < .01$ in both cases). The directions of these differences between teachers and other employees are in line with the differences between public and private sector employees found in AYAITA/GÜLAL/YANG (2018). But the differences in risk aversion (general and occupation-related) are much more pronounced between teachers and other employees than between public and private sector employees.

Table 4.2: Descriptive statistics: Means and standard deviations

Variable	Teachers ($n_1 = 2,553$ observations)		Non-teaching employees ($n_2 = 13,617$ observations)		<i>p</i> -value of mean difference (two-sided <i>t</i> -tests)
	Mean	Std. dev.	Mean	Std. dev.	
<u>Dependent variables</u>					
Risk aversion	5.708	2.060	5.191	2.075	.000
Occupation-related risk aversion	6.685	2.404	5.633	2.316	.000
<u>Control variables</u>					
Experience (full-time)	16.013	11.713	16.239	10.992	.347
Experience (part-time)	5.637	7.278	2.698	4.513	.000
Age	48.597	10.534	45.013	10.296	.000
Female	0.683	0.465	0.410	0.492	.000
Married	0.708	0.455	0.660	0.474	.000
German citizenship	0.994	0.079	0.988	0.108	.014
Migration background	0.054	0.226	0.086	0.280	.000
Civic virtue	2.458	0.665	2.321	0.701	.000
Altruism	3.321	0.530	3.197	0.550	.000
Financial motivation	2.942	0.526	2.968	0.581	.034
Openness	4.854	1.124	4.682	1.101	.000
Conscientiousness	5.711	0.883	5.804	0.847	.000
Extraversion	4.950	1.139	4.743	1.155	.000
Agreeableness	5.497	0.826	5.316	0.911	.000
Neuroticism	3.790	1.206	3.570	1.158	.000

Correlations between the motives and personality traits considered in the present study are shown in Table 4.3. (General) risk aversion is moderately correlated with occupation-related risk aversion ($r = .44$). The risk aversion measures show small correlations with the control variables civic virtue (negative correlations) and altruism (positive correlations). The correlations between different motives are very similar to those found in AYAITA/GÜLAL/YANG (2018). The relation between the risk aversion measures and the Big Five personality traits are mostly small ($|r| < .20$), except for a moderate positive correlation between general risk aversion and neuroticism ($r = .22$).

Table 4.3: Correlations between motives and personality traits

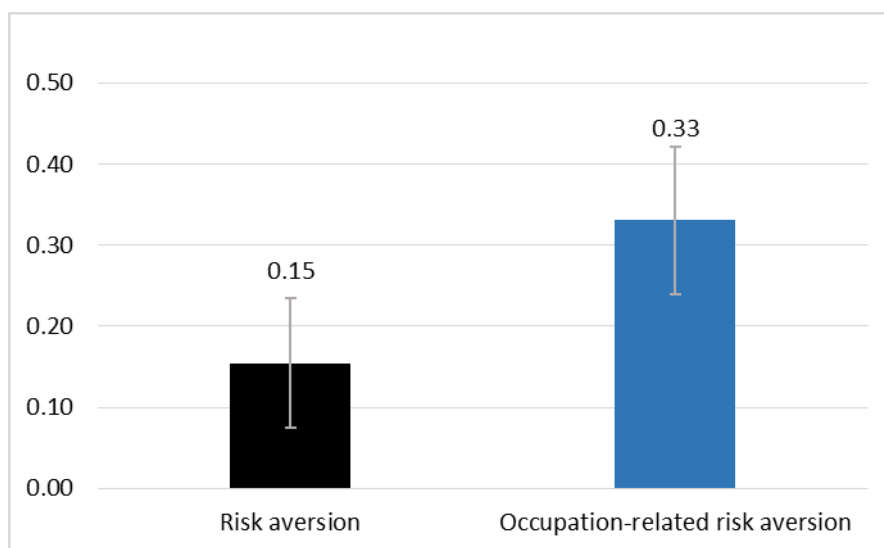
Variables	1	2	3	4	5	6	7	8	9	10
1 Risk aversion	1.00									
2 Occ.-related risk aversion	.45**	1.00								
3 Civic virtue	-.10**	-.06**	1.00							
4 Altruism	.03**	.03**	.19**	1.00						
5 Financial motivation	.02*	-.01	-.09**	.10**	1.00					
6 Openness	-.18**	-.14**	.19**	.12**	-.03**	1.00				
7 Conscient.	-.02**	-.02*	.03**	.07**	.07**	.14**	1.00			
8 Extraversion	-.19**	-.14**	.13**	.19**	.09**	.35**	.15**	1.00		
9 Agreeableness	.05**	.09**	.07**	.19**	-.04**	.14**	.22**	.08**	1.00	
10 Neuroticism	.22**	.12**	-.04**	.01	.03**	-.04**	-.14**	-.15**	-.15**	1.00

SOEP sample of employees in Germany with upper secondary school and college degree (2005–2016), $N = 16,170$ observations. ** $p < .01$. * $p < .05$. + $p < .10$.

4.4.2 Teaching and risk aversion in the pooled sample

The results of the first analysis are presented in Figure 4.1, where teachers are compared to all other employees with similar education level (upper secondary school degree and college degree) in the full sample from 2005 to 2016, using all control variables. Teaching relates positively to (general) risk aversion and, significantly stronger, to risk aversion with respect to occupational career. Compared to non-teaching, teaching is associated with a 0.15 standard deviations higher value in risk aversion (which are 0.32 points on the eleven-point Likert scale) and with a 0.33 standard deviations higher value in occupation-related risk aversion (0.77 points on the eleven-point Likert scale), on average. Each of these two coefficients is significant with $p < .01$.

The coefficients for the control variables are shown in Table 4.4.

Figure 4.1: Teaching profession and risk aversion

Coefficients from multiple linear regressions, with a z-standardized measure of risk aversion as the dependent variable and teaching (1 = yes, 0 = no) as the main explanatory variable. 95% confidence intervals. All control variables included: experience (full-time), experience (part-time), age, female, married, German citizenship, migration background, civic virtue, altruism, financial motivation, openness, conscientiousness, extraversion, agreeableness, and neuroticism. Region and year dummies included as well. SOEP sample of employees in Germany with upper secondary school and college degree (2005–2016), $N = 16,170$ observations. Robust standard errors clustered at the individual level.

Table 4.4: Teaching profession and risk aversion

Variables	(1) Risk aversion	(2) Occupation-related risk aversion
Teaching	0.154** (0.041)	0.331** (0.046)
Experience (full-time)	-0.003 (0.004)	-0.006 (0.004)
Experience (part-time)	0.000 (0.005)	0.001 (0.005)
Age	0.004 (0.004)	0.017** (0.004)
Female	0.296** (0.033)	0.176** (0.039)
Married	0.077* (0.030)	0.071* (0.035)
German citizenship	0.132 (0.126)	-0.050 (0.153)
Migration background	-0.109+ (0.058)	-0.093 (0.062)
Civic virtue	-0.055** (0.014)	-0.061** (0.015)
Altruism	0.030* (0.013)	0.037* (0.015)
Financial motivation	0.023+ (0.013)	0.013 (0.014)
Openness	-0.145** (0.014)	-0.119** (0.016)
Conscientiousness	0.020 (0.014)	-0.007 (0.016)
Extraversion	-0.150** (0.015)	-0.112** (0.017)
Agreeableness	0.083** (0.014)	0.112** (0.016)
Neuroticism	0.171** (0.015)	0.087** (0.016)
Constant	-0.279 (0.185)	-0.320 (0.226)
Observations	16,170	16,170
R-squared	0.167	0.135

All motives and personality traits are z-standardized. Robust standard errors clustered at the individual level in parentheses. See description of Figure 4.1 for details of the analysis. ** $p < .01$. * $p < .05$. + $p < .10$.

4.4.3 Teaching and risk aversion within more homogenous samples

In the next step, teachers are compared to other employees within narrower groups of occupations. The results are shown in Figure 4.2. When the sample is restricted to caring jobs (comprising education, health, and social care) and teachers are compared to other employees within this job type (filled bars), using all control variables, then the positive association between teaching profession and (general) risk aversion remains significant ($p < .01$) and is estimated to 0.14 standard deviations. The relationship between teaching and occupation-related risk aversion remains significant as well ($p < .01$) and is estimated to 0.29 standard deviations. These estimated effect sizes are both similar to the results in the full sample.

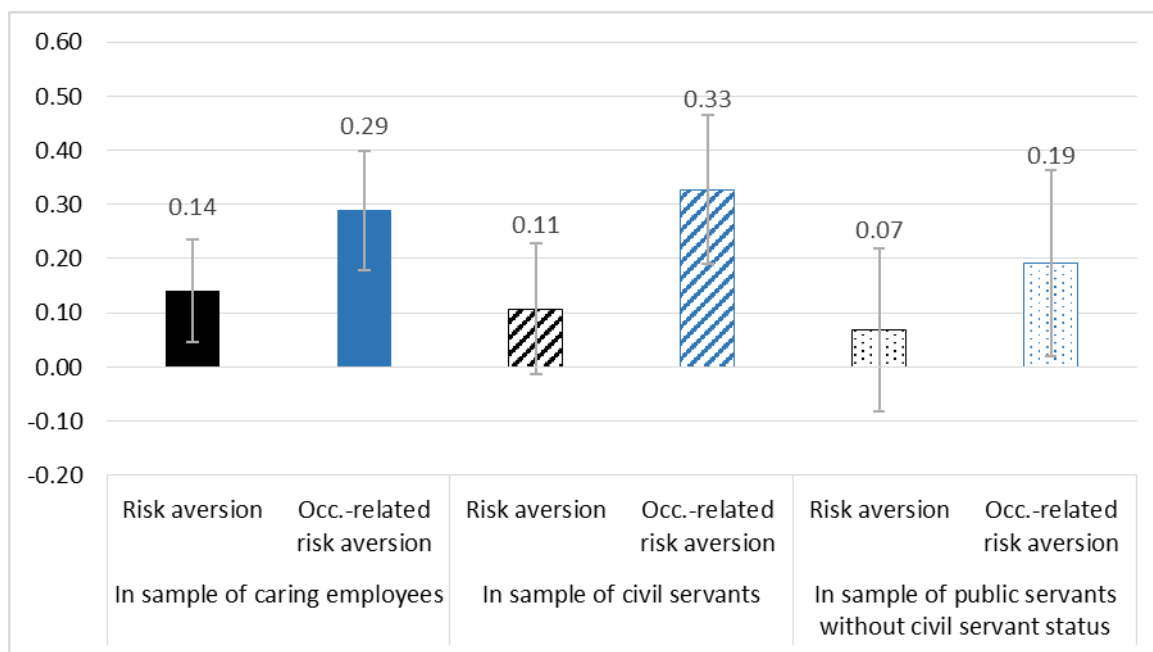
When the sample is restricted to civil servants only (public servants with lifetime tenure) and teaching civil servants are compared to other civil servants (striped bars), including all control variables, then the relationship between teaching and (general) risk aversion is only marginally significant ($p < .10$), and the point estimate is 0.11 standard deviations. However, occupation-related risk aversion is still considerably and significantly higher among teachers compared to other occupations, on average, even within the group of civil servants (0.33 standard deviations, $p < .01$). Overall, these results are in line with our theoretical expectation that risk aversion is in part a typical characteristic of civil servants in general.

Lastly, we compare teaching employees to other employees within the group of public servants who do not have civil servant status (that is, employees of the state without lifetime tenure). Although most teachers in Germany are civil servants and only 20.0% of the teachers in our final sample are public servants without civil servant status, this occupational status may be internationally more comparable. As the dotted bars indicate, there is no significant association between teaching profession and (general) risk aversion in this group, when all control variables are included. There is, however, a significant positive association between teaching and occupation-related risk aversion (0.19 standard deviations, $p < .05$). These results further support the idea that risk aversion is to some extent typical for individuals with public servant status and not entirely specific to teachers. However, we note that these last findings should be treated with caution, because teachers without civil servant status in Germany might deviate from other teachers (nationally and internationally) in crucial characteristics. In most German states, such an occupational

status for teachers is usually involuntary, is only accepted if other options did not work, and is associated with a temporary work contract of short duration.

The coefficients for the control variables are shown in Table 4.5.

Figure 4.2: Teaching profession and risk aversion in more homogenous samples



Coefficients from multiple linear regressions, with a z-standardized measure of risk aversion as the dependent variable and teaching (1 = yes, 0 = no) as the main explanatory variable. 95% confidence intervals. The two models on the left are restricted to employees in caring jobs (comprising education, health, and social care), $n_I = 5,675$ observations. The two models in the middle are restricted to civil servants (public servants with lifetime tenure), $n_{II} = 4,076$ observations. The two models on the right are restricted to employees of the state without civil servants status, $n_{III} = 3,491$ observations. All control variables, region and year dummies included. Robust standard errors clustered at the individual level.

Table 4.5: Teaching profession and risk aversion in more homogenous samples

Variables	Caring jobs (education, health, social care)		Civil servants (public servants with tenured position)		Public servants without civil servant status	
	(1) Risk aversion	(2) Occupation-related risk aversion	(3) Risk aversion	(4) Occupation-related risk aversion	(5) Risk aversion	(6) Occupation-related risk aversion
Teaching	0.141** (0.048)	0.288** (0.056)	0.107+ (0.062)	0.327** (0.070)	0.069 (0.077)	0.191* (0.088)
Experience (full-time)	-0.003 (0.005)	-0.001 (0.006)	0.005 (0.008)	0.008 (0.009)	0.001 (0.007)	0.000 (0.009)
Experience (part-time)	0.003 (0.007)	0.005 (0.008)	0.010 (0.009)	0.013 (0.010)	0.009 (0.010)	0.003 (0.011)
Age	0.002 (0.005)	0.014* (0.006)	-0.006 (0.007)	0.001 (0.008)	-0.003 (0.006)	0.011 (0.008)
Female	0.250** (0.055)	0.157* (0.066)	0.282** (0.067)	0.206* (0.080)	0.217** (0.063)	0.131+ (0.076)
Married	0.094+ (0.050)	0.100 (0.061)	0.186** (0.063)	0.187* (0.081)	0.077 (0.060)	0.048 (0.069)
German citizenship	0.028 (0.217)	0.006 (0.250)	-0.098 (0.252)	0.166 (0.313)	0.139 (0.225)	-0.074 (0.309)
Migration background	-0.314** (0.105)	-0.216+ (0.117)	-0.366* (0.157)	-0.405* (0.202)	-0.187+ (0.111)	-0.080 (0.112)
Civic virtue	-0.063** (0.023)	-0.076** (0.025)	-0.071* (0.029)	-0.050+ (0.029)	-0.083** (0.026)	-0.063* (0.031)
Altruism	0.003 (0.021)	0.037 (0.024)	-0.032 (0.029)	0.037 (0.031)	0.037 (0.026)	0.014 (0.030)
Financial motivation	0.036+ (0.021)	0.049* (0.024)	0.046+ (0.027)	0.051+ (0.029)	0.017 (0.025)	0.019 (0.029)
Openness	-0.159** (0.023)	-0.149** (0.028)	-0.111** (0.028)	-0.109** (0.032)	-0.163** (0.029)	-0.173** (0.036)
Conscientiousness	0.019 (0.024)	-0.015 (0.027)	0.038 (0.028)	-0.030 (0.032)	-0.037 (0.029)	0.000 (0.033)
Extraversion	-0.142** (0.026)	-0.073* (0.032)	-0.140** (0.030)	-0.149** (0.036)	-0.114** (0.029)	-0.039 (0.038)
Agreeableness	0.055* (0.022)	0.097** (0.028)	0.085** (0.028)	0.095** (0.035)	0.081** (0.029)	0.125** (0.035)
Neuroticism	0.168** (0.023)	0.107** (0.028)	0.158** (0.029)	0.059+ (0.031)	0.159** (0.030)	0.101** (0.035)
Constant	0.055 (0.301)	-0.441 (0.362)	0.292 (0.349)	-0.110 (0.438)	0.060 (0.359)	0.202 (0.457)
Observations	5,675	5,675	4,076	4,076	3,491	3,491
R-squared	0.184	0.162	0.202	0.166	0.155	0.127

All motives and personality traits are z-standardized. Robust standard errors clustered at the individual level in parentheses. See description of Figure 4.2 for details of the analysis. ** $p < .01$. * $p < .05$. + $p < .10$.

4.4.4 Selection and socialization

To find out whether differences between teachers and other employees are due to (self-) selection and/or due to socialization, in the next step we include the interaction of experience and teaching in the full regression model with control variables. We thereby test whether and how the effect of teaching changes with experience and whether teaching remains significantly related to risk aversion even with no year of work experience. In order to not overload the analysis, we compare teachers to all other employees with comparable education level (upper secondary school and college degree) and do not vary the reference group. The measure of overall work experience is used, combining full-time and part-time work experience. The results are shown in Table 4.6.

Model (1) explains (general) risk aversion. As the coefficient for *Teaching* shows, teaching relates positively to (general) risk aversion when work experience is equal to zero, holding the control variables constant (0.15 standard deviations, $p < .05$). There is no interaction effect of work experience and teaching on (general) risk aversion, meaning that the relationship between teaching and risk aversion does apparently not depend on experience. These results show that, in line with our theoretical expectation, selection explains teachers' higher average (general) risk aversion. In contrast, we do not find evidence on socialization effects for teachers' higher (general) risk aversion.

For occupation-related risk aversion (model (2)), we also find a selection effect, as teaching relates positively to occupation-related risk aversion with no year of work experience, holding the control variables constant (0.19 standard deviations, $p < .05$). In addition, as the interaction of experience and teaching shows, higher work experience is associated with a larger effect of teaching on occupation-related risk aversion: With each additional year of work experience, the relationship between teaching and occupation-related risk aversion increases by 0.008 standard deviations, on average ($p < .05$). These results suggest that teachers' higher occupation-related risk aversion is explained by selection and socialization.³⁸

³⁸ A multicollinearity problem might occur because age and experience are related to each other and are included together: Because a part of the experience effect might appear in the age coefficient, the analysis in Table 4.6 could potentially underestimate the magnitude of experience effects. We therefore check whether the results in Table 4.6 change if we exclude age. The pattern of results does not change, except that the interaction effect of experience and teaching is only

Table 4.6: Selection and socialization

Variables	(1) Risk aversion	(2) Occupation-related risk aversion
Teaching	0.150* (0.076)	0.186* (0.084)
Experience	-0.005 (0.003)	-0.010* (0.004)
Experience x Teaching	0.000 (0.003)	0.008* (0.004)
Age	0.005 (0.003)	0.020** (0.004)
Female	0.301** (0.032)	0.185** (0.038)
Married	0.077* (0.030)	0.074* (0.035)
German citizenship	0.134 (0.126)	-0.049 (0.152)
Migration background	-0.109+ (0.059)	-0.094 (0.062)
Civic virtue	-0.054** (0.013)	-0.060** (0.015)
Altruism	0.029* (0.013)	0.036* (0.015)
Financial motivation	0.023+ (0.013)	0.013 (0.014)
Openness	-0.145** (0.014)	-0.119** (0.016)
Conscientiousness	0.020 (0.014)	-0.008 (0.016)
Extraversion	-0.150** (0.015)	-0.111** (0.017)
Agreeableness	0.083** (0.014)	0.113** (0.016)
Neuroticism	0.171** (0.015)	0.087** (0.016)
Constant	-0.303+ (0.183)	-0.345 (0.221)
Observations	16,170	16,170
R-squared	0.167	0.136

Multiple linear regressions. Dependent variable: general risk aversion (model (1)) respectively occupation-related risk aversion (model (2)). The main explanatory variable *Teaching* is 1 if an individual is teaching and 0 for all other professions. All motives and personality traits are z-standardized. Each year of part-time work experience is counted as half a year of experience. Both models include region and year dummies. Robust standard errors clustered at the individual level in parentheses. ** $p < .01$. * $p < .05$. + $p < .10$.

marginally significant ($p < .10$) in the model for occupation-related risk aversion.

To test socialization effects more robustly, we finally assess changes in risk aversion within each individual for increasing teaching experience and for increasing experience in non-teaching occupations, where the individual is held constant by including an individual fixed effect. Again, all employees with an upper secondary school and college degree are included. The results are shown in Table 4.7.

General risk aversion increases by 0.019 standard deviations with each additional year of teaching experience, while it increases by 0.015 standard deviations with each additional year of non-teaching work experience, on average. Risk aversion with respect to occupational career increases by 0.038 standard deviations with each additional year of teaching experience and by 0.028 standard deviations with each additional year of non-teaching work experience. While these results suggest that socialization processes may indeed contribute to teachers' higher average risk aversion compared to other occupations, we note that in both models the difference between the effect of teaching experience and the effect of non-teaching experience is not significant.³⁹

³⁹ In the fixed effects analysis presented in Table 4.7, no control variables are used because each individual is already held constant. We nevertheless check whether the results are robust to including all control variables, accounting for the possibility that changes in some characteristics occur that affect both the main explanatory variables (experience) and risk aversion. Only age is not included, because changes in age are highly collinear with changes in experience; for the same reason, year dummies are not included. The pattern of results does not change.

Table 4.7: Fixed effects regressions: Changes in risk aversion within individuals

Variables	(1) Risk aversion	(2) Occupation-related risk aversion
<u>Teaching experience</u>	0.019** (0.007)	0.038** (0.010)
<u>Non-teaching experience</u>	0.015** (0.003)	0.028** (0.004)
Constant	-0.064** (0.013)	-0.124** (0.016)
Observations	16,170	16,170
R-squared	0.004	0.021

Multiple linear regressions with individual fixed effects. Dependent variable: z-standardized general risk aversion (model (1)) respectively z-standardized occupation-related risk aversion (model (2)). The explanatory variable Teaching experience captures the years of experience in teaching occupations cumulatively between 2005 and 2016, and the explanatory variable Non-teaching experience captures the years of experience in any other occupations cumulatively between 2005 and 2016. Robust standard errors in parentheses. ** $p < .01$. * $p < .05$. + $p < .10$.

4.4.5 Robustness check

We test whether the results are robust to restricting the analysis to those years in which risk aversion and occupation-related risk aversion are both assessed (2009 and 2014) instead of using information on motives from one year also for the next 1–4 years, as it is done in the analyses above, particularly for occupation-related risk aversion. In the smaller sample including only 2009 and 2014, the results in the pooled sample, comparing teachers to all other employees with respect to general and occupation-related risk aversion, remain qualitatively unchanged (see Table 4.8).

Within the more homogenous groups, two smaller changes occur. First, the association between teaching and general risk aversion within the group of civil servants increases (according to the point estimate) and becomes significant at the 5% level. Second, in the group of public servants without civil servant status, the association between teaching and occupation-related is not significant anymore. All other results of this analysis are equivalent to the baseline results. (See Table 4.9.)

In the analysis of selection and socialization, the selection effect for general risk aversion (association between teaching and general risk aversion when there is no year of work experience) is not significant anymore. However, there remains a significant selection effect for occupation-related risk aversion. The socialization effect for occupation-

related risk aversion (interaction of experience and teaching) is not significant anymore. While these changes may be due to the reduction in statistical power, they also indicate that the evidence on selection, in particular for occupation-related risk aversion, is more robust than the indications of socialization effects. (See Table 4.10.)

In the fixed effects analysis, the point estimates and partly the direction of effects change, which may be due to the fact that information from many years, including the information on occupation-related risk aversion from 2004, are not included anymore. However, the relation between the effects of increasing teaching experience and increasing non-teaching experience remains robust: The estimated effects of teaching experience on general and occupation-related risk aversion are larger than the estimated effects of non-teaching experience. As in the baseline analysis, the differences between teaching and non-teaching experience are not significant. (See Table 4.11.)

Table 4.8: Robustness check: Teaching profession and risk aversion, only including the years 2009 and 2014

Variables	(1) Risk aversion	(2) Occupation-related risk aversion
Teaching	0.236** (0.062)	0.369** (0.064)
Experience (full-time)	-0.008 (0.006)	-0.006 (0.006)
Experience (part-time)	-0.004 (0.008)	0.001 (0.008)
Age	0.012* (0.006)	0.019** (0.006)
Female	0.278** (0.049)	0.227** (0.050)
Married	0.107* (0.047)	0.067 (0.049)
German citizenship	0.473* (0.218)	0.129 (0.260)
Migration background	-0.004 (0.083)	-0.130 (0.080)
Civic virtue	-0.060** (0.023)	-0.051* (0.023)
Altruism	0.042+ (0.024)	0.033 (0.025)
Financial motivation	-0.022 (0.022)	-0.004 (0.022)
Openness	-0.128** (0.023)	-0.137** (0.023)
Conscientiousness	0.098** (0.023)	0.019 (0.023)
Extraversion	-0.154** (0.023)	-0.104** (0.025)
Agreeableness	0.088** (0.023)	0.110** (0.023)
Neuroticism	0.129** (0.023)	0.088** (0.024)
Constant	-0.678* (0.315)	-0.825* (0.353)
Observations	1,872	1,872
R-squared	0.176	0.154

** $p < .01$. * $p < .05$. + $p < .10$.

Table 4.9: Robustness check: Teaching profession and risk aversion in more homogenous samples, only including the years 2009 and 2014

Variables	Caring jobs (education, health, social care)		Civil servants (public servants with tenured position)		Public servants without civil servant status	
	(1) Risk aversion	(2) Occupation-related risk aversion	(3) Risk aversion	(4) Occupation-related risk aversion	(5) Risk aversion	(6) Occupation-related risk aversion
Teaching	0.211** (0.077)	0.314** (0.081)	0.246* (0.095)	0.353** (0.104)	0.043 (0.133)	0.143 (0.137)
Experience (full-time)	-0.002 (0.009)	-0.002 (0.009)	0.013 (0.011)	0.017 (0.013)	-0.011 (0.012)	-0.003 (0.013)
Experience (part-time)	0.000 (0.011)	-0.001 (0.011)	0.022 (0.014)	0.028+ (0.016)	-0.007 (0.016)	-0.006 (0.017)
Age	0.002 (0.009)	0.017+ (0.009)	-0.013 (0.012)	-0.010 (0.013)	0.014 (0.011)	0.023+ (0.013)
Female	0.225** (0.085)	0.238** (0.088)	0.235* (0.104)	0.277* (0.111)	0.217* (0.106)	0.185+ (0.109)
Married	0.230** (0.079)	0.069 (0.083)	0.355** (0.106)	0.129 (0.117)	0.169+ (0.099)	-0.050 (0.102)
German citizenship	-0.073 (0.388)	0.212 (0.448)	-0.442+ (0.245)	0.246 (0.295)	0.134 (0.411)	-0.214 (0.532)
Migration background	-0.492** (0.133)	-0.326* (0.158)	-0.464* (0.196)	-0.637** (0.243)	-0.266 (0.206)	-0.052 (0.164)
Civic virtue	-0.066+ (0.039)	-0.038 (0.040)	-0.031 (0.046)	-0.032 (0.048)	-0.109* (0.048)	-0.060 (0.053)
Altruism	-0.000 (0.039)	0.002 (0.042)	-0.063 (0.050)	0.001 (0.051)	0.029 (0.047)	0.007 (0.057)
Financial motivation	0.006 (0.036)	0.063 (0.040)	-0.083+ (0.044)	0.045 (0.050)	0.002 (0.046)	0.022 (0.051)
Openness	-0.092* (0.040)	-0.154** (0.041)	-0.110* (0.046)	-0.098* (0.047)	-0.054 (0.055)	-0.185** (0.058)
Conscientiousness	0.109** (0.041)	0.019 (0.040)	0.140** (0.047)	0.034 (0.048)	0.030 (0.052)	-0.023 (0.050)
Extraversion	-0.165** (0.041)	-0.051 (0.044)	-0.103* (0.048)	-0.157** (0.052)	-0.159** (0.054)	-0.034 (0.061)
Agreeableness	0.049 (0.040)	0.099* (0.040)	0.103* (0.047)	0.098* (0.049)	0.039 (0.052)	0.100+ (0.054)
Neuroticism	0.113** (0.038)	0.121** (0.038)	0.138** (0.045)	0.064 (0.047)	0.087+ (0.050)	0.126* (0.054)
Constant	-0.030 (0.532)	-0.816 (0.596)	0.564 (0.483)	0.122 (0.513)	-0.406 (0.634)	-0.189 (0.761)
Observations	661	661	457	457	409	409
R-squared	0.204	0.183	0.226	0.191	0.203	0.148

** $p < .01$. * $p < .05$. + $p < .10$.

Table 4.10: Robustness check: Selection and socialization, only including the years 2009 and 2014

Variables	(1) Risk aversion	(2) Occupation-related risk aversion
Teaching	0.188 (0.117)	0.268* (0.115)
Experience	-0.008 (0.005)	-0.010+ (0.006)
Experience x Teaching	0.003 (0.005)	0.006 (0.006)
Age	0.011* (0.005)	0.022** (0.005)
Female	0.278** (0.048)	0.237** (0.049)
Married	0.108* (0.048)	0.070 (0.049)
German citizenship	0.472* (0.218)	0.130 (0.258)
Migration background	-0.005 (0.083)	-0.132+ (0.080)
Civic virtue	-0.060** (0.023)	-0.050* (0.023)
Altruism	0.042+ (0.024)	0.032 (0.025)
Financial motivation	-0.022 (0.022)	-0.003 (0.022)
Openness	-0.128** (0.023)	-0.137** (0.023)
Conscientiousness	0.098** (0.023)	0.018 (0.023)
Extraversion	-0.154** (0.023)	-0.103** (0.025)
Agreeableness	0.088** (0.023)	0.111** (0.023)
Neuroticism	0.129** (0.023)	0.088** (0.024)
Constant	-0.665* (0.306)	-0.861* (0.343)
Observations	1,872	1,872
R-squared	0.176	0.155

** $p < .01$. * $p < .05$. + $p < .10$.

Table 4.11: Robustness check: Fixed effects regressions: Changes in risk aversion within individuals, only including the years 2009 and 2014

Variables	(1) Risk aversion	(2) Occupation-related risk aversion
<u>Teaching experience</u>	-0.014 (0.045)	0.058 (0.052)
<u>Non-teaching experience</u>	-0.075** (0.025)	-0.014 (0.028)
Constant	0.529** (0.082)	0.098 (0.093)
Observations	1,872	1,872
R-squared	0.119	0.012

** $p < .01$. * $p < .05$. + $p < .10$.

4.5 Conclusion

Based on twelve waves of a representative data set and final sample of 16,170 observations in Germany, the present study replicates an earlier finding that being a teacher at schools relates positively to risk aversion in comparison to observationally equivalent employees outside the teaching profession (see DOHMEN/FALK 2010). We show that this relationship is stronger for a specific form of risk aversion – namely, risk aversion with respect to occupational career – where teachers score even higher than other employees who have a very similar occupational status. One reason for this phenomenon might be that teaching is perceived as a rather familiar occupation, which makes it attractive for individuals with a low readiness to take risks in their career. We find evidence that individuals with higher scores in general risk aversion as well as those with higher occupation-related risk aversion are attracted to the teaching profession from career outset (compare BOWEN et al. 2015). In addition, we find tentative evidence that risk aversion, in particular with respect to occupational career, tends to increase over teachers' careers more strongly than for non-teaching employees, on average.

The evidence on teachers' relatively high risk aversion may inform discussions about teacher payment reforms. Because teachers on average have the motive to avoid risks, especially in their occupational career, any flexible payment is likely to reduce their satisfaction and lead to resistance (see BOWEN et al. 2015; DOHMEN/FALK 2010). Because the currently rather fixed payment schemes apparently attract risk-averse individuals to the teaching profession, changes in payment schemes toward performance pay would

probably lead to a change in the composition of the teacher workforce due to a changing self-selection process (see DOHMEN/FALK 2010).

One might even argue that teachers' higher risk aversion is one plausible explanation for many teachers' resistance to reform in general (see TERHART 2013). It is unclear, however, whether more or less risk-averse individuals are better suited for the teaching profession and student outcomes (see DOHMEN/FALK 2010). Risk aversion has been found to be negatively related to the adoption of new, innovative workplace practices among farmers (see ABADI GHADIM/PANNELL/BURTON 2005), but this economic decision is not necessarily comparable to the everyday work of a teacher. Risk aversion has also been determined as a negative predictor of the use of technology in teaching (see HOWARD 2013), but it is not clear whether and how these decisions relate to the ability to use technology in order to enhance students' learning processes. Therefore, it is an open question whether teachers' higher risk aversion predicts resistance toward innovations that would facilitate effective teaching practice. Risk aversion might prevent teachers from implementing inefficient reforms and is presumably important for the avoidance of risks in school excursions and the like.

A main limitation of the present study is the reliance on observational data. While this is highly beneficial for the representativeness, sample size, and comparison groups of the analyses, a disadvantage is that socialization effects can only be approximated in the absence of an experiment or quasi-experiment (natural experiment). Future research might use longitudinal data with a cohort design or exogenous variation in the share of teachers to study socialization effects.

We are additionally restricted in the analysis of selection effects because the sample only includes employees and not university students in teaching versus non-teaching programs or high school students before starting a teacher education program versus another program. These early points in time are very beneficial for the study of selection effects (see ROLOFF HENOCH et al. 2015).

5 Economic Effects of the Field Choice at University: The Role of Selection by Individual Characteristics⁴⁰

5.1 Introduction

Future earnings are one important factor for the choice of a field of study at university (see ARCIDIACONO/HOTZ/KANG 2012; BERGER 1988; LONG/GOLDHABER/HUNTINGTON-KLEIN 2015; MONTMARQUETTE/CANNINGS/MAHSEREDJIAN 2002; XIA 2016). However, researchers mostly rely on descriptive data, which include only few control variables, when estimating the effects of field of study on later earnings (for two reviews of studies in this research area, see ALTONJI/ARCIDIACONO/MAUREL 2016; ALTONJI/BLOM/MEGHIR 2012).

It is therefore important for researchers – and for students who choose their field – to know how the available descriptive evidence on field effects should be interpreted. On the one hand, estimated relationships between field of study and earnings may reflect causal effects of studying and completing particular fields of study: for example, because specific abilities are signaled to the labor market through graduating from particular fields (see SPENCE 1973), students acquire specific knowledge and skills in study programs that enhance productivity (human capital investment), and/or the relationship between labor demand and supply systematically varies across fields. On the other hand, estimated relationships between field of study and earnings may reflect selection effects – rather than effects that are caused by the field – if students with different individual characteristics that are relevant for earnings tend to be systematically selected and tend to self-select into different fields of study.

The present study investigates to what extent associations between field of study and later earnings are due to selection by individual characteristics. We focus on the role of the following individual characteristics before the start of studying at university: educational achievement, cognitive abilities, vocational interests, personality traits, and socioeconomic background. Because there may be additional individual characteristics that create systematic selection effects, our estimates can likely be interpreted as lower-bound

⁴⁰ This chapter is based on the article “Field of Study and Earnings: The Role of Abilities, Personality, and Socioeconomic Background”, written by Adam Ayaita, Marion Spengler, and Ulrich Trautwein. The journal article is in preparation.

estimates for the role of selection by individual characteristics; the actual share of selection effects may even be larger. As net (after-tax) earnings may usually be more relevant for the students (see WALKER/ZHU 2011: 1177), while most existing studies are based on gross (before-tax) earnings, we study both gross earnings and net earnings.

There is some evidence on causal effects of field of study on earnings. These studies use regression discontinuities generated by admission cutoffs (see ANDREWS/IMBERMAN/LOVENHEIM 2017; HASTINGS/NEILSON/ZIMMERMAN 2013; KIRKEBOEN/LEUVEN/MOGSTAD 2016) or exogenous variation in the admission to a particular field of study, as created by an admission lottery (see KETEL et al. 2016) or by a social policy reform (see BERTRAND/HANNA/MULLAINATHAN 2010). However, these approaches have important limitations (see also ALTONJI/ARCIDIACONO/MAUREL 2016 for a discussion). First, they are restricted to particular countries whose regulations make such identification strategies possible. Second, they are sometimes restricted to one specific field of study (see ANDREWS/IMBERMAN/LOVENHEIM 2017; BERTRAND/HANNA/MULLAINATHAN 2010; KETEL et al. 2016). Third, regression discontinuity designs that compare students just above and just below an admission cutoff are restricted to marginal students (as noted by HASTINGS/NEILSON/ZIMMERMAN 2013: 2), so that students at very high or low achievement levels are systematically left out. Fourth, the focus on students near an admission cutoff restricts the sample size considerably. To achieve a sufficiently large sample size, existing studies use a broad set of values around the admission cutoff, so that more than one third of applicants are defined as being close to the cutoff (see HASTINGS/NEILSON/ZIMMERMAN 2013: 16, 30), or even consider all individuals – also those who are not close to each other in their score and therefore not generally comparable – and then include the application score as a control variable (see KIRKEBOEN/LEUVEN/MOGSTAD 2016: 1087–1090).

Because there are only few studies and specific contexts in which causal field effects can be approximated, most of the evidence on the relationships between field of study and earnings is descriptive, and the question to which extent these associations are due to selection (selection bias) remains highly relevant. It has been argued that students in different fields tend to differ from each other with respect to abilities that are relevant for the labor market (see ALTONJI/ARCIDIACONO/MAUREL 2016). Empirical evidence shows that the inclusion of grades and competencies, as measured by educational achievement tests, can change the estimates of field effects substantially (see GRAVE/GÖRLITZ 2012; HAMERMESH/DONALD 2008; KINSLER/PAVAN 2015).

However, existing studies on the relationship between field of study and earnings are mainly based on labor market data and none of them considers extensive psychological and sociological measures as well as their role for the estimated effects. For example, while the results on educational achievement tests are moderately to highly correlated with cognitive abilities, they do not fully capture cognitive abilities (in terms of solving new cognitive tasks, or “fluid intelligence”) but rather reflect a mixture of cognitive abilities, knowledge, and personality traits (see BORGHANS et al. 2011; BORGHANS et al. 2016; FREY/DETTERTMAN 2004; NOFTLE/ROBINS 2007; ROBERTS et al. 2000). Grades are an even more imperfect proxy for cognitive abilities (see BORGHANS et al. 2011; BORGHANS et al. 2016). Because cognitive abilities capture the ability to solve new cognitive problems that one has not been educated for, they may predict studying cognitively more challenging study programs (see PÄBLER/HELL 2012) and are also relevant for the labor market in a changing environment (see SPENGLER et al. 2015; SPENGLER/DAMIAN/ROBERTS 2018). Moreover, existing literature on the relationship between field of study and earnings includes neither vocational interests (see HOLLAND 1997), which are important for the field choice (see PÄBLER/HELL 2012) and which have been shown to affect earnings (see STOLL et al. 2017), nor extensive personality measures such as the Big Five personality traits, which capture general patterns of thinking, feeling, and acting (see COSTA/MCCRAE 1992; ROBERTS 2009). Thus, the present study contributes to the existing literature by including more extensive psychological and sociological data as well as their role for the estimated effects of field of study.

Our analyses are based on the longitudinal TOSCA data set (Transformation of the Secondary School System and Academic Careers; see KÖLLER et al. (Eds.) 2004; TRAUTWEIN et al. (Eds.) 2010), where high school graduates from one state of Germany (Baden-Württemberg) have been tracked over 14 years. A large number of upper secondary schools has been randomly selected for the data set and is approximately representative for the state. The individuals are first observed in the last year of high school (2002), when their individual characteristics (psychological and sociological measures) are assessed. The most current wave is from 2016, when we observe earnings. The final sample of university graduates includes 1,063 individuals.

The empirical analysis with multivariate structural equation models and full-information maximum likelihood shows that the fields of engineering/technology, economics/business, and medicine/health are associated with significantly higher gross earnings

compared to the reference category humanities. Beyond field of study (that is, when including field of study in the model), a significant additional part of the variance in gross earnings is explained by individual characteristics. The point estimates suggest that selection by individual characteristics may account for 15.9–25.7% of the significant relationships between field of study and gross earnings. With respect to net earnings, we first estimate a significant premium not only for engineering/technology, economics/business, and medicine/health, but also for law and teaching. Again, a significant part of the variance is explained by individual characteristics, and the effect of law becomes insignificant in the full model. The estimates suggest that selection by individual characteristics may account for 28.8–47.0% of the significant associations between field of study and net earnings. While our results point to the importance of selection effects, they also show that significant field effects remain even when controlling for all available individual characteristics.

5.2 Theoretical considerations

We focus on the following individual characteristics, of which we argue that they are relevant for choosing and completing particular fields of study as well as for earnings on the labor market.

5.2.1 Educational achievement

One important factor is educational achievement at high school (competencies as measured by standardized achievement tests on the one hand, grades on the other hand). Individuals with higher achievement levels, in particular higher math competencies, may have a larger tendency to graduate from more quantitative fields such as the STEM subjects (science, technology, engineering, and mathematics): Those students may perceive their probability to succeed in these fields as higher, have lower costs in studying these fields (with respect to cognitive costs and time investment/opportunity costs), and be more probable not to fail or to drop out from these programs in case they start studying them.

Descriptive evidence supports this theoretical reasoning. Higher math competencies at the start of higher education and – interestingly – higher verbal competencies, both measured by the respective parts of the SAT (Scholastic Assessment Test), positively predict studying the field of STEM (see ARCIDIACONO 2004: 347f.; KINSLER/PAVAN 2015: 938–940). Individuals with lower scores (math SAT and verbal SAT) are more likely to leave

a STEM program and to leave a economics/business program, while this effect is weaker for other fields (see ARCIDIACONO 2004: 347f.). In addition, those who switch into STEM have higher math scores, on average, than those who switch out of this field; a similar, albeit less pronounced effect is found for the field of economics/business as compared to social sciences/humanities and education (see ARCIDIACONO 2004: 350).

At the same time, competencies are relevant for earnings. Due to their importance for productivity on the labor market and the positive relationship between productivity and earnings, individuals with higher competencies can be expected to receive higher earnings, on average. Empirical evidence supports the positive association between competencies and later earnings (see HECKMAN/STIXRUD/URZUA 2006), which holds for math competencies in particular (see KINSLER/PAVAN 2015: 943).

Beyond competencies, high school grades are relevant for the field choice and for earnings. Admission to some fields of study – medicine, pharmacy, and psychology – strongly depends on the final high school grade due to country-wide regulations in Germany. Moreover, universities can require particular grades for admission to specific programs. Grades are relevant for earnings, even beyond competencies, because they capture a combination of competencies, motivation, and personality traits (for related arguments, see BORGHANS et al. 2011; BORGHANS et al. 2016). Empirically, higher (better) grades have been shown to positively predict earnings (see BORGHANS et al. 2016), even when holding competencies constant (see JENCKS/CROUSE/MUESER 1983: 12).

5.2.2 Cognitive abilities

While educational achievement partly captures the ability to solve problems that one has been educated and trained for, cognitive abilities (in terms of “fluid intelligence”) aim at capturing fully and only the ability to solve new cognitive tasks. The ability to deal with new and cognitively demanding situations is important both for studying at university – in particular for cognitively more challenging programs – and for successful careers in a changing environment. Therefore, cognitive abilities may be relevant for the field choice and for earnings even when holding educational achievement constant.

Cognitive abilities are empirically related to field of study: Numerical abilities have been found to be negatively associated with studying humanities in comparison to natural sciences/mathematics, and verbal and spatial abilities are negatively associated with social sciences in comparison to natural sciences/mathematics (see PÄBLER/HELL 2012). Empirical research further finds a positive association between cognitive abilities and

earnings. In longitudinal samples, cognitive abilities at the end of primary school and at high school are found to have both an indirect effect on future income – via years of education – and a direct effect (see SPENGLER et al. 2015: 1334f.; SPENGLER/DAMIAN/ROBERTS 2018: 633).

5.2.3 Vocational interests

Another important factor is vocational interests according to the RIASEC model, which distinguishes realistic, investigative, artistic, social, enterprising, and conventional interests (see HOLLAND 1997). For example, realistic interests relate to working with physical objects and their functioning, artistic interests relate to languages and creativity, enterprising interests to leading and marketing, and conventional interests to data work and administration.

Vocational interests describe both individuals' preferences for activities and the opportunities, demands, and people in different occupations. Individuals are expected to self-select into those occupations that fit their preferences, because higher fit is thought to positively impact their satisfaction and performance (see STOLL/TRAUTWEIN 2017). As fields of study reflect different domains and tend to be associated with specific occupations, and because different study programs constitute different social groups, vocational interests may be strongly related to the field choice. Empirical findings support a significant relationship between vocational interests and field of study at university, holding cognitive abilities and gender constant (see PÄBLER/HELL 2012).

At the same time, vocational interests may relate to earnings, because some interests (e.g., realistic interests, enterprising interests) are associated with higher economic productivity, while other interests (e.g., artistic interests) may have lower economic value, on average. The relationship between interests and earnings may be driven both by the occupations that individuals choose – even conditional on field of study – and by the specific activities that individuals perform within an occupation (see STOLL et al. 2017). Empirical evidence shows significant associations between vocational interests and future earnings, with positive effects of realistic and enterprising interests and a negative effect of artistic interests, holding educational achievement, cognitive abilities, personality traits, and socio-economic background constant (see STOLL et al. 2017).

5.2.4 Personality traits

While vocational interests are related to specific domains, personality traits capture broad patterns of thinking, feeling, and acting (see ROBERTS 2009). The Big Five model of personality distinguishes the following traits: openness, conscientiousness, extraversion, agreeableness, and neuroticism (see COSTA/MCCRAE 1992).

Personality traits may predict field of study beyond vocational interests. The relationship between personality traits and field of study might occur through the way how different study programs are organized, rather than through the subject matter, which may be more strongly related to interests. For example, each field is associated with specific demands, but some fields may overall be more demanding than other fields and therefore require higher conscientiousness. While conscientiousness is likely beneficial in each field, because it positively predicts academic effort (see NOFTLE/ROBINS 2007; TRAUTWEIN et al. 2009; TRAUTWEIN et al. 2015), it might be more important for some fields, such as the STEM subjects, than for others. Individuals who score higher in that trait will then make other choices even conditional on vocational interests. Likewise, more open individuals may tend to have a preference for fields with a less rigorous curriculum, such as humanities, beyond the interest in specific domains. It has also been argued that personality traits differentially influence the productivity in different occupations, so that students will choose their field of study partly based on their personality traits (see HUMBURG 2017).

Empirical findings support the claim that personality traits are related to the field choice at university (see VEDEL 2016). The most robust findings from a longitudinal study in the Netherlands, in which personality traits are assessed during high school, can be summarized as follows (see HUMBURG 2017: 10): Controlling for gender, openness relates positively to studying law, negatively to social sciences, and positively to humanities, conscientiousness positively predicts medicine/health and negatively social sciences, extraversion is negatively associated with STEM and positively with economics/business and law, agreeableness relates positively to social sciences, and neuroticism negatively predicts STEM and positively humanities.

At the same time, personality traits are relevant for earnings. Because personality traits such as openness, conscientiousness, and extraversion are related to job performance via work motivation and effort (see BARRICK/MOUNT 1991; BARRICK/STEWART/PIOTROWSKI 2002), they are likely to impact earnings as well. Consequentially, the predictive role of

personality traits for earnings is empirically supported (see OZER/BENET-MARTÍNEZ 2006; ROBERTS et al. 2007; SPENGLER forthcoming). When holding educational attainment constant, agreeableness is – interestingly – associated with lower earnings, while neuroticism is associated with lower earnings as well (see NYHUS/PONS 2005). When controlling for educational attainment and cognitive abilities, a positive effect of openness, a positive effect of conscientiousness for women, and a negative effect of agreeableness for men are found (see MÜLLER/PLUG 2006). In a longitudinal study, extraversion positively predicts increases in income over ten years (see SUTIN et al. 2009).

5.2.5 Socio-economic background

Different relationships between socio-economic background and field of study are plausible from a theoretical perspective. A first possibility is that higher socio-economic background increases the probability of studying fields that tend to be financially less promising, such as social sciences and humanities. One argument is that monetary concerns may be less pronounced for these individuals, due to a decreasing marginal utility of earnings at higher levels of given financial resources. Socio-economic background may also positively relate to the expected success and the direct enjoyment from studying cultural subjects (see VAN DE WERFHORST/SULLIVAN/CHEUNG 2003: 45).

A second possibility is that higher socio-economic background positively predicts studying financially more promising fields such as STEM. These students may have a higher expected utility from choosing profitable fields because they want to maintain their status in the presence of loss aversion (see KAHNEMAN/TVERSKY 1979); for example, parental income may constitute a reference point (see VAN DE WERFHORST/SULLIVAN/CHEUNG 2003). In addition, these individuals might have a stronger motive to study financially promising fields such as medicine because they can in some cases take over a parent's firm or doctor's office. More generally, choosing the occupation of a parent is a strategy to reduce risks and may therefore contribute to less intergenerational mobility in the presence of risk aversion.

Empirical findings tend to support both predictions. On the one hand, field choices of students with an academic parental background are less strongly influenced by monetary prospects than the choices of other students (see BOUDARBAT/MONTMARQUETTE 2009). Parental education level – in particular maternal education level – is negatively related to studying natural sciences/mathematics and to studying engineering, when the final high

school grade is held constant (see DURU-BELLAT/KIEFFER/REIMER 2008; REIMER/POLLAK 2010). Parental occupational status is negatively related to natural sciences/mathematics/engineering, when holding competencies constant (see PARKER et al. 2012).

On the other hand, higher parental education level positively predicts studying medicine, law, and humanities (see DURU-BELLAT/KIEFFER/REIMER 2008; REIMER/POLLAK 2010). Parental occupational status is positively related to medicine and law (see PARKER et al. 2012; VAN DE WERFHORST/SULLIVAN/CHEUNG 2003). Taken together, these findings suggest that some financially promising fields such as natural sciences and engineering are attractive choices for individuals with a lower socio-economic background, while specific fields such as medicine and law are often chosen by individuals with a high socio-economic background; humanities tend to be attractive for students with highly educated parents.

Socio-economic background is also related to earnings. There are different mechanisms that may contribute to such a relationship, even within the same field of study: In addition to expectations, aspirations, and networks (see ALEXANDER/ECKLAND/GRIFFIN 1975; JENCKS/CROUSE/MUESER 1983; SEWELL/HALLER/PORTES 1969), socio-economic background may predict direct economic support during higher education and during the beginning occupational career of a student (see MCGUE/RUSTICHINI/IACONO 2017). In line with this reasoning, empirical studies show that even when educational attainment and high school achievement are held constant, socio-economic background (as measured by parental education, income, and occupational status) is a significantly positive predictor of earnings in early adulthood (see CARO/CORTINA/ECCLES 2015; RUMBERGER 2010).

5.3 Method

5.3.1 Sample

Our study is based on the Transformation of the Secondary School System and Academic Careers (TOSCA) data set (see KÖLLER et al. (Eds.) 2004; TRAUTWEIN et al. (Eds.) 2010). This is a longitudinal data set from Germany where a large number of high school graduates is tracked over 14 years so far (2002–2016). While the first wave (2002) observes students in the last year of high school and shortly before graduation, in the most current wave (2016) they are usually settled in the labor market. The study only includes graduates from upper secondary schools (*Gymnasium*), a school track that contains

schools with an academic focus as well as schools with a more vocational focus. Graduates from both types of upper secondary school have direct access to university in Germany, although admission to some fields and programs can require additional criteria such as a specific final high school grade, dependent on country-wide or university-specific regulations. The students graduated from 149 upper secondary schools in one state of Germany (Baden-Württemberg). The schools were randomly selected and are approximately representative of the population of upper secondary schools in this state.

Originally, the questionnaire was distributed to 5,897 students in their high schools in 2002, of which 4,730 filled out the questionnaire. The majority of students (around 3,000) also provided their address to continue participating in the study. In 2012, when detailed information on study programs (type of degree, type of university, and year of study start) were collected, answers from 1,428 individuals were received. In 2016, when earnings, the last completed field of study, and family status were collected, answers from 1,390 individuals were received. Of these, 388 did not respond to the previous questionnaire in 2012.⁴¹

⁴¹ To test the effects of the considerable attrition, we compare individuals who participate in the survey in the last wave (2016) with those who participate in the first wave (2002) but not in the last wave, using *t*-tests. With respect to educational achievement, cognitive abilities, vocational interests, personality traits, and socio-economic background, we compare z-standardized values to achieve differences in terms of Cohen's *d* (see COHEN 1988). Compared to those who do not remain in the sample, individuals who participate in the last wave score higher on math competencies ($d = 0.27, p < .01$), English skills ($d = 0.19, p < .01$), high school GPA ($d = 0.36, p < .01$; the score has been inverted to that larger numbers mean better grades), cognitive abilities ($d = 0.23, p < .01$), social interests ($d = 0.11, p < .01$), conventional interests ($d = 0.06, p < .10$), conscientiousness ($d = 0.19, p < .01$), agreeableness ($d = 0.12, p < .01$), parental education level ($d = 0.08, p < .05$), and parental occupational status ($d = 0.06, p < .10$). There are no significant differences with respect to realistic interests, investigative interests, artistic interests, enterprising interests, openness, extraversion, or neuroticism. Moreover, individuals who remain in the sample are 10 percentage points more likely to be female ($p < .01$), 0.17 years younger, on average ($p < .01$), 8 percentage points less likely to have migration background ($p < .01$), and 6 percentage points less likely to graduate from a vocational high school ($p < .01$). Overall, individuals who stay in the sample have properties that may be associated with higher achievement, therefore they are "positively" selected.

After merging the three samples from 2002, 2012, and 2016, we drop all individuals who report neither gross earnings nor net earnings in 2016, as well as those who report field of study neither in 2016 nor in 2012. These restrictions lead to a final sample of $N = 1,063$ individuals. Of these, 1,006 report gross earnings and 1,029 report net earnings.

5.3.2 Measures

5.3.2.1 Dependent variables

Gross earnings (observed in 2016): This variable captures monthly gross earnings (before tax and other deductions, such as social security payments) from the current occupation in €.

Net earnings (observed in 2016): This variable captures monthly net earnings (after tax and other deductions) from the current occupation in €.

A disadvantage of using net earnings is their sensitivity to various factors that are outside of the study's interest, including marital status, children, type of health insurance, and church membership. As most studies use gross earnings, using gross earnings also facilitates the comparison to the existing literature. However, an advantage of net earnings is that they may be more relevant from the perspective of the individuals (see WALKER/ZHU 2011: 1177). Furthermore, respondents may often know their net earnings more precisely than their gross earnings, and some only report their net earnings but not their gross earnings.

The reported earnings usually refer to the current occupation, but individuals are asked to report the earnings from their last occupation in case they are currently not employed. Of all individuals in the final sample, 18.4% are not employed at the time when earnings are reported (2016). They are included in the baseline analyses. We do not include control variables on employment status or other employment-related factors, for the reasons described in subchapter 5.3.3. Nevertheless, whether an individual is employed affects the interpretation of earnings (current earnings or previous earnings), therefore we perform a robustness check where only individuals who are employed in 2016 are included (see subchapter 5.4.4).

5.3.2.2 Main explanatory variables

Field of study (observed in 2016): The following fields are distinguished with dummy variables (1 = yes, 0 = no): natural sciences/mathematics, engineering/technology, medicine/health, economics/business, teaching, law, social sciences, and humanities. An overview over the fields is given in Table 5.1.

Table 5.1: Fields of study

Field	Included subjects (examples)	Sample size (number <i>n</i> of individuals)
Natural sciences/mathematics	Mathematics, computer science, physics, chemistry, earth and environmental sciences, biology	124
Engineering/technology	Civil engineering, electrical engineering, mechanical engineering, biotechnology	120
Medicine/health	(Human) medicine, pharmacy, sport sciences, veterinary medicine	88
Economics/business	Economics, business administration, management, business engineering, business informatics, business law	312
Teaching	Teacher education programs	182
Law	(General) law, international law, law of taxation	43
Social sciences	Psychology, educational sciences, sociology, political science, public administration	115
Humanities	History, archaeology, languages, philosophy, theology, arts, architecture	79

$N = 1,063$ individuals. The field classification is based on OECD (2007).

This classification is based on the “Fields of Science and Technology” by the Organisation for Economic Co-operation and Development (OECD 2007). For the purpose of this study, we deviate from the OECD classification in the following ways. First, we use own categories for economics/business, teaching, and law, instead of including these fields in the social sciences category, because we expect major differences between that fields and the other social sciences with respect to the study curriculum and selection patterns. Second, we drop the category of agricultural sciences, because very few individuals in our data set study this field; individuals graduating from agricultural sciences

are either assigned to medicine/health, in case they graduate from veterinary science, or otherwise to natural sciences/mathematics.

Our study concentrates on the last completed field of study. In the 2016 wave, individuals report up to three study programs and in addition a possible PhD (or doctoral) program. For each individual, a study program is considered only if it is completed and if the completion is later than (or equal to) the completion of any other study program. (If there are several last finished study programs, because several programs are completed in the same year, then the program that the respondent enters at the last position counts for the finally completed field of study.) We include the PhD program in this procedure. That is, if someone has a master degree in natural sciences/mathematics and later obtains a PhD in economics/business, this individual will be assigned to economics/business. The assumption is that the last finished program is most relevant for the labor market.

Two student research assistants assigned the names of the last finished study programs, as they were reported in the survey, independently from each other to one of the fields. Only teacher education programs did not have to be assigned manually, because this information was given in a separate box and was already included in the data set. When the students had questions regarding the assignment of a particular program, we assigned a field, based on the OECD (2007) classification; if it was impossible to understand to which field a study program belongs, we had to assign a missing value. Then we compared the two final versions of the field data sets created by the student research assistants: They agreed in 86.3% of the cases. In the other cases, we carefully chose the field of study that fits best to the best of our knowledge, again based on the OECD (2007) classification.

If the information on field of study is missing in 2016 but a completed study program is reported in 2012, then we use the information from 2012 to assign a field of study (based on the last study program that is completed up to this point in time). There are 46 such cases in the original sample from 2016 (that is, in the full sample from 2016, before individuals with missing values on the dependent or main explanatory variables are dropped).

An ambiguity occurs in cases of combined programs. In particular, a considerable number of individuals (49 in the original sample from 2016) obtains their last degree from a program that either includes economics/business and natural sciences/mathematics to a similar extent (business informatics, business physics, or business chemistry) or that in-

cludes economics/business and engineering/technology to a similar extent (business engineering, technical economics, or technical business administration). While these programs are assigned to the economics/business category in our baseline models, we perform a robustness check with an alternative classification, where these fields are assigned to natural sciences/mathematics respectively to engineering/technology.

As noted above, if the last finished program is finished in the same year as another program, then the program that the respondent enters at the last position counts for the finally completed field of study. There are 192 such cases in the original sample from 2016. Most of these cases are individuals who have completed a teacher education program and who list their teaching subjects separately. These individuals are assigned to the teaching category irrespective of their specific subjects. We check the other cases (non-teaching programs) carefully, because some individuals enter their major and their minor subject as two separate study programs. For example, if someone enters “history” and “political science”, finished in the same year and with the same type of degree, then we would rather regard history as the last finished (major) subject and therefore assign the field category of humanities. We correct these cases accordingly.

5.3.2.3 Control variables

Educational achievement (observed in 2002): Two types of educational achievement are captured. On the one hand, we consider competencies, as assessed by standardized educational achievement tests. We distinguish math competencies and English competencies. For math competencies, exercises from the TIMSS study are used (Trends in International Mathematics and Science Study) that assess advanced (pre-university) math competencies with 68 items (see BAUMERT/BOS/LEHMANN (Eds.) 2000). The average achievement score in this test is included in the data set, z-standardized to have mean 0 and standard deviation 1 in the original sample of last-year high school students in 2002. For English competencies, a short version of the ITP-TOEFL test is used (Institutional Testing Program – Test Of English as a Foreign Language) that captures listening comprehension, structure and written expression, as well as vocabulary and reading comprehension with 80 items in total (see KÖLLER/TRAUTWEIN 2004; LEUCHT 2003). The average score of these three subtests is included, z-standardized in the group of last-year high school students.

As a second form of educational achievement, we consider high school grades. The average grade of the high school degree is included in the data set (grade point average,

GPA), which can range from the lowest grade 6.0 to the highest grade 1.0 in Germany. (Individuals with a GPA above 4 do not achieve an upper secondary school diploma; in the final sample, GPA ranges from 1.0 to 3.6.) For the analyses, GPA is inverted, so that larger numbers mean higher (better) grades. All measures of educational achievement are z-standardized in the final sample for the analyses.

Cognitive abilities (observed in 2002): Two subscales of the revised cognitive abilities test for students in grades four to twelve (see HELLER/PERLETH 2000) are included in the data set: verbal abilities and figural abilities. In total, the included short test has 45 items. A combined score of cognitive abilities is built as the average over these items, standardized to have mean 100 and standard deviation 15 in the group of last-year high school students. For the analyses, a z-standardized version of the combined score is used.

Vocational interests (observed in 2002): We consider vocational interests according to the RIASEC model (see HOLLAND 1997). A validated German version of the scale is used (see BERGMANN/EDER 1992). This scale includes 60 items in total, each on a Likert scale from 1 (not at all) to 5 (very much). The following interests are distinguished (with internal consistencies as measured by Cronbach's alpha): realistic interests (e.g., interest in working physically and with machines; $\alpha = .86$), investigative interests (e.g., scientific reading, analyzing, experimenting, and software development; $\alpha = .85$), artistic interests (including languages and writing; $\alpha = .86$), social interests (e.g., educating others, consulting others, and caring for others; $\alpha = .90$), enterprising interests (e.g., leading, marketing, and organizing events; $\alpha = .87$), and conventional interests (e.g., accounting, working with office software, statistics, and controlling; $\alpha = .87$). The six variables are z-standardized for the analyses.

Personality traits (observed in 2002): The NEO-Five-Factor Inventory (NEO-FFI) is used as a model of personality (see COSTA/MCCRAE 1992). A validated German version of the scale is included in the data set (see BORKENAU/OSTENDORF 1991). The included scale consists of 60 items in total, each on a Likert scale from 1 (does not apply at all) to 4 (applies completely). The following five variables are distinguished (OCEAN): openness ($\alpha = .73$), conscientiousness ($\alpha = .83$), extraversion ($\alpha = .77$), agreeableness ($\alpha = .73$), and neuroticism ($\alpha = .83$). For the analyses, these variables are z-standardized.

Socio-economic background (observed in 2002): Two different measures of socio-economic background are included. The first variable captures parental education level, which is defined as the highest educational degree of the parents (that is, the degree of

the parent with the higher degree counts). The Likert scale ranges from 0 (no secondary school degree) to 7 (university degree from a traditional, research-based university). The second variable captures parental occupational status, defined as the highest occupational status of the parents. The occupational status is assessed with the ISEI scale (International Socio-Economic Index), which takes on values from 16 (e.g., farmhands, laborers, and cleaners) to 90 (judges); it assesses the “prestige” of occupations, mainly based on the education level and income of individuals who are employed in specific occupations (see GANZEBOOM/GRAAF/TREIMAN 1992; GANZEBOOM/TREIMAN 1996). The information on socio-economic status (education and occupation) are reported by the parents and, if missing, filled by information from the students. Both measures are z-standardized for the analyses.

Biographical controls and type of high school (observed in 2002): We include students’ gender (1 = female, 0 = male), age in years, and migration background (1 if the student or at least one of her/his parents has not been born in Germany, 0 otherwise). We also consider the type of upper secondary school from which the student achieved the high school degree (1 = vocational, 0 = academic).

Study-related controls (observed in 2012): First, we consider the degree type of the last finished study program with three categories: bachelor; master or equivalent (such as the German diploma or *Staatsexamen*); PhD/doctoral. In the analyses, two dummy variables are used: master degree (1 = yes, 0 = no) and PhD/doctoral degree (1 = yes, 0 = no), whereas bachelor degree is the reference category. Second, we capture the university type of the last finished study program with three categories: traditional, research-based university; university of applied sciences (including teacher education colleges for lower school tracks); cooperative state university (these institutions offer dual-study degrees in collaboration with industry partners). In the analyses, two dummy variables are used: university of applied sciences (1 = yes, 0 = no) and cooperative state university (1 = yes, 0 = no), whereas traditional, research-based university is the reference category.

As a last study-related control variable, the year of study start is captured. It is defined as the year in which the last finished study program has been started. If the last finished program is a consecutive program, that is, a master degree or PhD/doctoral degree, then the start of the (last) preceding bachelor, diploma, or *Staatsexamen* program counts. In this way, the variable year of study start is comparable across degree types, as it always captures the beginning of the study career in the finally chosen field.

Because study-related controls are assessed in 2012 and not included in the last wave (2016), these values are missing if individuals participate in the last wave but not in 2012 or if individuals complete a study program after 2012 and until 2016. (In the latter case, no missing values occur if the last program is a PhD/doctoral program, because type of degree and type of university – traditional, research-based university – are unambiguous in case of PhD/doctoral programs.) In total, study-related controls are missing in 451 cases. However, we check these cases and gather information on study-related control variables in some cases, when the description of the study program clearly informs us about the type of degree or type of university. (E.g., some students write “Dipl.,” which indicates that they received a diploma degree, equivalent to a master degree, or “FH”, which means *Fachhochschule* or university of applied sciences.)

Family status (observed in 2016): We capture information on marital status (1 if married or in a civil union, 0 otherwise) and having children (1 = yes, 0 = no).

5.3.3 Analyses

Multivariate structural equation models with full-information maximum likelihood (FIML) are used to explain gross earnings respectively net earnings. This method can deal with missing values in control variables. FIML finds the parameters (coefficients) for which the data in the sample are most probable. All information from all observations are used for the estimation of parameters. As a robustness check, we only include individuals who have no missing values and apply ordinary least squares (OLS) (see subchapter 5.4.4).

As the dependent variable, the natural logarithm of earnings is used, to account for the (right-) skewed distribution of earnings. Most studies make the same choice (see, e.g., ARCIDIACONO 2004; CHEVALIER 2011; FINNIE/FRENETTE 2003; GRAVE/GÖRLITZ 2012; KELLY/O’CONNELL/SMYTH 2010; KIM/TAMBORINI/SAKAMOTO 2015; KINSLER/PAVAN 2015; WEBBER 2014).

Gross earnings and net earnings are explained in two separate analyses. To test what part of the associations between field of study and earnings is due to selection, each of the two analyses consists of two models. In model (1), we use as explanatory variables only field of study and basic control variables, which are likely to be included in administrative data sets and other data sets used for descriptive analyses: biographical controls and type of high school, study-related controls, and family status. This model has the following form (using the example of gross earnings):

$$\begin{aligned}
\ln \text{Gross earnings}_i & \\
&= b_{01} + b_{11} * \text{Field of study}_i + b_{71} \\
&* \text{Biographical controls and type of high school}_i + b_{81} \\
&* \text{Study related controls}_i + b_{91} * \text{Family status}_i + e_{i1}
\end{aligned}$$

where i is the individual, b_{01} is the constant (the number 1 represents model (1)), the different b_{r1} with $1 \leq r \leq 9$ are vectors capturing the coefficients (for example, b_{11} captures seven coefficients for field of study, with humanities as the baseline category), and e_{i1} is the error term.

In model (2), individual characteristics in terms of psychological and sociological variables are additionally included: educational achievement, cognitive abilities, vocational interests, personality traits, and socio-economic background. This model has the following form (again using the example of gross earnings):

$$\begin{aligned}
\ln \text{Gross earnings}_i & \\
&= b_{02} + b_{12} * \text{Field of study}_i + b_{22} * \text{Educational achievement}_i \\
&+ b_{32} * \text{Cognitive abilities}_i + b_{42} * \text{Vocational interests}_i + b_{52} \\
&* \text{Personality traits}_i + b_{62} * \text{Socio economic background}_i + \beta_{72} \\
&* \text{Biographical controls and type of high school}_i + b_{82} \\
&* \text{Study related controls}_i + b_{92} * \text{Family status}_i + e_{i2}
\end{aligned}$$

where b_{02} is the constant, the different b_{s2} with $1 \leq s \leq 9$ are vectors capturing the coefficients, and e_{i2} is the error term. Because the assumption of homoscedasticity is rejected by a Breusch-Pagan/Cook-Weisberg test ($p < .01$), heteroscedasticity-robust standard errors are used both in model (1) and in model (2).

Variables that are arguably influenced by field of study are not included as control variables, even if they likely affect earnings, because such factors belong to the causal channel between field of study and earnings. Holding such factors constant would eliminate a part of the effect that we want to estimate and therefore bias the results for field of study (“bad controls”; for a similar reasoning see WEBBER 2014: 17). Thus, throughout the analyses we do not control for the occupation, working hours, or other employment-related factors; we also have only limited information on working hours in the data set. Year of college degree is not included either, because it is likely to be influenced by field of study (see also KIRKEBOEN/LEUVEN/MOGSTAD 2016: 1077).

We test how the inclusion of individual characteristics changes the results of the model. In a first step, we compare the percentage of explained variance in earnings (relative to the total variance in earnings), as measured by R-squared, between models (1) and (2). To test whether the increase in R-squared from model (1) to model (2) is statistically significant, we use chi-squared tests (in the robustness check with linear regression models, F -tests are used instead).

In a second step, we calculate the relative change in the point estimates of the different field of study coefficients between model (1) and model (2). We use the following formula:

$$\text{Relative difference}_k = \frac{b_{k2} - b_{k1}}{b_{k1}}$$

where k is a particular field of study, b_{k2} is the coefficient for this field of study in model (2), and b_{k1} is the coefficient for this field of study in model (1).

To find out whether differences in specific coefficients between model (1) and model (2) are statistically significant, we use bootstrapping (with 100 repetitions). The p -value is determined by the share of samples in which the coefficient does *not* change in the estimated direction. For example, if the coefficient for a specific field of study is estimated to decrease from model (1) to model (2), then the p -value is determined by the share of samples in which the coefficient does *not* decrease from model (1) to model (2). (See BUSER/PETER/WOLTER 2017: 129 for a similar approach.)

5.4 Results

5.4.1 Descriptive statistics and correlations

Table 5.2 shows the descriptive statistics, separately for the different fields of study. Average gross and net earnings 14 years after high school graduation are highest for natural sciences/mathematics, law, and engineering/technology and lowest for humanities, teaching, and social sciences. The standard deviations indicate that earnings are very heterogeneous within fields, as well. One reason for the large standard deviations is the presence of few individuals with very high earnings. Figures 5.1–5.8 show the earnings distributions.

Table 5.2: Descriptive statistics of all variables: means (standard deviations) in different fields of study

Variables	Natural sciences/ math. ($n_1 = 124$)	Engineer./ technology ($n_2 = 120$)	Medicine/ health ($n_3 = 88$)	Economics/ business ($n_4 = 312$)	Teaching ($n_5 = 182$)	Law ($n_6 = 43$)	Social sciences ($n_7 = 115$)	Humanities ($n_8 = 79$)
Dependent variables (monthly earnings in €) (2016):								
Gross earnings (before tax)	6043.33 (14413.74)	5650.12 (1729.87)	4922.54 (2612.73)	5249.92 (4135.22)	3670.79 (4282.69)	5979.95 (8923.06)	3158.38 (1435.96)	4349.29 (8562.35)
Net earnings (after tax)	3649.98 (8521.36)	3450.30 (1064.15)	2974.83 (1353.13)	3254.04 (3075.69)	2538.56 (983.17)	3813.46 (5243.37)	2070.11 (884.22)	2806.25 (5811.22)
Educational achievement (2002):								
Math competencies (TIMSS, z-standardized among high school graduates)	0.84 (1.01)	0.69 (0.90)	0.30 (0.99)	0.20 (0.95)	-0.02 (0.89)	0.41 (0.77)	0.06 (0.76)	0.10 (0.86)
English competencies (TOEFL, z-standardized among high school graduates)	0.51 (1.05)	0.11 (0.90)	0.16 (0.96)	0.14 (0.93)	-0.02 (1.02)	0.57 (0.93)	0.39 (1.03)	0.23 (1.06)
High school GPA (1 highest, 6 lowest)	2.02 (0.64)	2.25 (0.65)	1.95 (0.63)	2.26 (0.60)	2.34 (0.59)	1.99 (0.60)	2.16 (0.59)	2.24 (0.62)
Cognitive abilities (standardized to mean 100 and standard deviation 15 among high school graduates) (2002):								
Cognitive abilities (combined score)	107.98 (12.39)	107.55 (12.91)	100.49 (15.14)	102.75 (13.97)	99.45 (13.19)	104.23 (13.62)	101.86 (13.99)	102.92 (13.77)
Vocational interests (Likert scales from 1–5) (2002):								
Realistic interests	2.44 (0.64)	3.05 (0.62)	2.13 (0.60)	2.05 (0.72)	1.71 (0.54)	1.61 (0.44)	1.70 (0.53)	1.90 (0.62)
Investigative interests	3.42 (0.71)	3.21 (0.64)	3.16 (0.73)	2.46 (0.73)	2.25 (0.67)	2.40 (0.61)	2.30 (0.64)	2.27 (0.61)

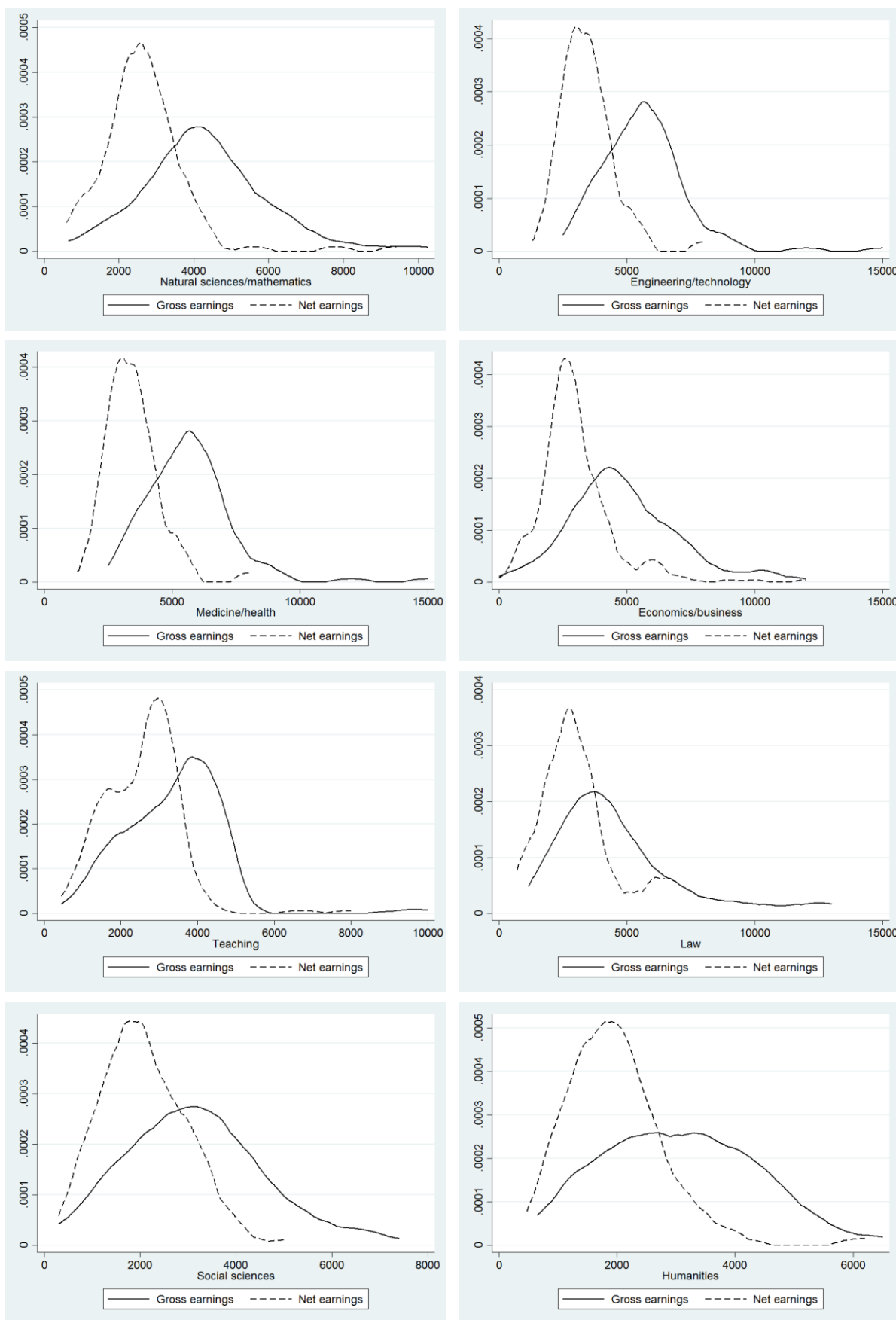
Variables	Natural sciences/ math. ($n_1 = 124$)	Engineer./ technology ($n_2 = 120$)	Medicine/ health ($n_3 = 88$)	Economics/busi- ness ($n_4 = 312$)	Teaching ($n_5 = 182$)	Law ($n_6 = 43$)	Social sci- ences ($n_7 = 115$)	Humanities ($n_0 = 79$)
Artistic interests	2.49 (0.81)	2.24 (0.74)	2.51 (0.72)	2.47 (0.79)	2.93 (0.86)	2.54 (0.78)	3.11 (0.85)	3.50 (0.67)
Social interests	2.36 (0.65)	2.27 (0.67)	3.30 (0.82)	2.72 (0.70)	3.46 (0.77)	2.96 (0.68)	3.50 (0.84)	2.98 (0.78)
Enterprising interests	2.62 (0.72)	2.86 (0.75)	3.02 (0.69)	3.52 (0.66)	3.19 (0.68)	3.54 (0.65)	3.23 (0.70)	3.01 (0.86)
Conventional interests	2.36 (0.54)	2.51 (0.58)	2.41 (0.65)	2.99 (0.68)	2.26 (0.68)	2.65 (0.64)	2.29 (0.74)	2.23 (0.63)
Personality traits (Likert scales from 1–4) (2002):								
Openness	2.83 (0.44)	2.66 (0.41)	2.84 (0.38)	2.65 (0.40)	2.75 (0.42)	2.92 (0.42)	2.92 (0.42)	3.05 (0.45)
Conscientiousness	2.90 (0.43)	2.99 (0.42)	3.07 (0.43)	3.03 (0.41)	2.92 (0.43)	3.06 (0.47)	2.85 (0.45)	2.79 (0.53)
Extraversion	2.71 (0.42)	2.73 (0.38)	2.87 (0.41)	2.90 (0.36)	2.92 (0.39)	2.93 (0.47)	2.87 (0.40)	2.77 (0.50)
Agreeableness	2.94 (0.34)	2.90 (0.32)	2.96 (0.33)	2.91 (0.36)	3.00 (0.33)	2.80 (0.39)	3.00 (0.35)	2.93 (0.40)
Neuroticism	2.26 (0.39)	2.17 (0.45)	2.29 (0.44)	2.23 (0.39)	2.32 (0.43)	2.16 (0.41)	2.37 (0.52)	2.32 (0.43)
Socio-economic background (2002):								
Parental education level (0–7)	5.46 (1.63)	5.18 (1.77)	5.46 (1.71)	5.12 (1.66)	5.25 (1.65)	5.98 (1.35)	5.37 (1.63)	5.67 (1.61)
Parental occupational status (ISEI, 16–90)	61.22 (14.44)	59.22 (15.41)	63.98 (14.65)	58.79 (14.16)	58.13 (14.54)	65.21 (11.40)	59.85 (15.38)	61.59 (14.44)

Variables	Natural sciences/ math. ($n_1 = 124$)	Engineer./ technology ($n_2 = 120$)	Medicine/ health ($n_3 = 88$)	Economics/busi- ness ($n_4 = 312$)	Teaching ($n_5 = 182$)	Law ($n_6 = 43$)	Social sci- ences ($n_7 = 115$)	Humanities ($n_0 = 79$)
Biographical controls and type of high school (2002):								
Female	0.42 (0.50)	0.17 (0.38)	0.71 (0.46)	0.52 (0.50)	0.80 (0.40)	0.56 (0.50)	0.78 (0.41)	0.78 (0.41)
Age	19.43 (0.57)	19.44 (0.58)	19.44 (0.63)	19.48 (0.56)	19.38 (0.51)	19.42 (0.52)	19.46 (0.50)	19.44 (0.59)
Migration background	0.13 (0.34)	0.17 (0.38)	0.18 (0.39)	0.18 (0.38)	0.10 (0.31)	0.16 (0.37)	0.17 (0.38)	0.16 (0.37)
Vocational school	0.29 (0.46)	0.40 (0.49)	0.28 (0.45)	0.41 (0.49)	0.34 (0.47)	0.16 (0.37)	0.30 (0.46)	0.20 (0.40)
Study-related controls (last university degree) (2012):								
Bachelor degree	0.08 (0.27)	0.09 (0.29)	0.02 (0.15)	0.11 (0.32)	0.04 (0.20)	0.00 (0.00)	0.12 (0.32)	0.08 (0.28)
Master degree	0.52 (0.50)	0.77 (0.42)	0.56 (0.50)	0.84 (0.37)	0.94 (0.23)	0.79 (0.42)	0.80 (0.40)	0.88 (0.33)
PhD/doctoral degree	0.40 (0.49)	0.14 (0.35)	0.41 (0.50)	0.05 (0.21)	0.01 (0.12)	0.21 (0.42)	0.08 (0.28)	0.04 (0.20)
Traditional, research-based university	0.69 (0.46)	0.50 (0.50)	0.93 (0.26)	0.37 (0.48)	0.39 (0.49)	0.88 (0.33)	0.62 (0.49)	0.72 (0.45)
University of applied sciences	0.24 (0.43)	0.36 (0.48)	0.07 (0.26)	0.32 (0.47)	0.59 (0.50)	0.12 (0.33)	0.29 (0.46)	0.28 (0.45)
Cooperative state university (for dual- study degrees with industry partners)	0.07 (0.25)	0.14 (0.35)	0.00 (0.00)	0.31 (0.46)	0.03 (0.16)	0.00 (0.00)	0.09 (0.28)	0.00 (0.00)
Year of study start	2003.25 (1.54)	2003.25 (1.27)	2003.53 (2.07)	2003.24 (1.69)	2003.35 (1.63)	2002.46 (0.58)	2004.23 (2.72)	2003.70 (1.76)

Variables	Natural sci- ences/ math. ($n_1 = 124$)	Engineer./ technology ($n_2 = 120$)	Medicine/ health ($n_3 = 88$)	Econo- mics/busi- ness ($n_4 = 312$)	Teaching ($n_5 = 182$)	Law ($n_6 = 43$)	Social sci- ences ($n_7 = 115$)	Humanities ($n_0 = 79$)
Family status (2016):								
Married	0.74 (0.44)	0.70 (0.46)	0.68 (0.47)	0.74 (0.44)	0.82 (0.38)	0.71 (0.46)	0.63 (0.49)	0.68 (0.47)
Children (dummy variable)	0.40 (0.49)	0.49 (0.50)	0.48 (0.50)	0.44 (0.50)	0.59 (0.49)	0.49 (0.51)	0.41 (0.49)	0.34 (0.48)

$N = 1,063$ individuals. Standard deviations in parentheses.

Figures 5.1–5.8: Distributions of monthly earnings (€) in different fields of study



In all eight figures, earnings up to €15,000 are displayed.

Table 5.3 shows the correlations between individual characteristics. There are few high correlations ($r > .50$): between realistic interests and investigative interests ($r = .60$), between artistic interests and openness ($r = .57$), between enterprising interests and conventional interests ($r = .56$), and between parental education level and parental occupational status ($r = .65$).

To test for multicollinearity, we calculate the variance-inflation factor (VIF) in the full model with all variables. Mean VIF is clearly acceptable (2.21). The VIF value of each variable is acceptable (< 10), and except for economics/business (VIF = 5.64), the VIF value of each variable is clearly acceptable (< 5).

Table 5.3: Correlations between individual characteristics

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1 Math competencies	1.00															
2 English competenc.	.32**	1.00														
3 High school GPA	.42**	.41**	1.00													
4 Cognitive abilities	.46**	.39**	.29**	1.00												
5 Realistic interests	.26**	.01	.00	.19**	1.00											
6 Investigative int.	.29**	.12**	.21**	.19**	.60**	1.00										
7 Artistic interests	-.16**	.10**	.02	-.13**	-.10**	-.07*	1.00									
8 Social interests	-.19**	-.11**	-.01	-.23**	-.25**	-.13**	.44**	1.00								
9 Enterprising int.	-.12**	-.06+	.00	-.09**	-.08**	-.06+	.21**	.36**	1.00							
10 Conventional int.	.02	-.07*	.04	.01	.21**	.16**	-.05	-.01	.56**	1.00						
11 Openness	.02	.24**	.20**	.07*	-.07*	.18**	.57**	.25**	.09**	-.14**	1.00					
12 Conscientiousness	.01	-.06+	.22**	-.05+	.04	.08*	-.15**	-.02	.21**	.30**	-.09**	1.00				
13 Extraversion	-.09**	-.10**	-.12**	-.15**	-.11**	-.10**	.11**	.28**	.42**	.09**	.07*	.10**	1.00			
14 Agreeableness	-.04	-.06+	-.04	-.06*	-.07*	-.07*	.08*	.22**	-.13**	-.11**	.08*	.09**	.22**	1.00		
15 Neuroticism	-.09**	-.05+	.01	-.11**	-.09**	-.08*	.17**	.08*	-.17**	-.06+	.02	-.21**	-.38**	-.12**	1.00	
16 Parental education	.13**	.21**	.15**	.07*	.02	.05+	.09**	.04	.03	-.10**	.14**	-.06+	.03	.03	-.05	1.00
17 Parental occupation	.08*	.14**	.10**	.02	.01	.05	.03	.02	.03	-.06+	.09**	-.00	.02	.05	-.07*	.65**

$N = 1,063$. All variables are z-standardized and GPA is inverted for the analysis, so that larger numbers mean higher (better) grades. ** $p < .01$. * $p < .05$. + $p < .10$.

5.4.2 Gross earnings analysis

Table 5.4 presents the results of the gross earnings analysis, where the natural logarithm of monthly gross earnings is explained by field of study in multivariate structural equation models with full-information maximum likelihood. Because the dependent variable is logarithmized, the coefficients can approximately be interpreted as relative earnings increases if a certain explanatory variable increases by one unit, holding the other explanatory variables constant.

Model (1) does not include individual characteristics (included as explanatory variables are only field of study and basic control variables, which are likely to be included in descriptive analyses and administrative data sets: biographical controls and type of high school, study-related controls, and family status). The results show that graduating from engineering/technology is, on average, associated with approximately 39.9% higher gross earnings 14 years after high school graduation, compared to humanities as the reference category. Economics/business and medicine/health are associated with earnings premia of approximately 32.8% and 31.1%, respectively, compared to humanities. The other fields of study (natural sciences/mathematics, teaching, law, and social sciences) do not show a significant association with gross earnings at this point in time and in this model.

When all individual characteristics (psychological and sociological variables) are additionally included (model (2)), the fields engineering/technology, medicine/health, and economics/business remain the three fields that are, on average, associated with significantly higher gross earnings than humanities. The point estimates decrease to approximately 33.6% for engineering/technology, 26.1% for medicine/health, and even to 24.3% for economics/business.

As a qui-squared test reveals, model (2) explains a significantly larger share of earnings variance than model (1), which shows that individual characteristics predict gross earnings beyond field of study. In particular, artistic interests relate negatively to earnings (marginally significant), enterprising interests relate positively to earnings, and conscientiousness positively predicts earnings as well, beyond the other individual characteristics.

When comparing the different field of study coefficients between models (1) and (2), the relative decreases in the point estimates for engineering/technology, economics/business, and medicine/health amount to 15.9%, 25.7%, and 16.1%, respectively. This suggests that selection by individual characteristics explains 15.9–25.7% of the significant relationships between field of study and gross earnings.

However, we note that although individual characteristics significantly improve the explanatory power of the model beyond field of study, differences in the coefficients for specific fields of study are not statistically significant. This follows from bootstrapping with 100 repetitions, where, for each field of study coefficient, the coefficient decreases from model (1) to model (2) in less than 95 cases (even in less than 90 cases). This likewise holds for almost all field of study coefficients in all analyses in the present study, and is most probably a consequence of the moderate sample size.

Figure 5.9 visualizes the main coefficients together with 95% confidence intervals.

Table 5.4: Field of study and gross earnings

Variables	(1) Log of gross earnings: without individual characteristics	(2) Log of gross earnings: with individual characteristics	Relative difference in estimated coefficient
Field of study: (reference category: humanities)			
Natural sciences/mathematics	0.149 (0.097)	0.118 (0.102)	-20.6%
Engineering/technology	0.399** (0.094)	0.336** (0.102)	-15.9%
Medicine/health	0.311** (0.095)	0.261* (0.104)	-16.1%
Economics/business	0.328** (0.093)	0.243* (0.097)	-25.7%
Teaching	0.077 (0.091)	0.045 (0.091)	-42.4%
Law	0.214 (0.136)	0.124 (0.131)	-42.0%
Social sciences	-0.018 (0.095)	-0.050 (0.095)	182.6%
Educational achievement:			
Math competencies		0.022 (0.033)	
English competencies		0.008 (0.019)	
High school GPA		-0.004 (0.028)	
Cognitive abilities:			
Cognitive abilities		0.019 (0.026)	
Vocational interests:			
Realistic interests		0.011 (0.026)	
Investigative interests		0.016 (0.025)	
Artistic interests		-0.055+ (0.028)	
Social interests		-0.016 (0.023)	
Enterprising interests		0.086* (0.039)	
Conventional interests		-0.041 (0.026)	
Personality traits:			
Openness		0.018 (0.022)	
Conscientiousness		0.042* (0.021)	

Extraversion		0.012 (0.034)
Agreeableness		-0.029 (0.021)
Neuroticism		0.009 (0.020)

Socio-economic background:

Parental education level		0.010 (0.022)
Parental occupational status		0.020 (0.021)

Biographical controls and type of high school:

Female	-0.349** (0.043)	-0.281** (0.049)
Age	-0.028 (0.037)	-0.026 (0.035)
Migration background	0.039 (0.046)	0.052 (0.047)
Vocational school	-0.047 (0.038)	-0.027 (0.039)

Study-related controls:

Master degree	0.033 (0.122)	0.016 (0.131)
PhD/doctoral degree	0.168 (0.151)	0.105 (0.159)
University of applied sciences	0.002 (0.055)	0.054 (0.064)
Cooperative state university	-0.126 (0.089)	-0.093 (0.093)
Year of study start	-0.071** (0.026)	-0.056* (0.027)

Family status:

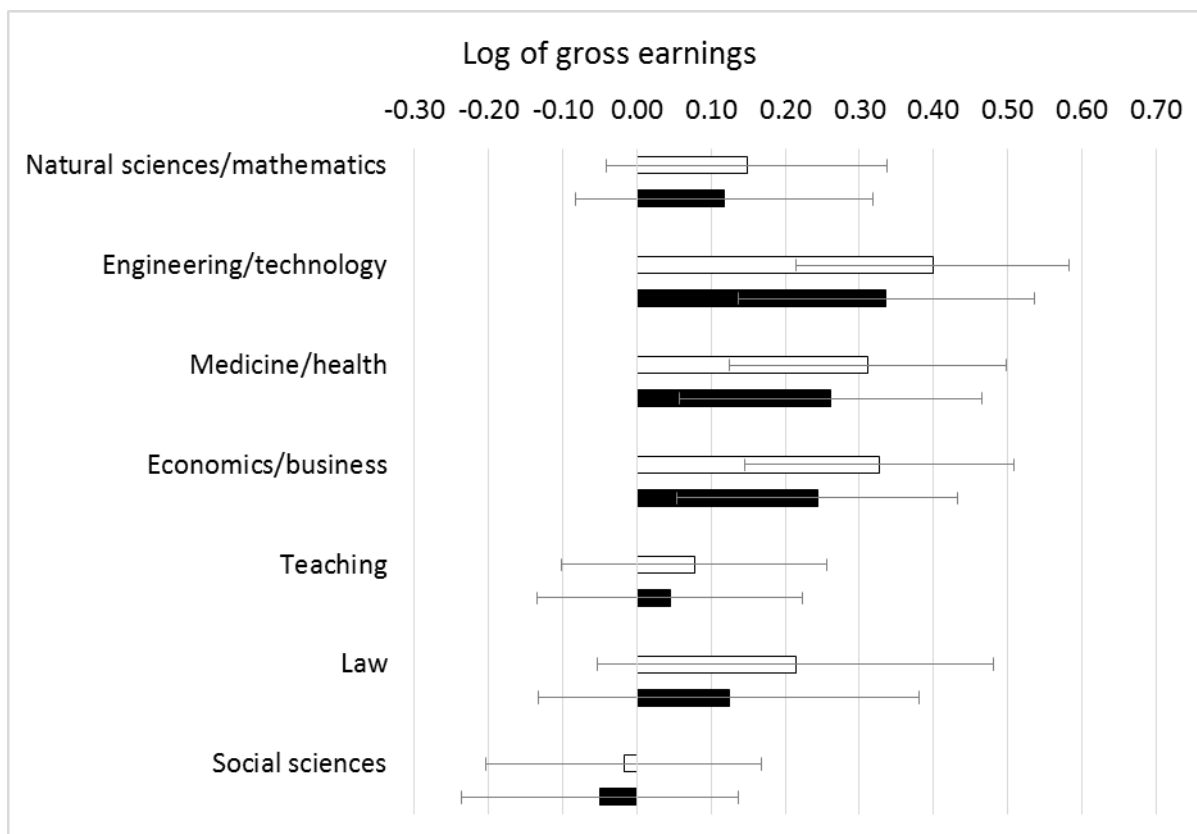
Married	0.034 (0.057)	0.023 (0.059)
Children	-0.189** (0.058)	-0.192** (0.060)
Constant	151.879** (52.283)	121.688* (53.179)
Observations	1,006	1,006
R-squared	0.229	0.244

Difference in R-squared between
models (1) and (2),
chi-squared test

*

Multivariate structural equation models with full-information maximum likelihood. The dependent variable is the natural logarithm of monthly gross earnings. All individual characteristics (educational achievement, cognitive abilities, vocational interests, personality traits, and socio-economic background) are z-standardized. Both model (1) and model (2) include biographical controls and type of high school, study-related controls, and family status. Robust standard errors in parentheses. ** $p < .01$. * $p < .05$. + $p < .10$.

Figure 5.9: Field of study and gross earnings



Coefficients for the estimated effects of field of study on the natural logarithm of monthly gross earnings, together with 95% confidence intervals. Humanities is the reference category for field of study. White bars: no individual characteristics included (model (1)). Black bars: all individual characteristics included (model (2)). See description of Table 5.4 for details of the analysis.

5.4.3 Net earnings analysis

Table 5.5 presents the results of the net earnings analysis. In addition to the relevance of net earnings for students, some individuals may know their net earnings more precisely than their gross earnings, and some only report net earnings but no gross earnings. The natural logarithm of net earnings is used as the dependent variable.

Model (1), which does not include individual characteristics, shows that graduating from engineering/technology is, on average, associated with approximately 32.5% higher net earnings, compared to humanities and holding basic control variables constant. In addition, economics/business relates to approximately 26.9% higher net earnings, law to 26.8%, medicine/health to 24.1%, and teaching to 20.1% higher net earnings, relative to humanities.

Estimated effects on net earnings tend to be smaller than the gross earnings effects. This is in part a consequence of the progressive income tax system, which imposes higher tax rates with increasing earnings. However, the difference between gross and net earnings (that is, tax rates, social security and other deductions) is also influenced by factors such as civil servant status and self-employment. It is remarkable that law and teaching show no significant association with gross earnings but a significant association with net earnings in model (1). This may reflect a relatively high share of civil servants among these graduates, because civil servants do not have to pay for unemployment insurance or public pension insurance.

In model (2), where all individual characteristics are included, the estimated association of engineering/technology with net earnings decreases to approximately 23.2%, compared to humanities. The effects of medicine/health, teaching, and economics/business are only marginally significant and are estimated to 16.9%, 15.9%, and 15.5%, respectively. Law shows no significant association with net earnings when all individual characteristics are held constant.

Comparing the R-squared values of model (1) and model (2), a qui-squared test reveals that model (2) explains a significantly larger share of earnings variance than model (1). This shows that individual characteristics explain net earnings beyond field of study. Similar to the gross earnings analysis, artistic interests show a negative relationship with net earnings, enterprising interests a positive relationship, and conscientiousness a (marginally significant) positive association with net earnings, beyond the other individual characteristics.

The decreases in point estimates of specific field of study coefficients between model (1) and model (2) amount to 28.8% for engineering/technology, 42.6% for economics/business, 47.0% for law, 30.1% for medicine/health, and 20.9% for teaching. This suggests that selection by individual characteristics may account for 20.9–47.0% of the significant relationships between field of study and net earnings.

Figure 5.10 visualizes the estimated net earnings effects together with 95% confidence intervals.

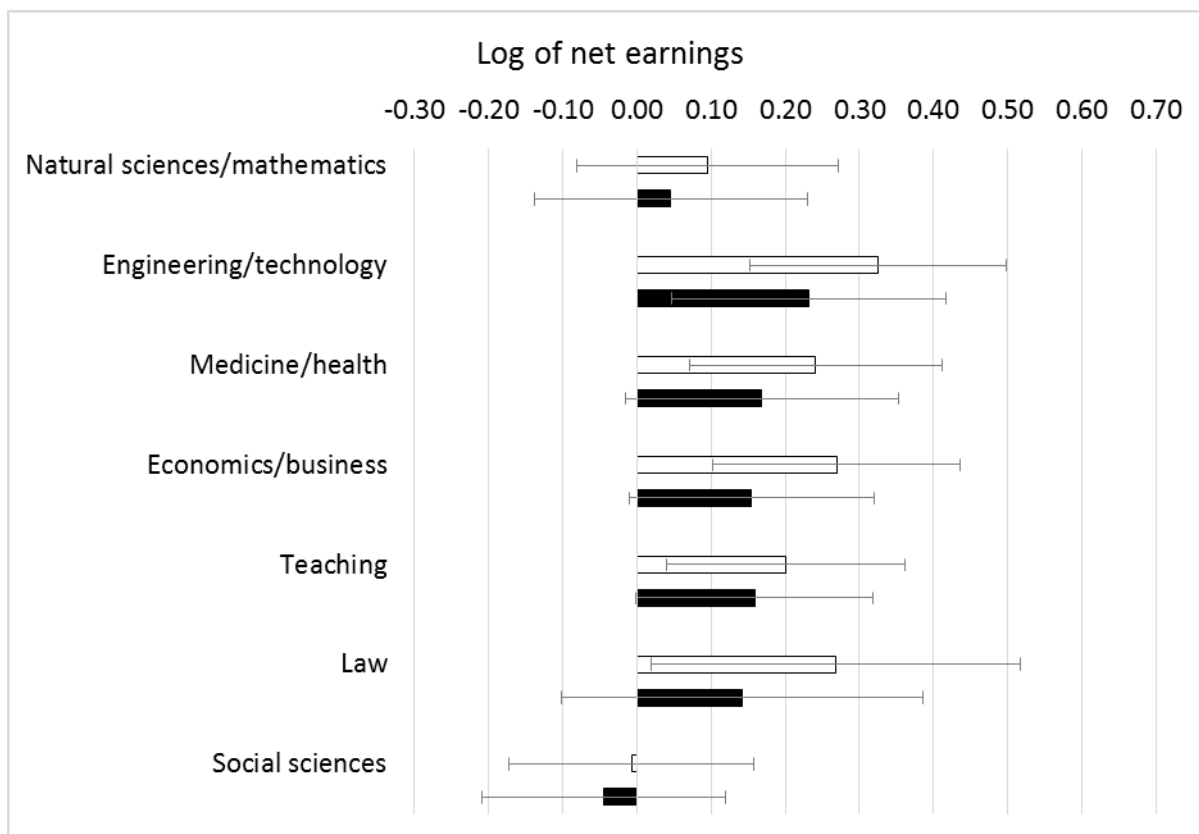
Table 5.5: Field of study and net earnings

Variables	(1) Log of net earnings: without individual characteristics	(2) Log of net earnings: with individual characteristics	Relative difference in estimated coefficient
Field of study: (reference category: humanities)			
Natural sciences/mathematics	0.095 (0.090)	0.046 (0.094)	-51.6%
Engineering/technology	0.325** (0.088)	0.232* (0.094)	-28.8%
Medicine/health	0.241** (0.087)	0.169+ (0.094)	-30.1%
Economics/business	0.269** (0.085)	0.155+ (0.084)	-42.6%
Teaching	0.201* (0.082)	0.159+ (0.082)	-20.9%
Law	0.268* (0.127)	0.142 (0.124)	-47.0%
Social sciences	-0.007 (0.084)	-0.044 (0.083)	522.1%
Educational achievement:			
Math competencies		0.020 (0.032)	
English competencies		0.002 (0.018)	
High school GPA		0.011 (0.026)	
Cognitive abilities:			
Cognitive abilities		0.010 (0.024)	
Vocational interests:			
Realistic interests		0.010 (0.026)	
Investigative interests		0.011 (0.022)	
Artistic interests		-0.078** (0.025)	
Social interests		-0.032 (0.021)	
Enterprising interests		0.082* (0.038)	
Conventional interests		-0.026 (0.025)	
Personality traits:			
Openness		0.032 (0.020)	
Conscientiousness		0.035+	

		(0.018)
Extraversion		0.030
		(0.033)
Agreeableness		-0.019
		(0.019)
Neuroticism		0.008
		(0.018)
Socio-economic background:		
Parental education level		0.016
		(0.021)
Parental occupational status		0.015
		(0.020)
Biographical controls and type of high school:		
Female	-0.338**	-0.273**
	(0.040)	(0.045)
Age	-0.031	-0.027
	(0.035)	(0.033)
Migration background	0.052	0.065
	(0.042)	(0.043)
Vocational school	-0.035	-0.015
	(0.036)	(0.036)
Study-related controls:		
Master degree	0.047	0.014
	(0.110)	(0.116)
PhD/doctoral degree	0.217	0.135
	(0.136)	(0.141)
University of applied sciences	0.059	0.108+
	(0.051)	(0.059)
Cooperative state university	-0.092	-0.073
	(0.073)	(0.076)
Year of study start	-0.043*	-0.033
	(0.020)	(0.021)
Family status:		
Married	-0.013	-0.029
	(0.049)	(0.050)
Children	-0.116*	-0.117*
	(0.048)	(0.048)
Observations	1,029	1,029
R-squared	0.184	0.217
Difference in R-squared between models (1) and (2), chi-squared test		**

Multivariate structural equation models with full-information maximum likelihood. The dependent variable is the natural logarithm of monthly net earnings. All individual characteristics (educational achievement, cognitive abilities, vocational interests, personality traits, and socio-economic background) are z-standardized. Both model (1) and model (2) include biographical controls and type of high school, study-related controls, and family status. Robust standard errors in parentheses. ** $p < .01$. * $p < .05$. + $p < .10$.

Figure 5.10: Field of study and net earnings



Coefficients for the estimated effects of field of study on the natural logarithm of monthly net earnings, together with 95% confidence intervals. Humanities is the reference category for field of study. White bars: no individual characteristics included (model (1)). Black bars: all individual characteristics included (model (2)). See description of Table 5.5 for details of the analysis.

5.4.4 Robustness checks

We perform several tests to check the robustness of our results. The detailed results of the robustness checks are shown in Tables 5.6–5.11 and demonstrate the robustness of our findings.

As a first robustness check, we exclude individuals who are currently not working (in the last wave 2016) and who therefore report earnings from their last occupation instead of the current one. Dropping these individuals reduces the final sample to 867 observations (of these, 823 individuals provide their gross earnings and 836 provide net earnings). Some point estimates for field of study coefficients increase slightly, which is more strongly the case for medicine/health. This suggests that medicine/health graduates who are working 14 years after high school graduation tend to receive substantially higher earnings than those who are currently not working used to receive at an earlier point of their career. Furthermore, in the net earnings analysis, the coefficient for law is now only marginally significant in model (1) and the effect of economics/business is not significant anymore in model (2). Otherwise the results are equivalent to the baseline findings. (See Tables 5.6 and 5.7.)

Table 5.6: Robustness check 1: Only including those who are employed and report current earnings (gross earnings analysis)

Variables	(1) Log of gross earnings: without individual characteristics	(2) Log of gross earnings: with individual characteristics	Relative difference in estimated coefficient
Natural sciences/mathematics	0.175+ (0.104)	0.123 (0.107)	-29.8%
Engineering/technology	0.422** (0.100)	0.341** (0.105)	-19.1%
Medicine/health	0.426** (0.098)	0.370** (0.106)	-13.3%
Economics/business	0.375** (0.098)	0.272** (0.103)	-27.5%
Teaching	0.145 (0.096)	0.121 (0.095)	-16.9%
Law	0.171 (0.123)	0.075 (0.125)	-56.4%
Social sciences	0.036 (0.097)	-0.005 (0.098)	-113.6%
Math competencies		0.027 (0.036)	
English competencies		0.014 (0.020)	
High school GPA		0.012 (0.029)	
Cognitive abilities		0.002 (0.028)	
Realistic interests		0.024 (0.024)	
Investigative interests		0.002 (0.026)	
Artistic interests		-0.057+ (0.033)	
Social interests		-0.029 (0.023)	
Enterprising interests		0.068 (0.042)	
Conventional interests		-0.024 (0.027)	
Openness		0.017 (0.023)	
Conscientiousness		0.024 (0.021)	
Extraversion		0.030 (0.040)	
Agreeableness		-0.026 (0.021)	
Neuroticism		-0.006 (0.021)	
Parental education level		0.013 (0.022)	

Parental occupational status		0.033+
		(0.018)
Female	-0.373**	-0.295**
	(0.044)	(0.049)
Age	-0.018	-0.017
	(0.041)	(0.039)
Migration background	-0.011	0.005
	(0.043)	(0.044)
Vocational school	-0.035	0.002
	(0.038)	(0.039)
Master degree	-0.051	-0.100
	(0.139)	(0.152)
PhD/doctoral degree	0.143	0.054
	(0.157)	(0.167)
University of applied sciences	0.044	0.086
	(0.060)	(0.071)
Cooperative state university	-0.165	-0.136
	(0.104)	(0.110)
Year of study start	-0.074**	-0.054*
	(0.027)	(0.026)
Married	0.077	0.070
	(0.068)	(0.071)
Children	-0.249**	-0.260**
	(0.082)	(0.088)
Constant	157.682**	116.408*
	(54.548)	(51.423)
Observations	823	823
R-squared	0.258	0.273
Difference in R-squared between models (1) and (2), chi-squared test		**

** $p < .01$. * $p < .05$. + $p < .10$.

Table 5.7: Robustness check 1: Only including those who are employed and report current earnings (net earnings analysis)

Variables	(1) Log of net earnings: without individual characteristics	(2) Log of net earnings: with individual characteristics	Relative difference in estimated coefficient
Natural sciences/mathematics	0.100 (0.101)	0.007 (0.104)	-93.2%
Engineering/technology	0.324** (0.099)	0.201* (0.101)	-38.0%
Medicine/health	0.331** (0.092)	0.234* (0.097)	-29.3%
Economics/business	0.293** (0.094)	0.150 (0.093)	-48.8%
Teaching	0.234** (0.090)	0.184* (0.088)	-21.2%
Law	0.216+ (0.114)	0.070 (0.119)	-67.3%
Social sciences	0.023 (0.090)	-0.034 (0.091)	-245.6%
Math competencies		0.025 (0.035)	
English competencies		0.007 (0.019)	
High school GPA		0.030 (0.027)	
Cognitive abilities		-0.002 (0.026)	
Realistic interests		0.015 (0.025)	
Investigative interests		0.004 (0.023)	
Artistic interests		-0.083** (0.029)	
Social interests		-0.045* (0.021)	
Enterprising interests		0.058 (0.041)	
Conventional interests		-0.002 (0.027)	
Openness		0.030 (0.021)	
Conscientiousness		0.016 (0.019)	
Extraversion		0.045 (0.038)	
Agreeableness		-0.016 (0.020)	
Neuroticism		-0.011 (0.019)	
Parental education level		0.016 (0.021)	

Parental occupational status		0.027 (0.018)
Female	-0.357** (0.040)	-0.280** (0.045)
Age	-0.033 (0.039)	-0.029 (0.036)
Migration background	0.017 (0.041)	0.033 (0.041)
Vocational school	-0.017 (0.037)	0.021 (0.038)
Master degree	-0.018 (0.127)	-0.080 (0.136)
PhD/doctoral degree	0.195 (0.149)	0.091 (0.153)
University of applied sciences	0.111+ (0.060)	0.154* (0.071)
Cooperative state university	-0.129 (0.085)	-0.121 (0.089)
Year of study start	-0.047* (0.021)	-0.031 (0.020)
Married	0.018 (0.057)	0.006 (0.058)
Children	-0.161* (0.066)	-0.167* (0.068)
Constant	102.085* (42.608)	69.792+ (40.077)
Observations	836	836
R-squared	0.207	0.247
Difference in R-squared between models (1) and (2), chi-squared test		**

** $p < .01$. * $p < .05$. + $p < .10$.

As a second robustness check, we assign individuals with a combined economics/business and natural sciences/mathematics program (e.g., business informatics) not to the economics/business category but to natural sciences/mathematics; analogously, we assign those with a combined economics/business and engineering/technology program (e.g., business engineering) not to economics/business but to engineering/technology. These changes affect 47 individuals in the final sample. While natural sciences/mathematics now shows a marginally significant positive relationship with gross earnings in model (1), the point estimates for economics/business decrease slightly, and the effect of economics/business on net earnings becomes insignificant in model (2). This suggests that a part of the positive earnings effects of economics/business is created by combined programs with STEM. (See Tables 5.8 and 5.9.)

Table 5.8: Robustness check 2: Alternative field classification (gross earnings analysis)

Variables	(1) Log of gross earnings: without individual characteristics	(2) Log of gross earnings: with individual characteristics	Relative difference in estimated coefficient
Natural sciences/mathematics	0.176+ (0.096)	0.148 (0.100)	-15.7%
Engineering/technology	0.396** (0.094)	0.343** (0.102)	-13.5%
Medicine/health	0.302** (0.095)	0.266** (0.103)	-11.8%
Economics/business	0.287** (0.095)	0.205* (0.095)	-28.4%
Teaching	0.066 (0.091)	0.038 (0.091)	-42.9%
Law	0.200 (0.137)	0.106 (0.130)	-47.1%
Social sciences	-0.042 (0.094)	-0.073 (0.093)	73.4%
Math competencies		0.022 (0.032)	
English competencies		0.011 (0.019)	
High school GPA		-0.005 (0.028)	
Cognitive abilities		0.020 (0.026)	
Realistic interests		0.006 (0.027)	
Investigative interests		0.008 (0.026)	
Artistic interests		-0.058* (0.028)	
Social interests		-0.017 (0.023)	
Enterprising interests		0.092* (0.038)	
Conventional interests		-0.038 (0.026)	
Openness		0.020 (0.022)	
Conscientiousness		0.042* (0.021)	
Extraversion		0.010 (0.034)	
Agreeableness		-0.029 (0.021)	
Neuroticism		0.008 (0.020)	
Parental education level		0.010 (0.022)	

Parental occupational status		0.021 (0.020)
Female	-0.344** (0.045)	-0.278** (0.049)
Age	-0.030 (0.037)	-0.028 (0.035)
Migration background	0.043 (0.046)	0.054 (0.047)
Vocational school	-0.049 (0.038)	-0.026 (0.039)
Master degree	0.039 (0.123)	0.022 (0.131)
PhD/doctoral degree	0.161 (0.151)	0.101 (0.158)
University of applied sciences	0.007 (0.055)	0.057 (0.063)
Cooperative state university	-0.103 (0.088)	-0.080 (0.092)
Year of study start	-0.071** (0.026)	-0.056* (0.026)
Married	0.042 (0.057)	0.029 (0.059)
Children	-0.189** (0.058)	-0.194** (0.060)
Constant	150.271** (52.203)	120.659* (53.044)
Observations	1,006	1,006
R-squared	0.227	0.245
Difference in R-squared between models (1) and (2), chi-squared test		**

Combined programs with economics/business and natural sciences/mathematics assigned to natural sciences/mathematics, combined programs with economics/business and engineering/technology assigned to engineering/technology. ** $p < .01$. * $p < .05$. + $p < .10$.

Table 5.9: Robustness check 2: Alternative field classification (net earnings analysis)

Variables	(1) Log of net earnings: without individual characteristics	(2) Log of net earnings: with individual characteristics	Relative difference in estimated coefficient
Natural sciences/mathematics	0.122 (0.090)	0.070 (0.093)	-42.1%
Engineering/technology	0.324** (0.088)	0.238* (0.095)	-26.6%
Medicine/health	0.237** (0.087)	0.176+ (0.094)	-25.4%
Economics/business	0.240** (0.087)	0.133 (0.084)	-44.8%
Teaching	0.194* (0.082)	0.155+ (0.082)	-20.0%
Law	0.262* (0.128)	0.136 (0.124)	-48.0%
Social sciences	-0.018 (0.083)	-0.054 (0.082)	195.6%
Math competencies		0.020 (0.031)	
English competencies		0.003 (0.018)	
High school GPA		0.009 (0.026)	
Cognitive abilities		0.010 (0.024)	
Realistic interests		0.007 (0.026)	
Investigative interests		0.005 (0.023)	
Artistic interests		-0.079** (0.025)	
Social interests		-0.032 (0.021)	
Enterprising interests		0.086* (0.037)	
Conventional interests		-0.024 (0.025)	
Openness		0.033 (0.020)	
Conscientiousness		0.036* (0.018)	
Extraversion		0.029 (0.033)	
Agreeableness		-0.019 (0.019)	
Neuroticism		0.008 (0.018)	
Parental education level		0.016 (0.021)	

Parental occupational status		0.016 (0.020)
Female	-0.334** (0.042)	-0.272** (0.046)
Age	-0.033 (0.035)	-0.030 (0.033)
Migration background	0.056 (0.042)	0.066 (0.043)
Vocational school	-0.033 (0.036)	-0.012 (0.036)
Master degree	0.052 (0.111)	0.018 (0.116)
PhD/doctoral degree	0.211 (0.136)	0.131 (0.140)
University of applied sciences	0.064 (0.051)	0.111+ (0.059)
Cooperative state university	-0.073 (0.072)	-0.064 (0.074)
Year of study start	-0.043* (0.020)	-0.033 (0.021)
Married	-0.010 (0.050)	-0.030 (0.051)
Children	-0.113* (0.048)	-0.115* (0.047)
Constant	94.425* (40.871)	74.904+ (41.733)
Observations	1,029	1,029
R-squared	0.183	0.218
Difference in R-squared between models (1) and (2), chi-squared test		**

Combined programs with economics/business and natural sciences/mathematics assigned to natural sciences/mathematics, combined programs with economics/business and engineering/technology assigned to engineering/technology. ** $p < .01$. * $p < .05$. + $p < .10$.

As a third and last robustness check, we use a more established method – linear regressions with ordinary least squares (OLS) – instead of structural equation models with full-information maximum likelihood, where missing values on the control variables are accepted. The OLS model only includes individuals without any missing values, therefore the sample size decreases to 455 observations (of these, 440 individuals report gross earnings and 441 report net earnings). Estimated field effects on earnings tend to be slightly larger in the OLS models, which is more strongly the case for medicine/health. The other results are equivalent to our baseline findings. (See Tables 5.10 and 5.11.)

Table 5.10: Robustness check 3: Using ordinary least squares (gross earnings analysis)

Variables	(1) Log of gross earnings: without individual characteristics	(2) Log of gross earnings: with individual characteristics	Relative difference in estimated coefficient
Natural sciences/mathematics	0.167 (0.103)	0.102 (0.113)	-38.8%
Engineering/technology	0.423** (0.092)	0.318** (0.110)	-24.9%
Medicine/health	0.525** (0.102)	0.405** (0.118)	-22.8%
Economics/business	0.403** (0.096)	0.299** (0.110)	-25.8%
Teaching	0.129 (0.104)	0.093 (0.112)	-27.4%
Law	0.391+ (0.199)	0.286 (0.195)	-26.9%
Social sciences	-0.027 (0.108)	-0.067 (0.119)	147.3%
Math competencies		-0.013 (0.026)	
English competencies		0.040 (0.025)	
High school GPA		0.032 (0.031)	
Cognitive abilities		-0.039 (0.025)	
Realistic interests		0.017 (0.031)	
Investigative interests		0.037 (0.026)	
Artistic interests		-0.048 (0.032)	
Social interests		-0.010 (0.031)	
Enterprising interests		0.075* (0.036)	
Conventional interests		-0.018 (0.029)	
Openness		0.024 (0.031)	
Conscientiousness		0.061* (0.029)	
Extraversion		-0.026 (0.032)	
Agreeableness		-0.020 (0.027)	
Neuroticism		0.008 (0.027)	
Parental education level		0.003 (0.024)	

Parental occupational status		-0.012 (0.027)
Female	-0.434** (0.048)	-0.406** (0.057)
Age	-0.109* (0.045)	-0.106* (0.044)
Migration background	0.025 (0.053)	0.039 (0.055)
Vocational school	-0.042 (0.047)	-0.035 (0.052)
Master degree	0.171+ (0.093)	0.155 (0.099)
PhD/doctoral degree	0.205+ (0.110)	0.171 (0.113)
University of applied sciences	-0.005 (0.050)	0.021 (0.056)
Cooperative state university	-0.199* (0.088)	-0.170+ (0.088)
Year of study start	-0.031* (0.015)	-0.019 (0.015)
Married	0.039 (0.047)	0.023 (0.048)
Children	-0.211** (0.044)	-0.176** (0.045)
Constant	72.710* (29.567)	48.874+ (29.482)
Observations	440	440
R-squared	0.368	0.414
Difference in R-squared between models (1) and (2), <i>F</i> -test		**

** $p < .01$. * $p < .05$. + $p < .10$.

Table 5.11: Robustness check 3: Using ordinary least squares (net earnings analysis)

Variables	(1) Log of net earnings: without individual characteristics	(2) Log of net earnings: with individual characteristics	Relative difference in estimated coefficient
Natural sciences/mathematics	0.107 (0.097)	0.073 (0.112)	-31.9%
Engineering/technology	0.311** (0.092)	0.229* (0.110)	-26.4%
Medicine/health	0.453** (0.096)	0.351** (0.112)	-22.7%
Economics/business	0.341** (0.095)	0.251* (0.108)	-26.5%
Teaching	0.263** (0.101)	0.243* (0.111)	-7.4%
Law	0.405* (0.195)	0.295 (0.191)	-27.2%
Social sciences	-0.039 (0.104)	-0.070 (0.113)	79.0%
Math competencies		-0.011 (0.026)	
English competencies		0.025 (0.026)	
High school GPA		0.046 (0.032)	
Cognitive abilities		-0.044+ (0.026)	
Realistic interests		0.023 (0.030)	
Investigative interests		0.013 (0.026)	
Artistic interests		-0.067* (0.031)	
Social interests		-0.019 (0.030)	
Enterprising interests		0.062 (0.039)	
Conventional interests		-0.011 (0.031)	
Openness		0.047+ (0.028)	
Conscientiousness		0.045 (0.028)	
Extraversion		0.013 (0.033)	
Agreeableness		-0.023 (0.026)	
Neuroticism		0.026 (0.026)	
Parental education level		0.012 (0.025)	

Parental occupational status		-0.005 (0.026)
Female	-0.457** (0.048)	-0.443** (0.061)
Age	-0.117* (0.046)	-0.115** (0.044)
Migration background	0.038 (0.052)	0.043 (0.055)
Vocational school	-0.010 (0.046)	-0.005 (0.053)
Master degree	0.162* (0.081)	0.122 (0.088)
PhD/doctoral degree	0.217* (0.098)	0.155 (0.102)
University of applied sciences	0.036 (0.050)	0.063 (0.056)
Cooperative state university	-0.154+ (0.080)	-0.138+ (0.080)
Year of study start	-0.014 (0.013)	-0.007 (0.013)
Married	-0.005 (0.043)	-0.026 (0.042)
Children	-0.138** (0.041)	-0.104* (0.041)
Constant	38.955 (27.089)	23.494 (26.579)
Observations	441	441
R-squared	0.341	0.389
Difference in R-squared between models (1) and (2), <i>F</i> -test		**

** $p < .01$. * $p < .05$. + $p < .10$.

5.5 Conclusion

Based on a representative and longitudinal data set with upper secondary school graduates from one German state, the present study shows that individual characteristics at the end of high school (psychological and sociological factors) significantly predict later earnings beyond field of study at university. The point estimates suggest that selection by individual characteristics accounts for 15.9–47.0% of the relationships between field of study and earnings.

These results indicate the importance of individual characteristics before studying at university for later earnings, even conditional on field of study (in particular, vocational interests and personality traits turn out to be significantly relevant). At the same time, the results show that significant associations between field of study and earnings remain even when controlling for all available individual characteristics. This suggests that field of study may have causal effects on earnings, as indicated by previous studies (see, e.g., HASTINGS/NEILSON/ZIMMERMAN 2013; KIRKEBOEN/LEUVEN/MOGSTAD 2016).

Different mechanisms may explain the remaining effects of field of study on earnings. One plausible mechanism is signaling (see SPENCE 1973): By graduating from specific fields, individuals signal abilities and other desired characteristics to the labor market that were already present before studying the respective field. Another plausible explanation is human capital investment, meaning that particular skills that increase productivity on the labor market are gathered during specific study programs more than in other fields. It is also plausible that the relationship between labor demand and supply systematically differs between fields. Empirical evidence, analyzing the effects of a reform in the study curriculum of economics and business programs in one university, indicates that returns to university programs may largely be explained by human capital investment (see ARTEAGA 2018).

A limitation of our study is that unobserved selection effects cannot be ruled out. While we control for extensive individual characteristics, there might be other factors and other selection patterns that explain a part of the relationships between field of study and earnings. However, because unobserved individual characteristics may create additional selection effects, our estimates are most likely lower-bound estimates for the role of selection effects, and field effects may in fact decrease even more strongly. Ideally, we would use an experiment, quasi-experiment, or instrumental variable to approximate causal field

effects and compare these estimates to the coefficients from model (1), which do not account for selection by individual characteristics.

One factor that we do not consider is the role of interactions between individual characteristics and field of study: It has repeatedly been noted that individual characteristics can moderate field effects on earnings (see, e.g., ALTONJI/ARCIDIACONO/MAUREL 2016; HASTINGS/NEILSON/ZIMMERMAN 2013). The inclusion of such interaction effects is beyond the scope of the present study: First, the estimation of the structural equation models with full-information maximum likelihood becomes barely tractable; second, the interpretation of field of study coefficients changes when interaction effects are included as well, so that the comparison between the model without and with individual characteristics would be impaired. However, the investigation of interaction effects between individual characteristics and field of study is an interesting avenue for future research.

6 Conclusion of the dissertation

6.1 Main findings

In addition to the specific results of each of the four studies (as presented in chapters 2–5), some general insights are gained in this dissertation. First, the dissertation finds support for the role of person-environment fit with respect to personality in the transition from the education system to the labor market: Specific personality-related characteristics are associated with specific educational and occupational environments (fields of study, professions, and sectors of employment), which points to congruence (similarity) between individuals and their environments (opportunities, demands, fellow students, and colleagues).

Among university students, field of study is significantly associated with specific social preferences (see chapter 2), which suggests mutual selection and (possible) adaptation of person and environment with regard to motives. Although business/economics students make experimental choices with higher self-interest, they exhibit significantly less positional preferences (preferences concerning the relative position in comparison to others) than students with another major, on average. This preference for more efficient choices (increasing the total payoff of the group) versus relative and equity concerns fits the usual fundamentals of the curriculum in this field of study.

Person-environment fit also becomes evident in the result that individuals with higher civic virtue are more probable to be employed in a sector that is directly concerned with serving the society (the public sector), when holding other motives (altruism, risk aversion, and laziness, and financial motivation) constant (see chapter 3). The positive association between civic virtue and public versus private sector employment holds within different branches (e.g., health and social care, service, and – with a weak effect – education) and is found to be due to (self-) selection (before the start of the career and in the form of sector changes during the career).

The dissertation then goes beyond the transition to sectors of employment and focuses on a specific profession, the teaching profession (see chapter 4): Rather than comparing public and private sector employees within the education branch (as in chapter 3), teachers are compared to non-teaching employees. The focus is on the motive of risk aversion, which is included as a control variable in chapter 3. The study finds support for the hypothesis that the teaching profession – as a profession that appears highly familiar and

that is associated with relatively high expected job security and rather fixed payment schemes – attracts individuals that score higher in risk aversion than observationally equivalent other employees. As expected, the relationship is particularly strong for risk aversion with respect to occupational career, holds within a more narrowly defined job area (the caring branch of education, health, and social care), and statistically already holds for individuals with no year of work experience. We find tentative evidence that socialization additionally contributes to teachers' higher risk aversion, at least for occupation-related risk aversion.

Finally, person-environment fit with respect to personality is found for the transition from high school to university and the labor market (see chapter 5). The results of the study show that individual characteristics at the end of high school, including vocational interests and personality traits, significantly predict earnings 14 years later beyond field of study (that is, when holding field of study constant). The results further suggest that estimated effects of field of study on earnings decrease when controlling for individual characteristics. This indicates that personality is associated both with field of study and with earnings on the labor market, and that individuals with characteristics that are more desirable on the labor market (e.g., higher enterprising interests, lower artistic interests, and higher conscientiousness) tend to be sorted into more profitable fields, which creates a positive bias if not controlling for individual characteristics. These selection effects are in line with person-environment fit theory, which would predict that individuals with similar personality tend to choose fields (and to be selected into fields) which are associated with specific opportunities, demands, and people in their study environment and their expected occupational environment.

While the dissertation finds support for the role of person-environment fit with respect to personality in the transition from the education system to the labor market, a second main finding is that the *extent* of the personality-related similarities is often weak: The associations between individuals' personality and specific occupational environments (compared to other occupational environments), as found in the present dissertation, are not large. For example, the theoretically predicted relationship between civic virtue and public versus private sector employment is positive and significant, but small (see chapter 3): With all control variables (biographical, work-related, and Big Five personality traits), a higher value in civic virtue by one standard deviation is associated with an increase in the probability of public sector employment by 4.9 percentage points (see subchapter 3.4.2). As discussed in subchapter 3.5, this is a small standardized effect size of 0.11 in

terms of Cohen's d (see COHEN 1988). The estimated relationship is overall similar within most branches and when concentrating on the motives before sector selection (that is, in the year before the first employment or before a change from the private to the public sector) (see subchapters 3.4.3 and 3.4.4). There is also a small positive relationship between risk aversion and public sector employment; the standardized effect size, calculated by dividing the coefficient in Model 5 of Table 3.5 by the standard deviation of the dependent variable, as shown in Table 3.3, amounts to $d = 0.05$. The estimated association between occupational-related risk aversion and public sector employment when including all control variables (see subchapter 3.4.3) is only slightly larger and amounts to $d = 0.06$. The theoretically predicted relationship between teaching profession and risk aversion is also not large, but small to moderate (see chapter 4): Teachers score 0.15 standard deviations higher in risk aversion than observationally equivalent other employees, on average, while the association with occupation-related risk aversion is significantly larger and amounts to 0.33 standard deviations (see subchapter 4.4.2). The relationship between teaching profession and risk aversion is similar – but smaller for occupation-related risk aversion – at zero years of experience (see subchapter 4.4.4).

However, a third main finding is that indications of person-environment fit are stronger when comparing university students in different fields of study. Using an experimental measure of positional preferences – as one form of social preferences – chapter 2 shows that majoring in business/economics relates to approximately 0.62 less positional choices over all six games choices, on average (see subchapter 2.5.2). This effect appears relatively substantial (more than 10% of the choices), and the standardized effect size is $d = 0.38$, a medium effect. In chapter 5 it is seen that students in different fields of study differ substantially from each other, on average, with respect to their vocational interests, while the average differences in personality traits are smaller (see subchapter 5.4.1). The results suggest that all considered individual characteristics (educational achievement, cognitive abilities, vocational interests, personality traits, and socio-economic background) together explain 15.9–47.0% of the significant relationships between field of study and earnings.

Therefore, when assessing the role of personality for the transition from the education system to the labor market, it appears that motives (preferences) and interests are highly relevant for (self-) selection into fields of study, while the selection into specific sectors and professions on the labor market is overall only weakly related to motives. Moreover, there is only weak evidence for socialization effects with respect to motives on the labor

market. This suggests that, although (self-) selection by personality exists on the labor market, a substantial amount of personality-related heterogeneity remains in occupational careers. According to person-environment fit theory, this middle course between personality-related congruence and diversity might allow for taking the advantages of congruence (e.g., high productivity in specialized tasks, and low conflict), while at the same time fulfilling different demands within the same area and remaining flexible for a changing environment.

6.2 Practical implications

In addition to their theoretical relevance in the context of person-environment fit theories, the main findings of the dissertation have practical implications, including policy implications. Because the motives considered in this dissertation mostly show only weak associations with occupations, organizations may search for new ways to attract individuals with specific personality-related characteristics in case they regard these characteristics as highly desirable. In particular, given the importance of civic virtue – the motive to contribute to society – for good governance in the public sector (see BOWLES/HWANG 2008), the rather weak relationship between civic virtue and public sector employment (see chapter 3) may motivate additional attempts to find and attract individuals with high civic virtue. According to person-environment fit theory, it might be that the small fit between employees' motives and the mission of public sector organizations is a consequence of working conditions in the public sector that do not fit the motive of civic virtue. The attraction of individuals with high civic virtue might be successful if working conditions are provided that are congruent with this motive, for example by strengthening job autonomy and the experience of societal impact in the job. It is plausible that such working conditions might also have positive socialization effects in terms of sustained or increasing civic virtue instead of the empirically observed decrease of civic virtue in the public sector (see subchapter 3.4.5).

From a broader perspective, it is important to note that the attraction of more suitable graduates and applicants to one particular branch or sector might easily end up as a zero-sum game (a situation with relative winners and relative losers with no benefit in total). For example, the successful attraction of the most motivated graduates to the public sector could worsen the situation of the private sector. Even though civic virtue may be more important for performance in the public sector, at a certain level the additional advantage

for the public sector may be outweighed by increasing disadvantages through less motivated workers in the private sector (for the importance of civic virtue within organizations in general, see ORGAN 1988). In this context, it is particularly interesting that the overall values of civic virtue in the population are rather low and, in particular, lower than altruism, the motive to care for others (see subchapter 3.4 and Table 3.3). If the care for those in the closer environment is not sufficient for the well-being in a whole society or organization – for example, because some groups have disadvantages in their conditions, or because of an insufficient investment in public goods – then these rather low values of civic virtue may be seen as a matter of concern. Policy makers might therefore search for ways to further foster and support civic virtue in the whole population, starting in education.

While a stronger fit between person and environment might be desirable in the case of civic virtue and the mission of the public sector, in other cases person-environment fit might have more ambiguous effects on organizational performance. In particular, this might be the case for the positive relationship between risk aversion and the teaching profession (see chapter 4). While extreme degrees of risk seeking are certainly not optimal, high degrees of risk aversion may lead to resistance to reforms and performance pay and thereby make such reforms more costly (see BOWEN et al. 2015). The results on risk aversion and the teaching profession tentatively suggest that the education sector should search for potential teachers who are interested in modern and innovative teaching. The flexibility that is required in the teaching profession should be reflected in the process of finding and employing teachers, and both the contents of teacher education programs and the working environment of teachers should be compatible with (and support) the motives of innovative, goal-oriented, and continuously learning personnel. However, risk aversion might also prevent teachers from implementing inefficient changes and from taking risks in school excursions and the like. An overall evaluation of the implications of risk aversion among teachers is not possible with the results of this dissertation.

Other practical implications are based on the substantial association between personality and field of study at university; in particular, the negative relationship between studying business/economics and the motive of positional preferences (see chapter 2). While there may still be reasons to criticize parts of business and economics curricula, this field appears to have an important advantage due to (self-) selection and/or socialization: Business/economics students tend to make decisions in the dictator games that increase the group payoff, and they tend to stay away from decisions that appear attractive from a pure

equity perspective but have no advantage (in absolute terms) for any single player. This result suggests that the focus on efficiency in the field of business/economics can be socially advantageous. Therefore, if higher education institutes and policy makers want to decrease the distance between business/economics and other social sciences, then it may not only be useful to foster, e.g., the consideration of psychological and sociological insights in economics, but also – vice versa – to foster the consideration of economic reasoning in other social sciences. Moreover, efficient decision making and the effects of cooperation might be a socially relevant part of education more generally.

6.3 Limitations

In this subchapter, some general limitations of the dissertation are discussed, which do not only refer to one specific study. Because the dissertation includes four different studies that have different research questions and use different data sources (experiment in chapter 2, SOEP data in chapters 3 and 4, and TOSCA data in chapter 5), a first limitation is that the personality constructs are not completely consistent across studies. While chapter 2 focuses on positional preferences, chapters 3 and 4 focus on other motives (in particular, civic virtue and risk aversion). Chapter 5 includes a large set of individual characteristics including vocational interests; these are not included in the other studies. Therefore, the comparison of findings across studies is only possible to a limited extent. It might be, for example, that vocational interests are not only important for field of study but also for (self-) selection into an occupational environment such as the employment sector and/or profession (see WILLE et al. 2014).

A second limitation arises from the use of short measures of personality. While chapters 2 and 5 can make use of extensive and established personality measures, in chapters 3 and 4 the short scales from the Socio-Economic Panel (SOEP) are used. The SOEP measures of personality traits show high correlations with more extensive measures (see HAHN/GOTTSCHLING/SPINATH 2012), and the measure of risk aversion is established in the literature (see, e.g., DOHMEN/FALK 2010) and predicts behavioral measures of risk aversion (see DOHMEN et al. 2005). Nevertheless, these short scales are not ideal for studying personality, which is also indicated by partly only moderate internal consistencies. There simply is not enough space for more extensive personality measures in the SOEP, which might also indicate general limits of large-scale interdisciplinary research in the current time.

A third limitation is that, except for chapter 2, the results of the present dissertation are not gathered through experiments. There is no random assignment: It is barely possible to randomly assign personality (although some attempts to manipulate or change personality have been made in research; see, e.g., BURSZTYN et al. 2017; ROBERTS/HILL/DAVIS 2017; STEELE/LIU 1983), and it is barely possible to randomly assign field of study or the occupation in practice. Moreover, no suitable quasi-experiments or instruments are available. These restrictions limit the possibility to identify causal effects.

Several attempts are made to approximate causal effects based on the available data. While it is not possible in chapter 2 to distinguish whether differences between business/economics and other students are due to selection and/or socialization – almost all students are roughly in the middle of their studies – in the other chapters attempts are made to distinguish selection and socialization. In chapter 3, selection effects are estimated by focusing on motives in the year before the first employment and the year before sector changes. In chapter 4, where the number of prospective teachers in the year before the first employment and the number of changes between teaching and non-teaching are too limited, selection effects are instead approximated by including work experience, its interaction with teaching, and in particular the estimated effect of teaching at zero years of experience. In both chapters 3 and 4, fixed effects regression are included, where each individual is held constant and intra-individual changes over time are studied, to approximate socialization effects. Chapter 5 benefits from the longitudinal design of the data set: As a cohort study, all individuals graduate from high school in the same year (2002), and all individual characteristics are observed just in that year, so that a confounding of selection effects and socialization processes in higher education or on the labor market can be ruled out.

Lastly, all data used in the present dissertation stem from Germany. The possibility that results would be different in other countries, cannot be excluded. This might be particularly relevant in chapter 4, because teachers in Germany mostly have the status of civil servants, which is not internationally comparable. Therefore, a check is performed where the analysis is restricted to public servants without civil servant status (see subchapter 4.4.3). However, this does not completely solve the problem, because working in the teaching profession in Germany without civil servant status is an atypical situation, at least in most German states. In chapter 5, it is well possible that relationships between field of study and earnings are different in other countries due to differences in industrial

sectors, and that selection into fields by individual characteristics differs between countries, for example because of differences in study programs. It might also be argued that university students in Germany are in general more homogeneous than in most other countries because of early tracking decisions in the German school system (see ORTIZ/KUCCEL 2008). However, higher education attendance has strongly increased in Germany over the last decades (see, e.g., REIMER/POLLAK 2010), and in other countries, even if there is no early tracking, there is also a systematic selection from secondary school to higher education (see, e.g., CARO/CORTINA/ECCLES 2015). Therefore, it is not clear whether university students in Germany are actually more homogeneous and whether systematic selection into fields of study is actually less pronounced in Germany than in other countries.

6.4 Future research

While the present dissertation aims at increasing our understanding of the role of personality in the transition from the education system to the labor market, there are certainly more questions that remain open – or that have been opened – than have been answered. This subchapter summarizes ideas for future research in this area, based on the main findings of the dissertation.

To find robust and reliable evidence on the various relationships between personality, education, and the labor market, the use of extensive psychological, educational, and sociological measures together with economic variables would be highly beneficial. A data set that contains socio-economic data on a large-scale basis and in addition reliable educational achievement measures and personality scales would be ideal; the measures of the TOSCA data set (Transformation of the Secondary School System and Academic Careers), which is used in chapter 5, constitute an important benchmark. To incentivize the participation in such surveys, considerable amounts of compensation (e.g., monetary compensation) are probably needed, and so large and systematic funding for this purpose would be beneficial – for example, some of the financial resources that are currently used for a plenitude of projects could be used for a solid interdisciplinary data basis instead.

To find evidence that is theoretically and practically informative, these data should ideally be accompanied by research designs that facilitate the detection of causal mechanisms. Studies should use or create opportunities for (quasi-) experimental research in this area. While it appears almost impossible to reliably manipulate personality within a large-scale study – beyond short-term changes in states – research should make use of

alternative opportunities to approximate causal effects: Longitudinal studies and, in particular, cohort studies should be preferred, and the effects of reforms and other relevant external shocks on the education-work transition should be investigated wherever possible. In addition, experiments can be used to assess revealed motives (see, e.g., HOLT/LAURY 2002) instead of relying only on self-evaluations of participants.

A crucial aspect of understanding person-environment fit is the distinction between selection into educational and occupational careers on the one hand and socialization in specific programs or careers on the other hand. There are several important ways to improve the basic understanding developed in the present dissertation. In particular, selection effects should ideally be identified at an early point in time, when individuals first make the decision to enter a particular path (e.g., when choosing a particular field of study at university – as in chapter 5 – or even when choosing specializations at high school), rather than when a job is finally entered (as in chapters 3 and 4). The analysis of long-term developments requires the observation of a sufficiently large number of individuals (“sufficient” in terms of statistical power) of the same cohort over a very long time span. The study of selection and socialization effects should also include the determinants and consequences of re-selection, that is, changes in selection decisions (e.g., changes between school tracks, between fields of study, transition to “untypical” professions after graduating from a particular field, and profession changes; compare subchapter 3.4.4). Moreover, the concrete mechanisms that lead to socialization effects in specific fields or careers should be investigated to build a foundation for possible interventions or reforms.

The development, implementation, and analysis of interventions is an important area of future research that might contribute to prosocial behavior and organizational performance. This research may include the investigation of effects of (educational) interventions on social preferences. As a first step to better understand the relationship between education and social preferences, based on chapter 2 students from various different fields of study should be systematically recruited, and positional preferences would ideally be assessed at different stages of their educational career (e.g., at the start of the first semester, in the middle of their studies, and at the end; ideally even before and after university). Intervention studies could investigate how positional preferences are affected by a lecture on efficient decision making and cooperation, and/or how decisions change when individuals are informed about other players’ average decisions, so that realistic expectations are formed. Another practically relevant intervention study could investigate the effects of working conditions on employees’ prosocial motives.

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Appendix

A.1 Instructions for experimental study (chapter 2): English translation

Sheet 1: participant information

Dear students attending the lecture “Labor, human resource management, organization” (*Arbeit, Personal, Organisation*),

Welcome to our experiment!

We are glad if you take part in our experiment. The aim of the experiment is to better understand preferences.

The data from the experiment are completely kept in confidence and are analyzed only in anonymized form. For this reason, please write neither your name nor your matriculation number on the forms.

The participation in the experiment is voluntary. You can break up your participation at any time without explanation, and this will not result in any disadvantages for you. You can later at any time request the deletion of your data. To this aim, refer to the address on the back of this sheet and give your individual code word, which you determine on the next sheet.

Within the experiment you make six decisions, make a couple of assessments, and answer questions regarding yourself.

Decisions:

In each of the six decisions, you decide between two payoff structures. A payoff structure determines how much money should be paid out to you and how much the other player, who is randomly assigned to you, receives.

Example:

Decision: Choose the payoff structure that you prefer:

- You receive €2, the other player receives €0. Or:
- You receive €1, the other player receives €1.

This means: With your decision between the two payoff structures you determine whether you should get €2 and the player that is assigned to you €0 (first option) or whether each of you should get €1 (second option).

In total, each participant makes six decisions between two payoff structures. After the collection of all sheets, each participant of the experiment is randomly assigned to another participant. For each pair of players, one of the twelve decisions made by these two players in total is randomly selected, and on this basis the payoffs are conducted.

This means, if you had chosen the first payoff structure in the example above and if this decision would have been randomly selected later on, then you would receive €2 and the player that is assigned to you 0€.

The money is paid out on May 8, 2017, after the lecture in front of the lecture hall. For this purpose, please keep the sheet on which you determine your code word (next sheet). After providing the code word you receive the payoff. The payoffs are conducted privately, that is, in concealed envelopes. Additionally, no participant will be informed to which other participant he was assigned. **Note that only those participants who have made all six decisions can participate in the pay-out.**

Please fill out all sheets independently of the other participants and do not communicate with others.

We thank you cordially!

Back of sheet 1

Project leaders:

[Name and affiliation of project leader 1]

[Name and affiliation of project leader 2]

Contact person for possible questions:

[Name of project leader 1]

[Address of project leader 1]

[Telephone number of project leader 1]

[Email address of project leader 1]

Sheet 2: code word**How do you create your personal code word?**

To assign your data correctly without violating the secrecy, we need a password or code word. The code word is constructed such that nobody can draw a conclusion from your code word to your person, we neither. But you can at any time reconstruct your code word if you are asked for it and should have forgotten it. We only have to reveal the rule to you according to which you have to build it.

These are the components of your code word:

1. The last two letters of your mother's birth name
2. The number of letters of your mother's first name
3. The last two letters of your father's first name
4. Your own day of birth (only the day, without month and/or year).

* Please write all numbers with two digits, that is, with leading zero if necessary.

* In case of several or combined first names, please only consider the first.

* If you do not know the respective name, please write XX instead of the letters respectively 00 for the number.

Example (fictitious)

Name of the mother: **Elke**-Hannelore Müller, née Mayerhofer

Name of the father: **Wolf**-Rüdiger Müller

Your birthday: November **09**, 1987

This results in the code word: **ER04LF09**

Please enter your code word now into the boxes:

The last two letters of your mother's birth name:

The number of letters of your mother's first name:

The last two letters of your father's first name:

Your own day of birth (only the *day*):

Important: This list remains with you. Keep it safe! You should not show it to anybody!

Sheet 3: declaration of consent**Declaration of consent**

Hint: This declaration of consent is collected separately from the other sheets. As your name is only written on this declaration and not on the other forms, the anonymity of the experiment remains ensured.

I (name of the participant in block capitals)

have been informed about the study and the experimental procedure in written form. I agree to participate in the experiment and that my data are used in anonymized form. In case I had questions regarding the study, they were answered completely and to my satisfaction by the experimenters.

I agree with the described collection and processing of the data (game decisions, assessments, and personal information). The recording and analysis of the data is conducted in anonymized form at the LEAD Graduate School & Research Network, that is, by using a personal code word that I have generated and that is only known by myself. This means, it is not possible for anybody to connect the data with my name. The sheet on which I generated this code word is in my possession. I know that I can cancel my consent regarding the storage of my data without disadvantages for me. I have been informed that I can at any time request a deletion of all my data. I agree that my anonymized data can further be used for research purposes and are saved for at least 10 years.

I am informed that my name is only written on this declaration of consent.

I had enough time for a decision and am ready to participate in the above-mentioned study. I know that the participation in the study is voluntary and that I can end the participation at any time without giving reasons and without disadvantages for me.

I have received a copy of the participant information and a copy of the declaration of consent. The participant information is part of this declaration of consent.

Place, date, & signature of the participant:

Name of the participant in block capitals:

Place, date, & signature of the experimenter:

Tübingen, April 12, 2017 _____

Name of the experimenter in block capitals:

[Name of project leader 1]

Sheet 4: choices (the order of the six decisions and the order of the two options at each decision are randomized across participants)

Please state your **code word** first, which you have determined on the second to last page. **Attention: Do not leave this field blank**, otherwise we cannot pay out money to you.

Your code word (eight characters, written in one line): _ _ _ _ _ _ _ _

Please make the following decisions now. **Be careful to choose exactly one option at each decision (no double choices).**

Please do not skip any decision. Otherwise your participation in the pay-out is unfortunately not possible.

1st decision: Choose the payoff structure that you prefer:

- You receive €10, the other player receives €10. Or:
- You receive €10, the other player receives €5.

2nd decision: Choose the payoff structure that you prefer:

- You receive €10, the other player receives €10. Or:
- You receive €9, the other player receives €5.

3rd decision: Choose the payoff structure that you prefer:

- You receive €5, the other player receives €10. Or:
- You receive €5, the other player receives €5.

4th decision: Choose the payoff structure that you prefer:

- You receive €5, the other player receives €10. Or:
- You receive €4, the other player receives €4.

5th decision: Choose the payoff structure that you prefer:

- You receive €8, the other player receives €10. Or:

- You receive €8, the other player receives €6.

6th decision: Choose the payoff structure that you prefer:

- You receive €8, the other player receives €10. Or:
- You receive €7, the other player receives €5.

Thank you very much. We have a couple of further questions for you.

Next sheet →

Sheet 5: expectations (the random order of the six decisions and the random order of the two options at each decision are the same as on sheet 4)

Now please assess how the other participants have decided. It is not only about the player that is assigned to you but about all participants in the lecture hall who have made all six decisions.

Of the six assessments that you make on this sheet, one is randomly selected. If your guess regarding the option that is chosen more often is correct, you receive a bonus of €1. If your additional guess regarding the percentage is at most 10 percentage points away from the actual percentage, you receive an additional bonus of €1. Thus, you can get up to €2 as a bonus.

1st assessment: The **majority** of the participants chooses:

- You receive €10, the other player receives €10. Or:
- You receive €10, the other player receives €5.

The **share** of the participants who choose this option (the option that is chosen more often according to your assessment) amounts to: _____%

2nd decision: The **majority** of the participants chooses:

- You receive €10, the other player receives €10. Or:
- You receive €9, the other player receives €5.

The **share** of the participants who choose this option (the option that is chosen more often according to your assessment) amounts to: _____%

3rd decision: The **majority** of the participants chooses:

- You receive €5, the other player receives €10. Or:

- You receive €5, the other player receives €5.

The **share** of the participants who choose this option (the option that is chosen more often according to your assessment) amounts to: _____%

4th decision: The **majority** of the participants chooses:

- You receive €5, the other player receives €10. Or:
- You receive €4, the other player receives €4.

The **share** of the participants who choose this option (the option that is chosen more often according to your assessment) amounts to: _____%

5th decision: The **majority** of the participants chooses:

- You receive €8, the other player receives €10. Or:
- You receive €8, the other player receives €6.

The **share** of the participants who choose this option (the option that is chosen more often according to your assessment) amounts to: _____%

6th decision: The **majority** of the participants chooses:

- You receive €8, the other player receives €10. Or:
- You receive €7, the other player receives €5.

The **share** of the participants who choose this option (the option that is chosen more often according to your assessment) amounts to: _____%

Thank you very much. Finally, please answer the questions regarding yourself.

Next sheet →

Sheet 6: questionnaire, page 1

Please answer the following questions **honestly**. For each question, please encircle one number. If you have difficulties making a decision, please choose the option that fits best.

Do not make double choices per question and do not mark spaces between options.

Please answer **all** questions.

Please indicate how much the following statements apply to you.

	not agree at all ↓			agree completely ↓		
	1	2	3	4	5	6
1. I am great.	1	2	3	4	5	6
2. I will someday be famous.	1	2	3	4	5	6
3. I show others how special I am.	1	2	3	4	5	6
4. I react annoyed if another person steals the show from me.	1	2	3	4	5	6
5. I enjoy my successes very much.	1	2	3	4	5	6
6. I secretly take pleasure in the failure of my rivals.	1	2	3	4	5	6
7. Most of the time I am able to draw people's attention to myself in conversations.	1	2	3	4	5	6
8. I deserve to be seen as a great personality.	1	2	3	4	5	6
9. I want my rivals to fail.	1	2	3	4	5	6
10. I enjoy it when another person is inferior to me.	1	2	3	4	5	6
11. I often get annoyed when I am criticized.	1	2	3	4	5	6
12. I can barely stand it if another person is at the center of events.	1	2	3	4	5	6
13. Most people won't achieve anything.	1	2	3	4	5	6
14. Other people are worth nothing.	1	2	3	4	5	6
15. Being a very special person gives me a lot of strength.	1	2	3	4	5	6
16. I manage to be the center of attention with my outstanding contributions.	1	2	3	4	5	6
17. Most people are somehow losers.	1	2	3	4	5	6
18. Mostly, I am very adept at dealing with other people.	1	2	3	4	5	6

Next sheet →

Sheet 6: questionnaire, page 2

Please indicate how much the following statements apply to you.

I see myself as someone who ...

	does not apply to me at all ↓			applies to me perfectly ↓			
does a thorough job	1	2	3	4	5	6	7
is communicative, talkative	1	2	3	4	5	6	7
is sometimes somewhat rude to others	1	2	3	4	5	6	7
is original, comes up with new ideas	1	2	3	4	5	6	7
worries a lot	1	2	3	4	5	6	7
has a forgiving nature	1	2	3	4	5	6	7
tends to be lazy	1	2	3	4	5	6	7
is outgoing, sociable	1	2	3	4	5	6	7
values artistic experiences	1	2	3	4	5	6	7
gets nervous easily	1	2	3	4	5	6	7
does things effectively and efficiently	1	2	3	4	5	6	7
is reserved	1	2	3	4	5	6	7
is considerate and kind to others	1	2	3	4	5	6	7
has an active imagination	1	2	3	4	5	6	7
is relaxed, handles stress well	1	2	3	4	5	6	7

Please indicate how much the following statements apply to you.

	strongly disagree ↓		strongly agree ↓	
1. On the whole, I am satisfied with myself.	0	1	2	3
2. At times I think I am no good at all.	0	1	2	3
3. I feel that I have a number of good qualities.	0	1	2	3
4. I am able to do things as well as most other people.	0	1	2	3
5. I feel I do not have much to be proud of.	0	1	2	3
6. I certainly feel useless at times.	0	1	2	3
7. I feel that I am a person of worth, at least on an equal plane with others.	0	1	2	3
8. I wish I could have more respect for myself.	0	1	2	3
9. All in all, I am inclined to feel that I am a failure.	0	1	2	3
10. I take a positive attitude toward myself.	0	1	2	3

Please provide the following last information:

Major subject in your studies (exact subject name):

Semester in this subject: _____

Age in years: _____

Sex: female male

Many thanks!

A.2 Instructions for experimental study (chapter 2): Original German version

Sheet 1: participant information

Liebe Studierende der Vorlesung „Arbeit, Personal, Organisation“,

willkommen bei unserem Experiment!

Wir freuen uns, wenn Sie bei unserem Experiment mitmachen. Ziel des Experiments ist es, Präferenzen besser zu verstehen.

Die Daten aus dem Experiment werden streng vertraulich behandelt und nur anonymisiert ausgewertet. Bitte schreiben Sie daher weder Ihren Namen noch die Matrikelnummer auf die Erhebungsbögen.

Die Teilnahme am Experiment ist freiwillig. Sie können die Teilnahme jederzeit ohne Begründung abbrechen, ohne dass Ihnen daraus Nachteile entstehen. Sie können später jederzeit die Löschung Ihrer Daten verlangen. Dazu wenden Sie sich an die auf der Rückseite angegebene Adresse und nennen Ihr individuelles Codewort, das Sie auf dem nächsten Blatt bestimmen.

Im Rahmen des Experiments treffen Sie sechs Entscheidungen, geben ein paar Einschätzungen ab und beantworten Fragen zu Ihrer Person.

Entscheidungen:

Bei jeder der sechs Entscheidungen entscheiden Sie jeweils zwischen zwei Auszahlungsstrukturen. Eine Auszahlungsstruktur legt fest, wie viel Geld Ihnen ausbezahlt werden soll und wie viel die Ihnen zufällig zugewählte Mitspielerin bzw. der Ihnen zufällig zugewählte Mitspieler erhält.

Beispiel:

Entscheidung: Wählen Sie die von Ihnen bevorzugte Auszahlungsstruktur:

- Sie erhalten 2 €, Ihre Mitspielerin/Ihr Mitspieler erhält 0 €. Oder:
- Sie erhalten 1 €, Ihre Mitspielerin/Ihr Mitspieler erhält 1 €.

Das heißt: Mit Ihrer Entscheidung zwischen den beiden Auszahlungsstrukturen legen Sie fest, ob Sie selbst 2 € erhalten sollen und die Ihnen zugewählte Mitspielerin/der Ihnen zugewählte Mitspieler 0 € (erstgenannte Option) oder ob beide jeweils 1 € erhalten sollen (zuletzt genannte Option).

Insgesamt fällt jeder Teilnehmer sechs Entscheidungen zwischen jeweils zwei Auszahlungsstrukturen. Nach Eingang aller Bögen wird jeder Experiment-Teilnehmer zufällig einem anderen Teilnehmer zugeordnet. Für jedes Paar von Spielern wird eine der insgesamt zwölf Entscheidungen beider Spieler ausgelost und darauf basierend werden die Auszahlungen vorgenommen.

Das heißt, hätten Sie im obigen Beispiel die erste Auszahlungsstruktur gewählt und wäre diese Entscheidung später dann ausgelost worden, so würden Sie selbst 2 € erhalten und die Ihnen zugewählte Mitspielerin/der Ihnen zugewählte Mitspieler 0 €.

Die Geldbeträge werden am 08.05.2017 nach der Vorlesung vor dem Hörsaal ausbezahlt. Behalten Sie hierzu bitte das Blatt, auf dem Sie Ihr Codewort bestimmen (nächstes Blatt). Gegen Vorlage des Codeworts erhalten Sie die Auszahlung. Die Auszahlungen finden privat, d.h. in verdeckten Umschlägen, statt. Zudem wird kein Teilnehmer erfahren, welchem anderen Teilnehmer er zugewählt wurde. **Beachten Sie, dass nur diejenigen Teilnehmer, die alle sechs Entscheidungen getroffen haben, an der Auszahlung teilnehmen können.**

Bitte füllen Sie alle Bögen unabhängig von den anderen Teilnehmern aus und kommunizieren Sie nicht mit anderen.

Wir danken Ihnen herzlich!

Back of sheet 1

Projektleitung:

[Name and affiliation of project leader 1]

[Name and affiliation of project leader 2]

Ansprechpartner für eventuelle Rückfragen:

[Name of project leader 1]

[Address of project leader 1]

[Telephone number of project leader 1]

[Email address of project leader 1]

Sheet 2: code word**Wie erstellen Sie Ihr persönliches Codewort?**

Um Ihre Daten richtig zuordnen zu können, ohne die Geheimhaltung zu verletzen, benötigen wir ein Kenn- oder Codewort. Das Codewort ist so aufgebaut, dass niemand von Ihrem Codewort auf Ihre Person rückschließen kann, auch wir nicht. Sie selbst können Ihr Codewort aber jederzeit rekonstruieren, wenn Sie danach gefragt werden und es vergessen haben sollten. Wir brauchen Ihnen nur die Regel zu verraten, nach der Sie es herstellen müssen.

Dies sind die Bestandteile Ihres Codeworts:

1. Die beiden letzten Buchstaben des Geburtsnamens Ihrer Mutter
2. Die Anzahl der Buchstaben des (ersten) Vornamens Ihrer Mutter
3. Die beiden letzten Buchstaben des (ersten) Vornamens Ihres Vaters
4. Ihr eigener Geburtstag (nur der Tag, nicht Monat und/oder Jahr).

* Bitte schreiben Sie alle Zahlen zweistellig, d.h. wenn nötig mit führender Null.

* Bei mehreren oder zusammengesetzten Vornamen berücksichtigen Sie bitte nur den ersten.

* Wenn Sie den jeweiligen Namen nicht kennen, schreiben Sie statt der Buchstaben XX bzw. für die Zahl 00.

Beispiel (fiktiv)

Name der Mutter: **Elke**-Hannelore Müller geb. Mayerhofer

Name des Vaters: **Wolf**-Rüdiger Müller

Ihr Geburtstag: **09**.11.1987

Daraus ergibt sich als Codewort: **ER04LF09**

Bitte tragen Sie jetzt in die Kästchen Ihr Codewort ein:

Die beiden letzten Buchstaben des Geburtsnamens Ihrer Mutter:

Die Anzahl der Buchstaben des (ersten) Vornamens Ihrer Mutter:

Die beiden letzten Buchstaben des (ersten) Vornamens Ihres Vaters:

Ihr eigener Geburtstag (nur der *Tag*):

Wichtig: Diese Liste verbleibt bei Ihnen. Bewahren Sie sie gut auf! Sie sollten sie niemandem zeigen!

Sheet 3: declaration of consent
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Einwilligungserklärung

Hinweis: Diese Einwilligungserklärung wird getrennt von den anderen Bögen eingesammelt. Da Ihr Name nur auf dieser Einwilligungserklärung und nicht auf den Erhebungsbögen steht, bleibt die Anonymität des Experiments gewährleistet.

Ich (Name der Teilnehmerin/des Teilnehmers in Blockschrift)

bin schriftlich über die Studie und den Versuchsablauf aufgeklärt worden. Ich willige ein, an dem Experiment teilzunehmen und dass meine Daten anonymisiert verwendet werden. Sofern ich Fragen zur Studie hatte, wurden sie von den Experimentatoren vollständig und zu meiner Zufriedenheit beantwortet.

Mit der beschriebenen Erhebung und Verarbeitung der Daten (Spielentscheidungen, Einschätzungen und persönliche Angaben) bin ich einverstanden. Die Aufzeichnung und Auswertung der Daten erfolgt anonymisiert in der LEAD Graduate School & Research Network, d. h. unter Verwendung eines persönlichen Codewortes, das ich selbst erstellt habe und das nur ich kenne. Das heißt, es ist niemandem möglich, meine Daten mit meinem Namen in Verbindung zu bringen. Das Blatt, auf dem ich dieses Codewort erstellt habe, befindet sich in meinem Besitz. Mir ist bekannt, dass ich mein Einverständnis zur Aufbewahrung bzw. Speicherung meiner Daten widerrufen kann, ohne dass mir daraus Nachteile entstehen. Ich bin darüber informiert worden, dass ich jederzeit eine Löschung all meiner Daten verlangen kann. Ich bin einverstanden, dass meine anonymisierten Daten zu Forschungszwecken weiter verwendet werden können und mindestens 10 Jahre gespeichert bleiben.

Ich bin darüber informiert, dass mein Name nur auf dieser Einwilligungserklärung steht.

Ich hatte genügend Zeit für eine Entscheidung und bin bereit, an der o.g. Studie teilzunehmen. Ich weiß, dass die Teilnahme an der Studie freiwillig ist und ich die Teilnahme jederzeit ohne Angaben von Gründen beenden kann, ohne dass mir daraus Nachteile entstehen.

Eine Ausfertigung der Teilnehmerinformation und eine Ausfertigung der Einwilligungserklärung habe ich erhalten. Die Teilnehmerinformation ist Teil dieser Einwilligungserklärung.

Ort, Datum & Unterschrift des Teilnehmers:

Name des Teilnehmers in Druckschrift:

Ort, Datum & Unterschrift des Versuchsleiters:

Tübingen, 12.04.2017 _____

Name des Versuchsleiters in Druckschrift:

[Name of project leader 1]

Sheet 4: choices (the order of the six decisions and the order of the two options at each decision are randomized across participants)

Bitte geben Sie zunächst Ihr **Codewort** an, das Sie auf der vorletzten Seite bestimmt haben. **Achtung: Lassen Sie dieses Feld nicht frei**, ansonsten können wir Ihnen kein Geld auszahlen.

Ihr Codewort (acht Zeichen, geschrieben in einer Zeile): ____ _

Bitte treffen Sie nun die folgenden Entscheidungen. **Achten Sie darauf, bei jeder Entscheidung genau eine Option auszuwählen (keine doppelte Auswahl).**

Lassen Sie bitte keine Entscheidung aus. Andernfalls ist Ihre Teilnahme an der Auszahlung leider nicht möglich.

1. Entscheidung: Wählen Sie die von Ihnen bevorzugte Auszahlungsstruktur:

Sie erhalten 10 €, Ihre Mitspielerin/Ihr Mitspieler erhält 10 €. Oder:

Sie erhalten 10 €, Ihre Mitspielerin/Ihr Mitspieler erhält 5 €.

2. Entscheidung: Wählen Sie die von Ihnen bevorzugte Auszahlungsstruktur:

Sie erhalten 10 €, Ihre Mitspielerin/Ihr Mitspieler erhält 10 €. Oder:

Sie erhalten 9 €, Ihre Mitspielerin/Ihr Mitspieler erhält 5 €.

3. Entscheidung: Wählen Sie die von Ihnen bevorzugte Auszahlungsstruktur:

- Sie erhalten 5 €, Ihre Mitspielerin/Ihr Mitspieler erhält 10 €. Oder:
- Sie erhalten 5 €, Ihre Mitspielerin/Ihr Mitspieler erhält 5 €.

4. Entscheidung: Wählen Sie die von Ihnen bevorzugte Auszahlungsstruktur:

- Sie erhalten 5 €, Ihre Mitspielerin/Ihr Mitspieler erhält 10 €. Oder:
- Sie erhalten 4 €, Ihre Mitspielerin/Ihr Mitspieler erhält 4 €.

5. Entscheidung: Wählen Sie die von Ihnen bevorzugte Auszahlungsstruktur:

- Sie erhalten 8 €, Ihre Mitspielerin/Ihr Mitspieler erhält 10 €. Oder:
- Sie erhalten 8 €, Ihre Mitspielerin/Ihr Mitspieler erhält 6 €.

6. Entscheidung: Wählen Sie die von Ihnen bevorzugte Auszahlungsstruktur:

- Sie erhalten 8 €, Ihre Mitspielerin/Ihr Mitspieler erhält 10 €. Oder:
- Sie erhalten 7 €, Ihre Mitspielerin/Ihr Mitspieler erhält 5 €.

Herzlichen Dank. Wir haben ein paar weitere Fragen für Sie.

Nächstes Blatt →

Sheet 5: expectations (the random order of the six decisions and the random order of the two options at each decision are the same as on sheet 4)

Bitte geben Sie nun Ihre Einschätzung ab, wie die anderen Teilnehmerinnen und Teilnehmer sich entschieden haben. Dabei geht es nicht nur um die Mitspielerin/den Mitspieler, die/der Ihnen zugewandt wird, sondern um alle Teilnehmerinnen und Teilnehmer im Hörsaal, die alle sechs Entscheidungen getroffen haben.

Von den sechs Einschätzungen, die Sie auf diesem Blatt abgeben, wird eine zufällig ausgewählt. Falls Ihre Einschätzung zur häufiger gewählten Option zutrifft, erhalten Sie einen Bonus von 1 €. Falls Ihre zusätzlich abgegebene Einschätzung zur Prozentzahl höchstens 10 Prozentpunkte von der tatsächlichen Prozentzahl entfernt ist, erhalten Sie einen zusätzlichen Bonus von 1 €. Insgesamt können Sie also bis zu 2 € Bonus erzielen.

1. Einschätzung: Die **Mehrzahl** der Teilnehmerinnen und Teilnehmer entscheidet sich für:

- Sie erhalten 10 €, Ihre Mitspielerin/Ihr Mitspieler erhält 10 €. Oder:
- Sie erhalten 10 €, Ihre Mitspielerin/Ihr Mitspieler erhält 5 €.

Der **Anteil** der Teilnehmerinnen und Teilnehmer, die sich für diese (nach Ihrer Einschätzung häufiger gewählte) Option entscheiden, beträgt: _____%

2. Einschätzung: Die **Mehrzahl** der Teilnehmerinnen und Teilnehmer entscheidet sich für:

- Sie erhalten 10 €, Ihre Mitspielerin/Ihr Mitspieler erhält 10 €. Oder:
- Sie erhalten 9 €, Ihre Mitspielerin/Ihr Mitspieler erhält 5 €.

Der **Anteil** der Teilnehmerinnen und Teilnehmer, die sich für diese (nach Ihrer Einschätzung häufiger gewählte) Option entscheiden, beträgt: _____%

3. Einschätzung: Die **Mehrzahl** der Teilnehmerinnen und Teilnehmer entscheidet sich für:

- Sie erhalten 5 €, Ihre Mitspielerin/Ihr Mitspieler erhält 10 €. Oder:
- Sie erhalten 5 €, Ihre Mitspielerin/Ihr Mitspieler erhält 5 €.

Der **Anteil** der Teilnehmerinnen und Teilnehmer, die sich für diese (nach Ihrer Einschätzung häufiger gewählte) Option entscheiden, beträgt: _____%

4. Einschätzung: Die **Mehrzahl** der Teilnehmerinnen und Teilnehmer entscheidet sich für:

- Sie erhalten 5 €, Ihre Mitspielerin/Ihr Mitspieler erhält 10 €. Oder:
- Sie erhalten 4 €, Ihre Mitspielerin/Ihr Mitspieler erhält 4 €.

Der **Anteil** der Teilnehmerinnen und Teilnehmer, die sich für diese (nach Ihrer Einschätzung häufiger gewählte) Option entscheiden, beträgt: _____%

5. Einschätzung: Die **Mehrzahl** der Teilnehmerinnen und Teilnehmer entscheidet sich für:

- Sie erhalten 8 €, Ihre Mitspielerin/Ihr Mitspieler erhält 10 €. Oder:
- Sie erhalten 8 €, Ihre Mitspielerin/Ihr Mitspieler erhält 6 €.

Der **Anteil** der Teilnehmerinnen und Teilnehmer, die sich für diese (nach Ihrer Einschätzung häufiger gewählte) Option entscheiden, beträgt: _____%

6. Einschätzung: Die **Mehrzahl** der Teilnehmerinnen und Teilnehmer entscheidet sich für:

- Sie erhalten 8 €, Ihre Mitspielerin/Ihr Mitspieler erhält 10 €. Oder:

- Sie erhalten 7 €, Ihre Mitspielerin/Ihr Mitspieler erhält 5 €.

Der **Anteil** der Teilnehmerinnen und Teilnehmer, die sich für diese (nach Ihrer Einschätzung häufiger gewählte) Option entscheiden, beträgt: _____%

Herzlichen Dank. Beantworten Sie bitte noch die Fragen zu Ihrer Person.

Nächstes Blatt →

Sheet 6: questionnaire, page 1

Bitte beantworten Sie die folgenden Fragen **ehrlich**. Kreisen Sie bitte jeweils eine Zahl ein. Wenn Sie Schwierigkeiten haben, sich zu entscheiden, wählen Sie bitte die Option, die am ehesten passt.

Treffen Sie keine doppelte Auswahl und kreuzen Sie keine Zwischenräume an.

Beantworten Sie bitte **alle** Fragen.

Beurteilen Sie bitte, wie sehr die folgenden Aussagen auf Sie zutreffen.

	trifft überhaupt nicht zu ↓		trifft vollkommen zu ↓			
1. Ich bin großartig.	1	2	3	4	5	6
2. Ich werde einmal berühmt sein.	1	2	3	4	5	6
3. Ich zeige anderen, was für ein besonderer Mensch ich bin.	1	2	3	4	5	6
4. Ich reagiere genervt, wenn eine andere Person mir die Schau stiehlt.	1	2	3	4	5	6
5. Ich genieße meine Erfolge sehr.	1	2	3	4	5	6
6. Es freut mich insgeheim, wenn meine Gegner scheitern.	1	2	3	4	5	6
7. In Gesprächen gelingt es mir meist, die Aufmerksamkeit der Anwesenden auf mich zu ziehen.	1	2	3	4	5	6
8. Ich habe es verdient, als große Persönlichkeit angesehen zu werden.	1	2	3	4	5	6
9. Ich will, dass meine Konkurrenten scheitern.	1	2	3	4	5	6
10. Ich genieße es, wenn mir ein anderer Mensch unterlegen ist.	1	2	3	4	5	6
11. Ich reagiere häufig gereizt auf Kritik.	1	2	3	4	5	6
12. Ich ertrage es nur schlecht, wenn eine andere Person Mittelpunkt des Geschehens ist.	1	2	3	4	5	6
13. Die meisten Menschen werden es zu nichts bringen.	1	2	3	4	5	6
14. Andere Menschen sind nichts wert.	1	2	3	4	5	6
15. Ich ziehe viel Kraft daraus, eine ganz besondere Person zu sein.	1	2	3	4	5	6
16. Mit meinen besonderen Beiträgen schaffe ich es, im Mittelpunkt zu stehen.	1	2	3	4	5	6
17. Die meisten Menschen sind ziemliche Versager.	1	2	3	4	5	6
18. Ich verhalte mich im Umgang mit anderen meist überaus gewandt.	1	2	3	4	5	6

Nächstes Blatt →

Sheet 6: questionnaire, page 2

Beurteilen Sie bitte, wie sehr die folgenden Aussagen auf Sie zutreffen.

Ich bin jemand, die/der ...

	trifft überhaupt nicht zu ↓				trifft voll zu ↓		
gründlich arbeitet	1	2	3	4	5	6	7
kommunikativ, gesprächig ist	1	2	3	4	5	6	7
manchmal etwas grob zu anderen ist	1	2	3	4	5	6	7
originell ist, neue Ideen einbringt	1	2	3	4	5	6	7
sich oft Sorgen macht	1	2	3	4	5	6	7
verzeihen kann	1	2	3	4	5	6	7
eher faul ist	1	2	3	4	5	6	7
aus sich herausgehen kann, gesellig ist	1	2	3	4	5	6	7
künstlerische Erfahrungen schätzt	1	2	3	4	5	6	7
leicht nervös wird	1	2	3	4	5	6	7
Aufgaben wirksam und effizient erledigt	1	2	3	4	5	6	7
zurückhaltend ist	1	2	3	4	5	6	7
rücksichtsvoll und freundlich mit anderen umgeht	1	2	3	4	5	6	7
eine lebhaft Phantasie, Vorstellungen hat	1	2	3	4	5	6	7
entspannt ist, mit Stress gut umgehen kann	1	2	3	4	5	6	7

Beurteilen Sie bitte, wie sehr die folgenden Aussagen auf Sie zutreffen.

	trifft gar nicht zu ↓		trifft voll und ganz zu ↓	
1. Alles in allem bin ich mit mir selbst zufrieden.	0	1	2	3
2. Hin und wieder denke ich, dass ich gar nichts taue.	0	1	2	3
3. Ich besitze eine Reihe guter Eigenschaften.	0	1	2	3
4. Ich kann vieles genauso gut wie die meisten anderen Menschen auch.	0	1	2	3
5. Ich fürchte, es gibt nicht viel, worauf ich stolz sein kann.	0	1	2	3
6. Ich fühle mich von Zeit zu Zeit richtig nutzlos.	0	1	2	3
7. Ich halte mich für einen wertvollen Menschen, jedenfalls bin ich nicht weniger wertvoll als andere auch.	0	1	2	3
8. Ich wünschte, ich könnte vor mir selbst mehr Achtung haben.	0	1	2	3
9. Alles in allem neige ich dazu, mich für einen Versager zu halten.	0	1	2	3
10. Ich habe eine positive Einstellung zu mir selbst gefunden.	0	1	2	3

Bitte machen Sie zuletzt die folgenden Angaben:

Hauptfach im Studium (genaue Bezeichnung):

Fachsemester: _____

Alter in Jahren: _____

Geschlecht: weiblich männlich

Vielen Dank!

A.3 Curriculum vitae

Contact and personal information

Last name: Ayaita
 First name: Adam
 E-mail: adam.ayaita@gmail.com
 Year/place of birth: 1987 in Paris
 Nationality: German

Research interests

Education economics, organizational behavior, personality, behavioral economics, applied ethics

Academic positions

10/2015 – present Research assistant at the LEAD Graduate School & Research Network (Learning, Educational Achievement, and Life Course Development), University of Tübingen
 05/2014 – 09/2015 Research assistant at the chair of Human Resource Management and Organization, Prof. Dr. Kerstin Pull, University of Tübingen
 04/2008 – 07/2008 Student teaching assistant in philosophy, Dr. Frank Hofmann, University of Tübingen
 02/2008 – 09/2008 Student research assistant in philosophy, Prof. Dr. Dr. h.c. Otfried Höffe, University of Tübingen

Education

10/2015 – present Doctoral studies at the interdisciplinary LEAD Graduate School & Research Network, University of Tübingen, with courses at the Swiss Leading House “Economics of Education”, Zurich and Bern
 10/2013 – 09/2015 Managerial economics (applied economics), University of Tübingen, Master of Science (grade: very good)
 10/2010 – 09/2013 Business informatics, dual studies (cooperation with a company), Berlin School of Economics and Law, Bachelor of Science (grade: very good)
 09/2009 – 05/2010 Philosophy, two semesters at the University of Massachusetts Amherst (USA)
 10/2008 – 09/2010 Philosophy, University of Konstanz

10/2006 – 09/2008	Philosophy, University of Tübingen, Magister intermediate examination (grade: very good)
10/2006 – 07/2007	Studium generale (general studies), Leibniz Kolleg in Tübingen
06/2006	University-entrance diploma (grade 1.0 / A), Friedrichsgymnasium in Kassel

Practice experience

05/2012 – 09/2013	Development of databases with Microsoft Access, E.DIS AG (formerly E.ON edis AG), e.dialog GmbH
12/2011 – 02/2012	Human resource management, E.ON edis AG
07/2011 – 10/2011	Purchase of services, E.ON edis AG
01/2011 – 04/2011	Accounting, E.ON edis AG

Languages

Englisch (fluent in speaking, reading, and writing), German (native language), Latin (Latinum), Ancient Greek (Graecum)

Statistics software and IT

Stata (professional), SPSS (advanced), R (basic)

Microsoft Office (professional), LaTeX/LyX (advanced)

Scholarships, funding, and awards

02/2018 – 03/2018	Funding from the <i>Universitätsbund</i> of the University of Tübingen for the travel to the Colloquium on Personnel Economics in Munich
08/2017	DAAD stipend (German Academic Exchange Service) for the congress travel to the TIBER Symposium (Tilburg Institute for Behavioral Economics Research)
04/2017 – 11/2017	Intramural Research Grant of the LEAD Graduate School & Research Network (€3,210.12) for the project “Positional Preferences and Narcissistic Rivalry” (with Kerstin Pull)
01/2017 – 02/2017	Funding from the <i>Universitätsbund</i> of the University of Tübingen for the travel to the Colloquium on Personnel Economics in Zurich
01/2014 – 09/2015	Study stipend from the German National Academic Foundation (<i>Studienstiftung des deutschen Volkes</i>)
09/2013	Book prize for the Bachelor of Science degree, Berlin School of Economics and Law

09/2009 – 05/2010	Tuition waiver through the exchange program of the University of Konstanz
08/2009 – 05/2010	Fulbright Scholarship Program (travel stipend)
12/2006 – 09/2010	Study stipend from from the German National Academic Foundation
11/2005	Project Youth–School–Economy (<i>Jugend–Schule–Wirtschaft</i>): winners in the region and award from the Deutsche Bank Stiftung (with Florian Friemel, Juliane Hack, Matthias Heinzemann, Katharina Krimmel, Kristina Semper and Marius P. Studte)

Teaching

Summer term 2017	Seminar in quantitative data analysis in empirical education science and social science (bachelor) for Prof. Dr. Benjamin Nagengast, University of Tübingen
Winter term 2016/17	Seminar in quantitative data collection in empirical education science and social science (bachelor) for Prof. Dr. Benjamin Nagengast, University of Tübingen
Winter term 2015/16	Practice course in personnel economics (English master course) for Prof. Dr. Kerstin Pull, University of Tübingen
Summer term 2008	Tutorial in philosophy of psychology for Dr. Frank Hofmann, University of Tübingen

Review and service

Reviewer for the *Journal for Labour Market Research* (04/2016, 07/2018)

Participation in application interviews for new master students in Management & Economics, University of Tübingen (06/2016)

Current projects

Gülal, Filiz; Adam Ayaita: The Impact of Minimum Wages on Well-Being: Evidence from a Quasi-Experiment in Germany. Manuscript submitted for publication.

Working paper available at:

http://www.diw.de/documents/publikationen/73/diw_01.c.584177.de/diw_sp0969.pdf

Ayaita, Adam; Marion Spengler: Field of Study and Earnings: The Role of Abilities, Personality, and Socioeconomic Background. Manuscript in preparation.

Ayaita, Adam; Kerstin Pull: Does Narcissism Explain Positional Preferences? Manuscript submitted for publication.

Ayaita, Adam; Kathleen Stürmer: Risk Aversion and the Teaching Profession: An Analysis Including Different Forms of Risk Aversion, Different Control Groups, Selection and Socialization Effects. Manuscript submitted for publication.

Publications

Ayaita, Adam; Filiz Güral; Philip Yang (2018): Where Does the Good Shepherd Go? Civic Virtue and Sorting into Public Sector Employment. *German Economic Review*. <https://doi.org/10.1111/geer.12180>

Working paper available at:

<https://ideas.repec.org/p/iso/educat/0134.html>

Ayaita, Adam; Kerstin Pull; Uschi Backes-Gellner (2017): You get what you 'pay' for: Academic attention, career incentives and changes in publication portfolios of business and economics researchers. *Journal of Business Economics*. <https://doi.org/10.1007/s11573-017-0880-6>

Working paper available at:

<https://ideas.repec.org/p/iso/educat/0133.html>

For publications before 2017, the full name of birth Omar Adam Ayaita was used. The name was changed in 2017 for organizational reasons.

Ayaita, Omar Adam; Johannes Mellein (2016): Zu viel Empathie in der Politik. *Novo Argumente*, 19.05.2016. (Journalistic contribution)

Available at:

https://www.novo-argumente.com/artikel/zu_viel_empathie_in_der_politik

Scholl, Johannes; Michael Schneider; cooperators: Salim Acimi; Julia Adam; Omar Adam Ayaita; Isabelle Bär; Maral Baghai Arassi; Lena Bandelin; Florian Feist; Maik von der Forst; Alexander Kilzheimer; Lea Lütteken; Marcin Lukasz Maciolek; Anna Dominique Mierswa; Florian Müller; Mohammed Qalanawi; Christian Johannes Raff; Jonas Rote; Almut Schoffers; Kerstin Sell; Jan Stratil; Carolin Weinhold (2015): Gesundheitspolitik: Gesundheitsförderung und Prävention weiterdenken. *Deutsches Ärzteblatt* 112(2015)44: 1830–1834.

Available at:

<http://www.aerzteblatt.de/archiv/172786>

Ayaita, Omar A. (2010): *Philosophical Knowledge. The Search for Truth and its Limits*. Norderstedt: Books on Demand.

– German edition: *Philosophisches Wissen. Die Suche nach Wahrheit und ihre Grenzen*. Norderstedt: Books on Demand.

Ayaita, Omar Adam; David Johannes Hawellek; Aiste Jusyte; Anne Lohse; Torben Ott (2009): Die Entwicklung des Ich. In: Evers, Dirk; Niels Weidtmann (Eds.): *Wahrnehmung und Identität*. Berlin/Münster: Lit Verlag: 1–51.

Ayaita, O. A.; A. Lay / Ch. N. Adolph (2008): Diskussionsbericht zum Themenbereich ‚Privatisierung im Bereich der Gefahrenabwehr‘. In: Kleszczewski, Diethelm; Steffi Müller; Frank Neuhaus (Eds.): *Entstaatlichung und gesellschaftliche Selbstregulierung*. Paderborn: Mentis: 59–63.

Presentations at conferences

Ayaita, Adam; Marion Spengler: “What Part of the Associations between Field of Study and Earnings Is Due to Selection by Individual Characteristics?”, Workshop on educational inequalities: psychological and sociological processes, Tübingen, October 1–2, 2018.

Ayaita, Adam; Kerstin Pull: “Positional Preferences and Narcissistic Rivalry”, 21st Colloquium on Personnel Economics, Munich, March 1–2, 2018.

Ayaita, Adam; Kerstin Pull: “Positional Preferences and Narcissistic Rivalry”, Research Seminar in Economics and Management (SEAM), Paderborn, October 9, 2017.

Ayaita, Omar Adam; Kerstin Pull: “Positional Preferences and Narcissistic Rivalry”, TIBER Symposium on Psychology and Economics, Tilburg, August 25, 2017.

Ayaita, Omar Adam; Kathleen Stürmer: “The Motivational Basis of Working in the Education Branch: Evidence on Primary School, Secondary School, and College Teachers”, Conference of the Society for Empirical Educational Research (GEBF), Heidelberg, March 13–15, 2017.

Ayaita, Omar Adam; Filiz Güral; Philip Yang: “Being the Good Shepherd or Being Secure: Public Service Motivation, Risk Aversion, and Public Sector Employment”, 20th Colloquium on Personnel Economics, Zurich, February 1–3, 2017.

Ayaita, Omar Adam; Kerstin Pull; Uschi Backes-Gellner: “Research Productivity beyond Journal Articles: Productivity Patterns of Researchers over Time”, Annual Meeting of the Committee on Education Economics (*Bildungsökonomischer Ausschuss*) in the German Economic Association (VfS), Bamberg, March 17–18, 2016.

Ayaita, Omar Adam; Kerstin Pull; Uschi Backes-Gellner: “Research Productivity beyond Journal Articles: Productivity Patterns of Researchers over Time”, 18th Colloquium on Personnel Economics, Vienna, March 26–27, 2015.

Ayaita, Omar Adam; Kerstin Pull; Uschi Backes-Gellner: “Research Productivity beyond Journal Articles: Productivity Patterns of Researchers over Time”, Annual Conference of the Division on Higher Education Studies (*Kommission Hochschulmanagement*) in the German Academic Association for Business Research (VHB), Duisburg, February 20–21, 2015.