Rank in Class and Occupational Choice

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Abstract

This paper aims at identifying the causal effect of a student's ordinal rank in her classroom on occupational choice. The ordinal rank is based on students' math and reading performance. Occupations are alternatively ranked by average gross earnings, prestige score, average existing math and reading skills, and necessary skill levels in math and reading in an occupation. Identification of the ordinal rank effect relies on quasi-random variation in classmates' performance across classroom within the same school. To ensure that the ordinal rank does not reflect the level of skills, we control for a quartic in math and reading performance. Furthermore, we condition on students' parental and socio-economic background and individual characteristics. We use panel data from the National Educational Panel Study (NEPS) of 9th-class students. For a sub-sample of lower secondary track students, we observe students' actual occupation choice (i.e. their vocational training position). For the full sample, we observe students' occupational expectations in 9th class. So far we find a highly statistically significant, positive, and robust effect of ordinal rank on academic self concept. Despite of this strong effect, we do not find any effect of ordinal rank on occupational choice regardless of the way we rank occupations. These findings might either reflect effect heterogeneity which we want to investigate in the next months. It is also possible that students' occupational choices are not affected by their ordinal rank in their classroom. Then students would make optimal career choices with respect of ordinal rank.

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1 Introduction

Occupations differ greatly with respect to mean earnings, skills needed, and unemployment risk. Since computerization tends to make routine-task occupations obsolete and simultaneously increases the returns to non-routine-task occupations (e.g. Acemoglu & Autor (2011)), occupational choice is an ever-more important decision about human capital investment affecting lifetime earnings and well-being. The determinants of occupational choice are not finally identified but are expected to include parental and family background, cognitive skills, and non-cognitive skills. There is a high correlation between occupations of children and parents (Constant & Zimmermann 2003) this is so far mainly investigated for men but can also be found for women (**?**). This does affect intergenerational mobility as e.g. Blanden, Haveman, Smeeding & Wilson (2014) find. The fact that children choose similar occupation pathways as their parents is the primary source of intergenerational persistence in several adult-life outcomes in UK. The literature on the effect of cognitive skills on occupational choice is scarce. Constant & Zimmermann (2003) can show for Germany that people with higher education choose higher ranked jobs. For the US a growing literature investigates the impact on college major choice. A college major determines the field a young adult might start her labor market career in and therefore works in a similar way than occupational choice (Altonji, Arcidiacono & Maurel 2016). Empirically the aim of this literature is to identify returns to certain college majors and in these studies prior standardized test scores like SAT or high school grades are considered as important factors which drive college major choice (see Altonji et al. (2016) for an overview). For Germany John & Thomsen (2014) show that non-cognitive skills are major determinants of occupational choice as identical personality profiles are differently rewarded across occupations. From a social point of view, each individual chooses the occupation that requires her level of cognitive and non-cognitive skills. Only then skills are used effectively (Perry, Wiederhold & Ackermann-Piek 2014). That this is not the case in reality shows the literature on skill mismatch (see e.g. Leuven & Oosterbeek (2011), or Perry et al. (2014)). We argue that misconception of one's cognitive skill level due to random variation in peer quality of classmates – the ordinal rank in cognitive skills – might affect the occupational choice beyond the absolute level of skills. Evidence from the psychological literature has shown that the ordinal rank in a classroom influences a student's academic self-concept (Marsh 1987) and, thus, would be

part of non-cognitive skills. Recent economic studies find that a student's ordinal rank in her classroom has an effect on educational attainment (Murphy & Weinhardt 2014) (Elsner & Isphording 2015). Elsner & Isphording (2015) and **?** show also a positive effect of ordinal rank on educational expectations i.e. expected college attendance. This paper aims at identifying the causal effect of a student's ordinal rank in her classroom on occupational choice. The ordinal rank is based on students' math and reading performance. Occupations are alternatively ranked by average gross earnings, prestige score, average existing math and reading skills, and necessary skill levels in math and reading in an occupation (Unemployment risk is in construction). Identification of the ordinal rank effect relies on quasi-random variation in classmates' performance across classroom within the same school. To ensure that the ordinal rank does not reflect the level of skills, we control for a quartic in math and reading performance. Furthermore, we condition on students' parental and socio-economic background (parent's education and occupation, books at home) and individual characteristics (gender, age, migration background). Importantly, we can control for parents' occupation. We use panel data from the National Educational Panel Study (NEPS) of 9th-class students. For a sub-sample of lower secondary track students, we observe students' actual occupation choice (i.e. their vocational training position). For the full sample, we observe students' occupational expectations in 9th class. As main outcome, actual and expected occupations are ranked by matching the real average earnings of each occupation from official sources to the NEPS data. (To match as well official data on earnings in each year of vocational training is in progress.) So far we find a highly statistically significant, positive, and robust effect of ordinal rank on academic self concept confirming Marsh (1987). Despite of this strong effect, we do not find any effect of ordinal rank on occupational choice regardless of the way we rank occupations[4]. These findings might either reflect effect heterogeneity which we want to investigate in the next months. It is also possible that students' occupational choices are not affected by their ordinal rank in their classroom. Then students would make optimal career choices with respect of ordinal rank. The rest of the paper is structured as follows: Section 2 introduces NEPS data and the samples we construct out of it providing summary statistics. Section 3 states our empirical identification strategy and section 4

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[4]We find an effect on prestige scores but it is small and goes in the wrong direction.

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Table 1: Participation, Missing Patterns, and Panel Attrition

waves	year	type	missing by design	temporary missings	panel attrition	partici- pation	total
1	2010	school	0	796	0	15629	16425
2	2011 summer	school	0	1221	0	15204	16425
3	2011/2012	school	0	2296	172	13957	16425
4	2012 spring	tel	14432	463	179	1351	16425
5	2012/2013	tel+ school	0	2644	799	12982	16425
6	2013 spring	tel	9507	667	859	5392	16425

discusses our results on the basis of regression tables. Section 5 concludes and gives an outlook on ideas we want to pursue in this project in the following months.

2 Data and Summary Statistics

The first data source we use are panel data from NEPS (NEPS 2016) which offer survey responses, competence tests, and an extensive survey on the family and school environment of students all over Germany. These students are randomly sampled on institution level (school) and if possible two classes per school are sampled.[5] We use data on starting cohort 4: 9th-class cohort which are observed in 6 waves from fall 2010 to spring 2013. Table 1 shows the developments of observation numbers, temporary missings and panel attrition over these waves. Wave 1, 2, 3, and 5 are paper-and-pencil questionnaires handed out to students in school. As some students switch to another school, vocational training or vocational preparation after 9th class, NEPS followed these students via telephone interviews which are treated as extra wave: 4 and 6. Panel attrition amounts to 5% for students in schools (wave 5) and to about 12.5% for students in telephone interviews (wave 6). We construct two samples out of these data. The first sample includes all students in regular schools from wave 1 [6]. We calculate ordinal ranks for math and reading competences in this sample following the formula:

$$Ordinal\ Rank = \frac{absolute\ rank - 1}{no.\ of\ students\ in\ class - 1} \tag{1}$$

[5]For more information about the study see Blossfeld, Rossbach & von Maurice (2011).

[6]Students from 'Foerderschue' are dropped as there are no data on competence tests available for them.

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Table 2: Summary Statistics: All 9th-Class Students in 2010

Variable	Obs	Mean	Std.Dev.	Min	Max
Mean Rank Test Scores	13393	0,49	0,25	0	1
Competence Rank Math	14511	0,49	0,31	0	1
Competence Rank Reading	13883	0,49	0,31	0	1
Math Test Scores	14523	0,02	1,21	-4,37	4,62
Reading Test Scores	13897	-0,03	1,26	-4,75	3,30
Grade Rank Math	13546	0,36	0,30	0	1
Grade Rank German	13613	0,31	0,29	0	1
Last Grade Math	13564	4,01	1,03	1	6
Last Grade German	13631	4,12	0,84	1	6
No. Students in Class	15239	17,34	6,17	1	34
Controls					
Female	15223	0,50	0,50	0	1
Migration Background	15145	0,32	0,47	0	1
Books@home	14212	3,79	1,48	1	6
Max. Parental Educ	11439	2,65	1,22	0	6
Outcomes					
Self-Concept School	14106	2,88	0,57	1	4
Self-Concept Math	14100	2,51	0,92	1	4
Self-Concept German	14140	2,94	0,62	1	4
Asp. Occup - ln(Gross Income)	8691	8,10	0,33	7,24	8,87
Asp. Occup - ISEI08	9417	53,28	21,11	11,56	88,96
Attends School in 2013	15239	0,45	0,50	0	1

The absolute rank is a ranking within a class of test scores in the standardized math and reading tests in NEPS. We compute an ordinal rank for math and reading separately and then compute the mean of those two ordinal ranks for each student. As outcomes we use occupational expectations from wave 2 and we construct a dummy which is 1 for all students in this sample who are still in the school sample in wave 5 or state in the telephone interview to attend school. Occupations are ranked by the log of gross earnings in a specific occupation in Germany 2010 (StatistischesBundesamt 2010), prestige scores (ISEI 08), mean of average math and reading skill level in a specific occupation in the NEPS Starting Cohort 6 - Adults (NEPS 2015), and by importance and level of math and reading skills by occupation originating from O*NET (ONET 2016)[7]. Table 2 gives an overview of outcome and control variables of this sample. The second sample consists of all students who ever started vocational training and includes their occupation in their first vocational training position. Their rank and control variables are merged from the sample with all students. As most of these students were tracked in lower and middle secondary schools mean ranks, competence test scores, and grades are lower than in

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[7]These data stems from occupations in the US

Table 3: Summary Statistics: Students in Vocational Training

Variable	Obs	Mean	Std.Dev.	Min	Max
Mean Rank Test Scores	2904	0,48	0,25	0	1
Competence Rank Math	3126	0,49	0,31	0	1
Competence Rank Reading	3017	0,47	0,31	0	1
Math Test Scores	3131	-0,45	0,94	-4,37	4,62
Reading Test Scores	3021	-0,58	1,11	-3,88	3,30
Grade Rank Math	2610	0,35	0,35	0	1
Grade Rank German	2634	0,30	0,34	0	1
Last Grade Math	2750	3,95	1,01	1	6
Last Grade German	2773	3,98	0,80	1	6
Left School in K9	3494	0,23	0,42	0	1
Controls					
Female	3276	0,41	0,49	0	1
Migration Background	3476	0,29	0,45	0	1
Books@home	3237	3,34	1,42	1	6
Max. Parental Educ	2527	2,27	1,15	0	6
Outcomes					
Self-Concept School	3234	2,83	0,55	1	4
Self-Concept Math	3222	2,52	0,90	1	4
Self-Concept German	3234	2,83	0,63	1	4
Mean Median Skills (2d, Adults)	3494	-0,36	0,37	-2,99	1,22
Median Math Skills (2d, Adults)	3494	-0,32	0,51	-2,60	1,44
Median Reading Skills (2d,Adults)	3494	-0,41	0,44	-3,38	1,23
ln(Gross Income) monthly	3163	7,90	0,22	7,20	8,68

the sample of all students. There are more males in the sample which reflects that girls select themselves more in education. Family background measured in books at home and parental education is as well slightly lower in the vocational training sample.

3 Empirical Identification Strategy

NEPS randomly and representatively samples schools in Germany. If the school is large enough NEPS follows the students of two classes in each school. Given this structure, our identification strategy relies on random assignment of students to classrooms within a given school conditional on all covariates. This identification strategy follows **?** and **?**. Our estimation equation looks like this:

$$Y_{i,s} = \beta_0 + \beta_1 * rank_i + competences_i * \beta_2 + X_i * \beta_3 + \delta_s + \epsilon_{i,s}. \tag{2}$$

The outcome variables $Y_{i,s}$ include measures for expected future occupations and actual occupations chosen for vocational training. The coefficient of interest is $beta_1$ which shows the influence of ordinal rank in class on occupational choice. $Competencies_i$ in-

clude standardized test scores in math and reading up to the quartic polynomial. Our control variables are captured in X_i and include individual level characteristics: gender, migration background, quarter of birth and year of birth dummies and family background characteristics: number of books at home, highest education of parents, and parent's occupation dummies (KldB88 two digit level). We cluster standard errors at school level.

4 Results

This section presents results for the estimations within our two samples: all 9th-class students in 2010 and students in vocational training. At first, we show that we can confirm Marsh (1987) that ordinal rank influences academic self concept and might therefore be an exogenous variation in non-cognitive skills. Our main results are the influence of rank on occupational expectations and actual occupational choices through vocational training. Concluding that the influence of rank in class is close to zero we check if found rank effects might be driven by people who choose the academic track instead of vocational track. Both results are checked for robustness looking at grade ranks (in construction) which are communicated ranks from the teacher instead of our hidden competence ranks. In the last subsection we discuss further determinants of occupational choice for our vocational-training sample.

4.1 Channel: Academic Self-Concept

Looking for channels which are driving an ordinal-rank effect on educational outcomes, the academic self concept is often considered (Elsner & Isphording 2015), (Marsh 1987). Higher ranked students see that they are better than their peers and therefore think that they are good at school or a specific subject in general. In NEPS the academic self-concept is observed for math and German and school in general. Example questions asked for degree of agreement on a 4-point scale are: "I learn fast in Math/German", "I get good grades in Math/German", "Math/German is one onf my best subjects" "I have always been good at Math/German". The answers to these questions are aggregated to compute a 10-point scale for self concept in Math/German and school in general. Table 4 shows the influence of ordinal rank in math on self concept in math. The coefficient of ordinal rank is robust and positive. The higher the ordinal rank the better the self

Table 4: Self Concept Math

	(1) Self Concept: Math Coef./Std. err.	(2) Self Concept: Math Coef./Std. err.	(3) Self Concept: Math Coef./Std. err.	(4) Self Concept: Math Coef./Std. err.
Rank Math	0.217***	0.240***	0.270***	0.271***
	(0.058)	(0.058)	(0.067)	(0.062)
Math Comp.	0.415***	0.346***	0.336***	0.344***
	(0.025)	(0.025)	(0.029)	(0.027)
Math Comp.2	0.039***	0.042***	0.051***	0.043***
	(0.006)	(0.006)	(0.007)	(0.007)
Math Comp.3	-0.013***	-0.010***	-0.010***	-0.010***
	(0.003)	(0.002)	(0.003)	(0.003)
Math Comp.4	-0.000	-0.000	-0.001	-0.001
	(0.001)	(0.001)	(0.001)	(0.001)
Constant	2.221***	2.236***	2.141***	2.309***
	(0.031)	(0.081)	(0.121)	(0.106)
School FE	Yes	Yes	Yes	Yes
Birthyear/-quarter	No	Yes	Yes	Yes
Books@home	No	Yes	Yes	Yes
Gender/Migration	No	Yes	Yes	Yes
Par. KldB Code 2dig	No	No	No	Yes
Par. Educ.	No	No	Yes	No
Mean Dep. Var.	2.513	2.513	2.512	2.511
Observations	14080	13839	10611	10927
R^2	0.249	0.277	0.294	0.307

*S*tandard errors in parentheses, clustered on school level.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 5: Self Concept School

	(1) Self Concept: School Coef./Std. err.	(2) Self Concept: School Coef./Std. err.	(3) Self Concept: School Coef./Std. err.	(4) Self Concept: School Coef./Std. err.
Mean Rank	0.143***	0.164***	0.218***	0.187***
	(0.053)	(0.052)	(0.060)	(0.061)
Math Comp.	0.088***	0.079***	0.081***	0.090***
	(0.014)	(0.014)	(0.016)	(0.016)
Math Comp.2	0.016***	0.018***	0.019***	0.014***
	(0.005)	(0.005)	(0.005)	(0.005)
Math Comp.3	-0.002	-0.002	-0.003	-0.003
	(0.002)	(0.002)	(0.003)	(0.002)
Math Comp.4	-0.000	-0.000	-0.000	0.000
	(0.000)	(0.001)	(0.001)	(0.001)
Read. Comp.	0.080***	0.065***	0.055***	0.060***
	(0.012)	(0.012)	(0.014)	(0.014)
Read. Comp. 2	0.013**	0.012**	0.018***	0.013*
	(0.006)	(0.006)	(0.007)	(0.007)
Read. Comp. 3	-0.004***	-0.004***	-0.003**	-0.003**
	(0.001)	(0.001)	(0.001)	(0.001)
Read. Comp. 4	-0.000	-0.000	-0.001	-0.000
	(0.001)	(0.001)	(0.001)	(0.001)
Constant	2.651***	2.446***	2.365***	2.448***
	(0.030)	(0.068)	(0.091)	(0.082)
School FE	Yes	Yes	Yes	Yes
Birthyear/-quarter	No	Yes	Yes	Yes
Books@home	No	Yes	Yes	Yes
Gender/Migration	No	Yes	Yes	Yes
Par. KldB Code 2dig	No	No	No	Yes
Par. Educ.	No	No	Yes	No
Mean Dep. Var.	2.889	2.891	2.912	2.905
Observations	13008	12787	9837	10140
R^2	0.134	0.149	0.168	0.184

*S*tandard errors in parentheses, clustered on school level.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

concept. The same holds for self concept in school in general (table 5). For ordinal rank in reading and self concept in German (not reported) the effect is also robust and positive but smaller in magnitude. These results confirm the findings of Marsh (1987) and suggest that ordinal rank influences students non-cognitive skills. The next subsections explore if this effect on non-cognitive skills also influences occupational choice.

4.2 Occupational Expectations and Occupations in Vocational Training

In this section we first use realistic occupational expectations [8] in $9^t h$ class as outcomes and rank these occupations by average income in the specific occupation 2010 in Ger-

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[8] Using idealistic expectations does not change the revealed pattern.

Table 6: Aspiration Real Occup: Income

	(1) ln(Income) Real Coef./Std. err.	(2) ln(Income) Real Coef./Std. err.	(3) ln(Income) Real Coef./Std. err.	(4) ln(Income) Real Coef./Std. err.
Mean Rank	-0.068*	-0.056	-0.040	-0.034
	(0.036)	(0.035)	(0.042)	(0.041)
Math Comp.	0.064***	0.050***	0.047***	0.047***
	(0.009)	(0.009)	(0.011)	(0.011)
Math Comp.2	-0.006**	-0.005*	-0.005	-0.007*
	(0.003)	(0.003)	(0.003)	(0.003)
Math Comp.3	-0.002*	-0.002*	-0.003**	-0.002
	(0.001)	(0.001)	(0.001)	(0.001)
Math Comp.4	0.000	0.000	0.001*	0.000
	(0.000)	(0.000)	(0.000)	(0.000)
Read. Comp.	0.028***	0.028***	0.029***	0.028***
	(0.008)	(0.008)	(0.010)	(0.010)
Read. Comp. 2	0.003	0.000	0.001	0.001
	(0.004)	(0.004)	(0.004)	(0.005)
Read. Comp. 3	-0.001	-0.000	-0.001	-0.001
	(0.001)	(0.001)	(0.001)	(0.001)
Read. Comp. 4	-0.000	-0.000	-0.000	-0.000
	(0.000)	(0.000)	(0.000)	(0.001)
Constant	8.196***	8.108***	8.122***	8.077***
	(0.020)	(0.033)	(0.047)	(0.045)
School FE	Yes	Yes	Yes	Yes
Birthyear/-quarter	No	Yes	Yes	Yes
Books@home	No	Yes	Yes	Yes
Gender/Migration	No	Yes	Yes	Yes
Par. KldB Code 2dig	No	No	No	Yes
Par. Educ.	No	No	Yes	No
Mean Dep. Var.	8.107	8.108	8.121	8.117
Observations	8175	8020	6267	6491
R^2	0.306	0.321	0.339	0.352

*St*andard errors in parentheses, clustered on school level.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

many (StatistischesBundesamt 2010) and ISEI 08 prestige score. The advantage of these expectations is that all students were asked these questions. Students who stay in upper secondary school to obtain university entry qualification are as well captured as those students planning to leave school after the ongoing school year and start vocational training. Table 6 shows that there is no effect of ordinal rank on income in the expected occupation. We would expect that students with a higher rank would choose occupations which are higher paying. The coefficients which are not statistically significantly different from zero, however, are even negative. Table 7 shows the influence of ordinal rank on the prestige score of the expected occupations. The coefficients are statistically significantly negative. The coefficients are, however, still small as the mean of prestige scores is 53 ranging from a minimum of 11 to a maximum of 88 (see table 2). As these

Table 7: Aspiration Real Occup: ISEI 08

	(1) ISEI08 Real Coef./Std. err.	(2) ISEI08 Real Coef./Std. err.	(3) ISEI08 Real Coef./Std. err.	(4) ISEI08 Real Coef./Std. err.
Mean Rank	-8.422***	-7.214***	-6.775***	-5.998**
	(2.144)	(2.055)	(2.402)	(2.399)
Math Comp.	2.091***	3.245***	3.223***	3.402***
	(0.525)	(0.512)	(0.600)	(0.596)
Math Comp.2	0.366**	0.358**	0.454**	0.239
	(0.169)	(0.164)	(0.177)	(0.193)
Math Comp.3	-0.046	-0.086*	-0.125**	-0.103**
	(0.047)	(0.045)	(0.057)	(0.050)
Math Comp.4	-0.005	-0.004	-0.004	0.004
	(0.013)	(0.012)	(0.015)	(0.014)
Read. Comp.	3.825***	2.713***	2.537***	2.287***
	(0.495)	(0.467)	(0.554)	(0.541)
Read. Comp. 2	0.104	0.148	0.269	0.310
	(0.218)	(0.212)	(0.229)	(0.263)
Read. Comp. 3	-0.054	-0.051	-0.011	-0.013
	(0.048)	(0.044)	(0.044)	(0.051)
Read. Comp. 4	-0.032	-0.030	-0.052***	-0.055**
	(0.023)	(0.021)	(0.020)	(0.027)
Constant	60.141***	47.979***	46.488***	48.378***
	(1.218)	(1.985)	(2.821)	(2.539)
School FE	Yes	Yes	Yes	Yes
Birthyear/-quarter	No	Yes	Yes	Yes
Books@home	No	Yes	Yes	Yes
Gender/Migration	No	Yes	Yes	Yes
Par. KldB Code 2dig	No	No	No	Yes
Par. Educ.	No	No	Yes	No
Mean Dep. Var.	53.453	53.564	54.651	54.362
Observations	8868	8697	6817	7031
R^2	0.396	0.430	0.446	0.457

Standard errors in parentheses, clustered on school level.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 8: Occupation Vocational Training: ln(Gross Earnings)

	(1) ln(Income) Coef./Std. err.	(2) ln(Income) Coef./Std. err.	(3) ln(Income) Coef./Std. err.	(4) ln(Income) Coef./Std. err.
Mean Rank	-0.018	-0.046	-0.047	-0.024
	(0.048)	(0.046)	(0.054)	(0.054)
Math Comp.	0.071***	0.035***	0.036**	0.032**
	(0.012)	(0.012)	(0.014)	(0.015)
Read. Comp.	0.006	0.023**	0.029**	0.027**
	(0.012)	(0.011)	(0.014)	(0.013)
Constant	8.047***	8.100***	8.041***	8.085***
	(0.027)	(0.040)	(0.060)	(0.057)
School FE	Yes	Yes	Yes	Yes
Competencies higher power	Yes	Yes	Yes	Yes
Birthyear/-quarter	No	Yes	Yes	Yes
Books@home	No	Yes	Yes	Yes
Gender/Migration	No	Yes	Yes	Yes
Par. KldB Code 2dig	No	No	No	Yes
Par. Educ.	No	No	Yes	No
Mean Dep. Var.	7.900	7.901	7.905	7.903
Observations	2803	2724	2069	2141
R^2	0.265	0.415	0.441	0.491

*S*tandard errors in parentheses, clustered on school level.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

are only expectations, results could change if revealed occupational choices are analysed. In the sample of students in their first vocational training position we can use these occupations as revealed choice. Again, we rank the occupations by average income 2010, prestige score (ISEI 08), and additionally by needed skill levels first measured as mean of average math and reading skills in an occupation measured by competence tests in NEPS Starting Cohort 6 - Adults, and second measured by O*NET data on the importance of math and reading skills weighted by their needed level. Again, we do not find a statistically significant effect of ordinal rank on any of our occupation measure except for prestige score. The coefficients are as well negative, which runs against our expectation, and they are very small in magnitude. As we are particularly interested if students choose an occupation which will not become obsolete by computerization we used measures on performing repetitive tasks in an occupation and how automated an occupation already is from O*NET as outcome variables. Table **??**nd table **??**how the results. There is no statistically significant effect of ordinal rank on the degree of repetitive tasks and automation of an occupation. The coefficients are negative which would, however, suggest that people with higher rank tend to choose occupations with a lower degree of repetitive tasks and degree of automation. This would meet our expectations.

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Table 9: Occupation Vocational Training: ISEI 08

	(1) Prestige (ISEI 08) Coef./Std. err.	(2) Prestige (ISEI 08) Coef./Std. err.	(3) Prestige (ISEI 08) Coef./Std. err.	(4) Prestige (ISEI 08) Coef./Std. err.
Mean Rank	-9.404***	-7.988***	-7.456**	-3.639
	(2.748)	(2.676)	(3.233)	(3.406)
Math Comp.	1.835**	2.881***	2.562***	2.266**
	(0.767)	(0.755)	(0.894)	(0.945)
Read. Comp.	3.239***	2.498***	2.805***	2.119***
	(0.642)	(0.643)	(0.813)	(0.777)
Constant	54.399***	47.484***	46.412***	45.428***
	(1.617)	(2.432)	(3.540)	(3.670)
School FE	Yes	Yes	Yes	Yes
Competencies higher power	Yes	Yes	Yes	Yes
Birthyear/-quarter	No	Yes	Yes	Yes
Books@home	No	Yes	Yes	Yes
Gender/Migration	No	Yes	Yes	Yes
Par. KldB Code 2dig	No	No	No	Yes
Par. Educ.	No	No	Yes	No
Mean Dep. Var.	36.209	36.305	36.672	36.688
Observations	2904	2821	2137	2217
R^2	0.245	0.302	0.348	0.391

*S*tandard errors in parentheses, clustered on school level.
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 10: Occupation Vocational Training: Existing Skills

	(1) Mean Med. Skills Coef./Std. err.	(2) Mean Med. Skills Coef./Std. err.	(3) Mean Med. Skills Coef./Std. err.	(4) Mean Med. Skills Coef./Std. err.
Mean Rank	-0.063	-0.076	-0.073	-0.042
	(0.073)	(0.074)	(0.091)	(0.089)
Math Comp.	0.075***	0.065***	0.064**	0.062**
	(0.022)	(0.023)	(0.026)	(0.026)
Read. Comp.	0.042**	0.043**	0.051**	0.061***
	(0.018)	(0.019)	(0.024)	(0.022)
Constant	-0.136***	-0.185**	-0.245**	-0.070
	(0.043)	(0.077)	(0.110)	(0.113)
School FE	Yes	Yes	Yes	Yes
Competencies higher power	Yes	Yes	Yes	Yes
Birthyear/-quarter	No	Yes	Yes	Yes
Books@home	No	Yes	Yes	Yes
Gender/Migration	No	Yes	Yes	Yes
Par. KldB Code 2dig	No	No	No	Yes
Par. Educ.	No	No	Yes	No
Mean Dep. Var.	-0.345	-0.342	-0.336	-0.333
Observations	2904	2821	2137	2217
R^2	0.264	0.277	0.310	0.377

*S*tandard errors in parentheses, clustered on school level.
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 11: Occupation Vocational Training: ONET Needed Skills Math

	(1) Skills Math Coef./Std. err.	(2) Skills Math Coef./Std. err.	(3) Skills Math Coef./Std. err.	(4) Skills Math Coef./Std. err.
Rank Math	-0.002	-0.003	-0.003	-0.004
	(0.007)	(0.007)	(0.009)	(0.009)
Math Comp.	0.006**	0.004	0.004	0.006
	(0.003)	(0.003)	(0.004)	(0.004)
Constant	0.122***	0.120***	0.121***	0.123***
	(0.004)	(0.007)	(0.011)	(0.011)
School FE	Yes	Yes	Yes	Yes
Competencies higher power	Yes	Yes	Yes	Yes
Birthyear/-quarter	No	Yes	Yes	Yes
Books@home	No	Yes	Yes	Yes
Gender/Migration	No	Yes	Yes	Yes
Par. KldB Code 2dig	No	No	No	Yes
Par. Educ.	No	No	Yes	No
Mean Dep. Var.	0.116	0.116	0.117	0.117
Observations	3120	3031	2302	2389
R^2	0.201	0.218	0.263	0.309

*S*tandard errors in parentheses, clustered on school level.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 12: Occupation Vocational Training: ONET Needed Skills Reading

	(1) Skills Reading Coef./Std. err.	(2) Skills Reading Coef./Std. err.	(3) Skills Reading Coef./Std. err.	(4) Skills Reading Coef./Std. err.
Rank Read.	-0.028**	-0.018	-0.016	0.001
	(0.013)	(0.013)	(0.015)	(0.015)
Read. Comp.	0.016***	0.011**	0.012*	0.008
	(0.005)	(0.005)	(0.006)	(0.006)
Constant	0.342***	0.284***	0.285***	0.290***
	(0.008)	(0.014)	(0.020)	(0.022)
School FE	Yes	Yes	Yes	Yes
Competencies higher power	Yes	Yes	Yes	Yes
Birthyear/-quarter	No	Yes	Yes	Yes
Books@home	No	Yes	Yes	Yes
Gender/Migration	No	Yes	Yes	Yes
Par. KldB Code 2dig	No	No	No	Yes
Par. Educ.	No	No	Yes	No
Mean Dep. Var.	0.266	0.267	0.269	0.269
Observations	3011	2819	2135	2215
R^2	0.225	0.337	0.382	0.426

*S*tandard errors in parentheses, clustered on school level.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 13: Occupation Vocational Training: ONET Repetitive Tasks

	(1) repetition Coef./Std. err.	(2) repetition Coef./Std. err.	(3) repetition Coef./Std. err.	(4) repetition Coef./Std. err.
Mean Rank	-0.051*	-0.033	-0.026	-0.031
	(0.027)	(0.025)	(0.028)	(0.032)
Math Comp.	0.001	0.018***	0.020**	0.021**
	(0.007)	(0.007)	(0.008)	(0.009)
Read. Comp.	0.020***	0.013**	0.011	0.017**
	(0.006)	(0.006)	(0.007)	(0.008)
Constant	0.654***	0.588***	0.596***	0.580***
	(0.016)	(0.022)	(0.034)	(0.031)
School FE	Yes	Yes	Yes	Yes
Competencies higher power	Yes	Yes	Yes	Yes
Birthyear/-quarter	No	Yes	Yes	Yes
Books@home	No	Yes	Yes	Yes
Gender/Migration	No	Yes	Yes	Yes
Par. KldB Code 2dig	No	No	No	Yes
Par. Educ.	No	No	Yes	No
Mean Dep. Var.	0.593	0.594	0.597	0.594
Observations	2898	2815	2133	2212
R^2	0.215	0.336	0.383	0.417

*S*tandard errors in parentheses, clustered on school level.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 14: Occupation Vocational Training: ONET Automated

	(1) automatation Coef./Std. err.	(2) automatation Coef./Std. err.	(3) automatation Coef./Std. err.	(4) automatation Coef./Std. err.
Mean Rank	-0.035	-0.031	-0.011	-0.026
	(0.022)	(0.023)	(0.025)	(0.029)
Math Comp.	0.010*	0.015**	0.012*	0.015**
	(0.006)	(0.006)	(0.007)	(0.007)
Read. Comp.	0.012**	0.011**	0.005	0.014**
	(0.005)	(0.005)	(0.006)	(0.006)
Constant	0.314***	0.280***	0.276***	0.278***
	(0.013)	(0.022)	(0.032)	(0.030)
School FE	Yes	Yes	Yes	Yes
Competencies higher power	Yes	Yes	Yes	Yes
Birthyear/-quarter	No	Yes	Yes	Yes
Books@home	No	Yes	Yes	Yes
Gender/Migration	No	Yes	Yes	Yes
Par. KldB Code 2dig	No	No	No	Yes
Par. Educ.	No	No	Yes	No
Mean Dep. Var.	0.277	0.278	0.282	0.278
Observations	2898	2815	2133	2212
R^2	0.221	0.241	0.298	0.361

*S*tandard errors in parentheses, clustered on school level.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 15: In School 2013

	(1) In School 2013 Coef./Std. err.	(2) In School 2013 Coef./Std. err.	(3) In School 2013 Coef./Std. err.
Mean Rank	-0.097**	-0.084*	-0.200
	(0.041)	(0.051)	(0.202)
Math Comp.	0.067***	0.077***	0.317***
	(0.011)	(0.013)	(0.051)
Math Comp.2	-0.011***	-0.008***	-0.005
	(0.003)	(0.003)	(0.019)
Math Comp.3	-0.004***	-0.005***	-0.013*
	(0.001)	(0.002)	(0.006)
Math Comp.4	0.001***	0.001***	0.001
	(0.000)	(0.000)	(0.002)
Read. Comp.	0.076***	0.062***	0.247***
	(0.010)	(0.011)	(0.046)
Read. Comp. 2	-0.015***	-0.015***	-0.036*
	(0.004)	(0.004)	(0.020)
Read. Comp. 3	-0.003***	-0.003***	-0.009*
	(0.001)	(0.001)	(0.005)
Read. Comp. 4	0.001**	0.001***	0.003
	(0.000)	(0.000)	(0.002)
Constant	0.353***	0.156**	-1.679***
	(0.022)	(0.065)	(0.296)
School FE	Yes	Yes	Yes
Birthyear/-quarter	No	Yes	Yes
Books@home	No	Yes	Yes
Gender/Migration	No	Yes	Yes
Par. Educ.	No	Yes	No
Mean Dep. Var.	0.572	0.598	0.530
Observations	10935	8314	8726
R^2	0.539	0.565	

*S*tandard errors in parentheses, clustered on school level.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

4.3 Academic Expectations and Attending School

Given that **?** and **?** find positive effects on educational attainment and expectations it is possible that the ordinal rank has a stronger effect on academic considerations. As students are only 17 at the end of our panel data set we cannot observe decisions on studying. We, therefore, check in table 15 if ordinal rank has an effect on being still in school in 2013. Here we estimate equation 2 with a binary outcome variable with OLS (column 1 and 2) and logistic regression (column 3). If at all table 15 reveals that there is a negative effect of ordinal rank on being in school in 2013 which, again, is counter-intuitive.

4.4 Robustness Check: Grade Ranks

Test scores from the NEPS competence tests are not communicated to students, parents, or teachers. Therefore, students' occupational choice might not be influenced by their real competence rank in class as they do not know it. To see their relative standing in terms of competence in class students might rely on grades which they get from their teachers. To test if the ordinal rank has actually be communicated to the students to influence their actions we compute grade ranks instead of competence test score ranks. (Tables under construction)

4.5 Other Determinants of Occupational Choice: Cognitive and Non-Cognitive Skills and Parental Occupation

As ordinal rank is part of a peer effect and thus of non-cognitive skills. In this section we want to discuss the other two aspects of occupational choice which are discussed in the literature and which we use as control variables: cognitive skills and family background i.e. parents. Cognitive skills are measured in test scores in a math and reading test. We consider these test scores up to the 4th polynomial in our regressions. For almost all of our measures for occupations the influence of cognitive skills is highly statistically significant and positive. The higher the ordinal rank the better paid is the expected or chosen occupation, the higher its prestige, and the existing skills within that occupation. Table 15 shows that cognitive skills positively influence if a student is still in school 2013. Very often the influence is not only linear but has also significant effects in its higher polynomials. Therefore, we can conclude that actual cognitive abilities are more important to students occupational choice than their ordinal rank. Family background and in particular the occupation of the parents is also reported in NEPS. As Blanden et al. (2014) show in UK, the European country in their study, occupations are a main driver of intergenerational mobility, we want to check if inheriting occupations is an issue in Germany as well. As we do not report coefficients of each parental occupation dummy, we checked how many of the students in vocational training chose an occupation which is the same as the occupation of at least one parent. Table 16 shows for ISCO-08 three and two digits that only very few students chose the same occupation as one of their parents. At a maximum 7.3 percent are in the same occupation as one of their parents. As also the R^2 is only increased between 0.02 and 0.06 percentage points including the

Table 16: Students in Same Occupation as Parents

	KldB88 - 3d	%	KldB88 - 2d	%
Same occup as at least one parent	195	7.3	317	11.86
Other occup as parents	2477	92.7	2355	88.14
Missings	822		822	
Total	3494		3494	

dummies for parental occupation, we conclude that parents' occupations are not the main driver of occupational choice for students in vocational training. It is possible that the influence of parents works rather via the company they work in than the occupation. This, however, cannot be tested with NEPS data.

5   Conclusion and Outlook

Ordinal rank in class has a robust and positive effect on academic self concept which is part of non-cognitive skills. Despite of this strong effect we do not see any effect of the mean math and reading rank in class on occupational choice regardless of how we rank occupations. Considering the magnitude of effects and also the only significant effect we find on prestige scores, the effect is negative which is counter-intuitive. We plan to further investigate this issue looking at rank quartiles. It is possible that the effect of the ordinal rank goes in the opposite direction for highly ranked students compared to low-ranked students. Then we want to consider differences in ordinal rank between math and reading suggesting that such a difference might reveal a specific talent to the student. Students who are higher ranked in math than in reading might chose more math intensive occupations. As outcomes we plan to analyse influences on routine-task occupations versus non-routine-task occupations more closely. Additionally, we want to add a data set for Switzerland, where the structure of the school system and vocational training is similar to Germany. We plan to use the TREE panel data which follows students from the PISA survey of 2000 over the next 10 years. In this dataset, we observe actual occupational choices and earnings.

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