

# Who benefits from school-to-work linkages in the labor market? A comparison between natives, migrants educated abroad, and those educated domestically

## Online Appendix

### *Robustness checks*

As a robustness test, we perform analyses in which we do not only distinguish by migrants' place of education, but also by migrants' region of origin. Especially migrants with foreign degrees from non-Western countries may face problems in having their qualifications recognized. Moreover, non-Western, rather than Western immigrant groups, tend to face discrimination in the labor market. Figures A2 and A3 show a replication of earlier analyses differentiating between Western and non-Western immigrants for employment probabilities and working in matching occupations. With respect to employment probabilities, Western immigrants with domestic qualifications seem to benefit most from holding more occupation-specific qualifications, followed by natives. We do not observe that non-Western migrants with foreign qualifications benefit less from holding more occupation-specific qualifications than Western ones. In fact, the reverse seems true as non-Western migrants experience slight benefits, whereas Western migrants seem to experience disadvantages. Like the main analyses, overall differences are small. With respect to working in a matching occupation, findings reflect the main findings: the majority population and migrants with domestic qualifications tend to profit equally from holding more occupation-specific qualifications. Immigrants with foreign qualifications experience smaller benefits, and this especially applies to non-Western migrants with foreign qualifications.

Figures A4 and A5 show the results for labor market returns. Similar to the main findings we observe that, when individuals make it into the occupation they are educated for, there are little to no differences between the groups (with the exception of the income of non-Western immigrants). Not working in a matching occupation seems to be the crux: for both occupational status and income, non-Western immigrants with foreign qualifications are penalized more strongly for holding high link strength titles compared to their Western counterparts. The effect of link strength when people do not make it into the occupation they are educated for does not differ systematically between majority individuals and immigrants with German qualifications – irrespective of whether they originate from a Western or non-Western country.

Table A1: Linear multilevel model predicting log-income (n=175,818, N=83).

Log(Total net income)	Model 1		Model 2		Model 3	
	coef.	s.e.	coef.	s.e.	coef.	s.e.
Intercept	7.40*	0.03	5.72*	0.03	5.72*	0.03
Majority (ref.)						
Immigrant with domestic qualification (DQ)	-0.05*	0.01	-0.04*	0.01	-0.04*	0.01
Immigrant with foreign qualification (FQ)	-0.22*	0.01	-0.20*	0.01	-0.20*	0.01
Link strength	0.08*	0.02	0.04*	0.01	0.04*	0.01
In occupation educated for	0.03*	0.00	0.03*	0.00	0.03*	0.00
DQ*link strength					0.01	0.00
FQ*link strength					-0.03*	0.00
Female			-0.23*	0.00	-0.23*	0.00
Age			0.04*	0.00	0.04*	0.00
Age*Age			-0.00*	0.00	-0.00*	0.00
Married			0.05*	0.01	0.05*	0.01
Number of children present under 10			0.06*	0.00	0.06*	0.00
Inverse mills ratios			0.62*	0.09	0.58*	0.09
Fulltime employment			0.54*	0.00	0.54*	0.00
Work hours			0.00*	0.00	0.00*	0.00
REML	301352		234468		234436	
Level 1 Variance Individuals	0.32		0.22		0.22	
Level 2 Variance Educational titles	0.06		0.02		0.01	

Note: \*=p<.05; link strength standardized; in models 2 and 3 we control for educational attainment (ISCED).

Table A2: Robustness checks using German PIAAC data (n=3,376)

Occupational status (ISEI)	Model 1		Model 2		Model 3	
	coef.	s.e.	coef.	s.e.	coef.	s.e.
Intercept	34.09*	0.79	34.39*	0.79	30.59*	1.01
Majority (ref.)						
Immigrant with domestic qualification (DQ)	-1.53	1.18	-1.29	0.92	0.07	0.90
Immigrant with foreign qualification (FQ)	-3.46*	1.34	-2.90*	1.05	-1.65	1.03
Link strength	11.02*	0.81	-0.51	0.69	0.25	0.68
In occupation educated for	8.45*	0.66	5.57*	0.52	5.46*	0.51
Female			1.61*	0.57	2.78*	0.56
Work experience			-0.03	0.23	0.42	0.23
Public employee			4.60*	0.64	4.67*	0.62
Part-time employment			-1.84*	0.62	-1.64*	0.60
Years of education			5.72*	0.14	4.94*	0.15
Parental education			2.50*	0.46	1.36*	0.45
Numeracy skills					0.08*	0.01
Readiness to learn					1.51*	0.33

Note: \*= $p < .05$ , link strength standardized. Female, work experience, years of education and parental education grand-mean centered.

Table A3: Three-way interaction models predicting ISEI and income (n=175,818, N=83). Results for Figures 1 and A1.

	ISEI		Log(Total net income)	
	coef.	s.e.	coef.	s.e.
Intercept	33.49*	1.45	5.73*	0.03
Majority (ref.)				
Immigrant with domestic qualification (DQ)	-1.60	0.18	-0.05*	0.01
Immigrant with foreign qualification (FQ)	-8.57*	0.15	-0.23*	0.01
Link strength	-0.11	0.62	0.02*	0.01
In occupation educated for	-0.47*	0.06	0.02*	0.00
DQ*link strength	-0.61*	0.19	0.02*	0.01
FQ*link strength	-1.08*	0.15	-0.05*	0.01
Link strength*In occupation educated for	3.47*	0.07	0.05*	0.00
DQ*In occupation educated for	1.42*	0.24	0.02*	0.01
FQ*In occupation educated for	7.63*	0.29	0.13*	0.01
DQ*In occupation educated for*link strength	0.65*	0.24	-0.03*	0.01
FQ*In occupation educated for*link strength	1.47*	0.23	0.05*	0.01
Level 1 Variance Individuals	128.61		0.22	
Level 2 Variance Educational titles	35.69		0.01	

Note: \*=p<.05; link strength standardized; controlled for educational attainment (ISCED), age, age2, married, number of children present under 10, inverse mills ratios, fulltime employment and work hours.

Table A4: Two-way interaction models predicting employment and working in occupation they are educated for (n=175,818, N=83). Results for Figures A2 and A3.

	Employment		In occupation educated for	
	coef.	s.e.	coef.	s.e.
Intercept	0.88*	0.01	0.57*	0.05
Majority (ref.)				
Western immigrant with domestic qualification (W-DQ)	-0.01*	0.00	0.01	0.01
Non-Western immigrant with domestic qualification (NW-DQ)	-0.03*	0.00	-0.01	0.01
Western immigrant with foreign qualification (W-FQ)	-0.04*	0.00	-0.13*	0.01
Non-Western immigrant with foreign qualification (NW-FQ)	-0.08*	0.00	-0.13*	0.01
Link strength	0.00	0.00	0.10*	0.02
W-DQ*link strength	0.01*	0.00	-0.00	0.01
NW-DQ*link strength	0.00	0.00	-0.00	0.01
W-FQ*link strength	-0.00	0.00	-0.03*	0.00
NW-FQ*link strength	0.00	0.00	-0.05*	0.01
Level 1 Variance Individuals	0.041		0.196	
Level 2 Variance Educational titles	0.000		0.044	

Note: \*=p<.05; link strength standardized; controlled for educational attainment (ISCED), age, age2, married and number of children present under 10.

Table A5: Three-way interaction models predicting ISEI and income (n=175,818, N=83). Results for Figures A4 and A5.

	ISEI		Log(Total net income)	
	coef.	s.e.	coef.	s.e.
Intercept	33.59*	1.45	5.71*	0.03
Majority (ref.)				
Western immigrant with domestic qualification (W-DQ)	-1.64*	0.21	-0.05*	0.01
Non-Western immigrant with domestic qualification (NW-DQ)	-1.45*	0.28	-0.07*	0.01
Western immigrant with foreign qualification (W-FQ)	-8.56*	0.16	-0.22*	0.01
Non-Western immigrant with foreign qualification (NW-FQ)	-8.48*	0.28	-0.30*	0.01
Link strength	-0.11	0.62	0.02	0.01
In occupation educated for	-0.47*	0.06	0.02*	0.00
W-DQ*link strength	-0.69*	0.17	0.02*	0.01
NW-DQ*link strength	-0.53*	0.29	0.02	0.01
W-FQ*link strength	-0.67*	0.17	-0.05*	0.01
NW-FQ*link strength	-2.09*	0.25	-0.07*	0.01
Link strength*In occupation educated for	-3.47*	0.07	0.05*	0.00
W-DQ*In occupation educated for	1.44*	0.29	0.02	0.01
NW-DQ*In occupation educated for	1.38*	0.40	0.03*	0.02
W-FQ*In occupation education for	7.35*	0.32	0.12*	0.01
NW-FQ*In occupation education for	8.56*	0.59	0.15*	0.02
W-DQ*In occupation educated for*link strength	0.61*	0.31	-0.03*	0.01
NW- DQ*In occupation educated for*link strength	0.73*	0.37	-0.03	0.02
W-FQ*In occupation educated for*link strength	1.14*	0.27	0.04*	0.01
NW-FQ*In occupation educated for*link strength	2.21*	0.42	0.06*	0.02
Level 1 Variance Individuals		128.60		0.22
Level 2 Variance Educational titles		35.66		0.01

Note: \*=p<.05; link strength standardized; controlled for educational attainment (ISCED), age, age2, married, number of children present under 10, inverse mills ratios, fulltime employment and work hours.

Figure A1: Three-way interaction of link strength, in occupation and group indicators on log-income.

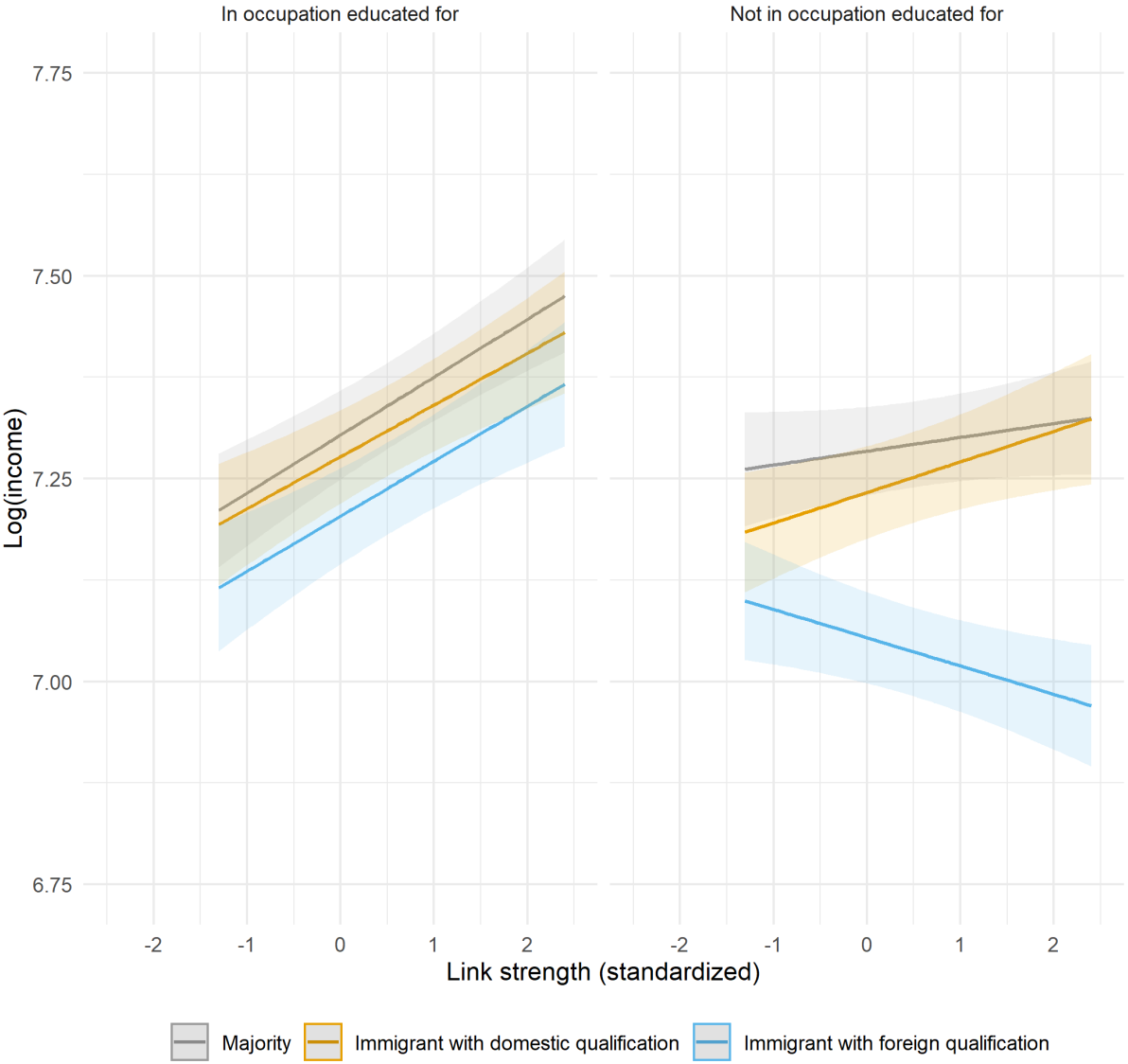


Figure A2: Two-way interaction of link strength and group indicators which differentiate between Western and non-Western immigrants on the linear probability of employment.

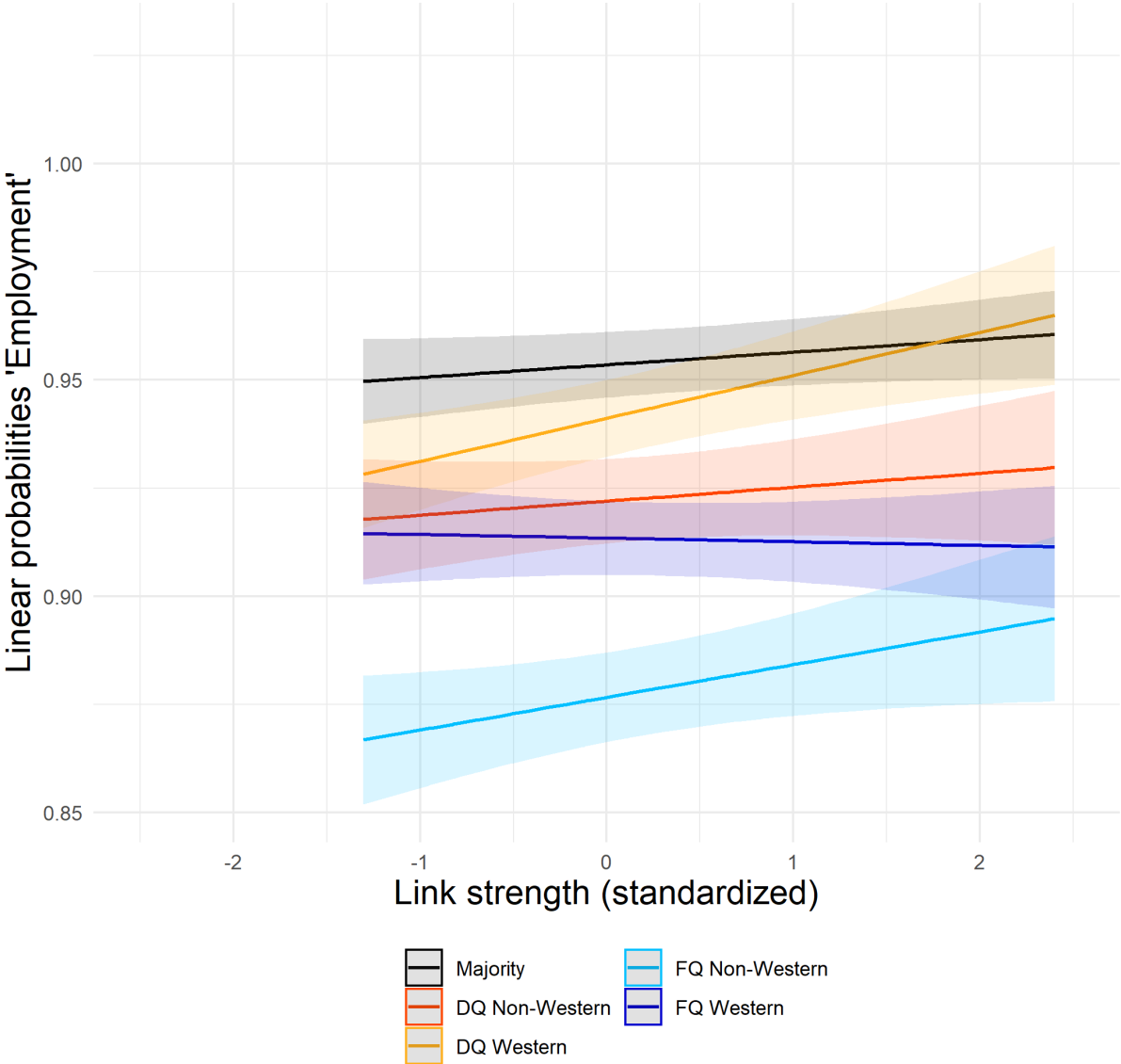




Figure A3: Two-way interaction of link strength and group indicators which differentiate between Western and non-Western immigrants on the linear probability of working in occupation educated for.

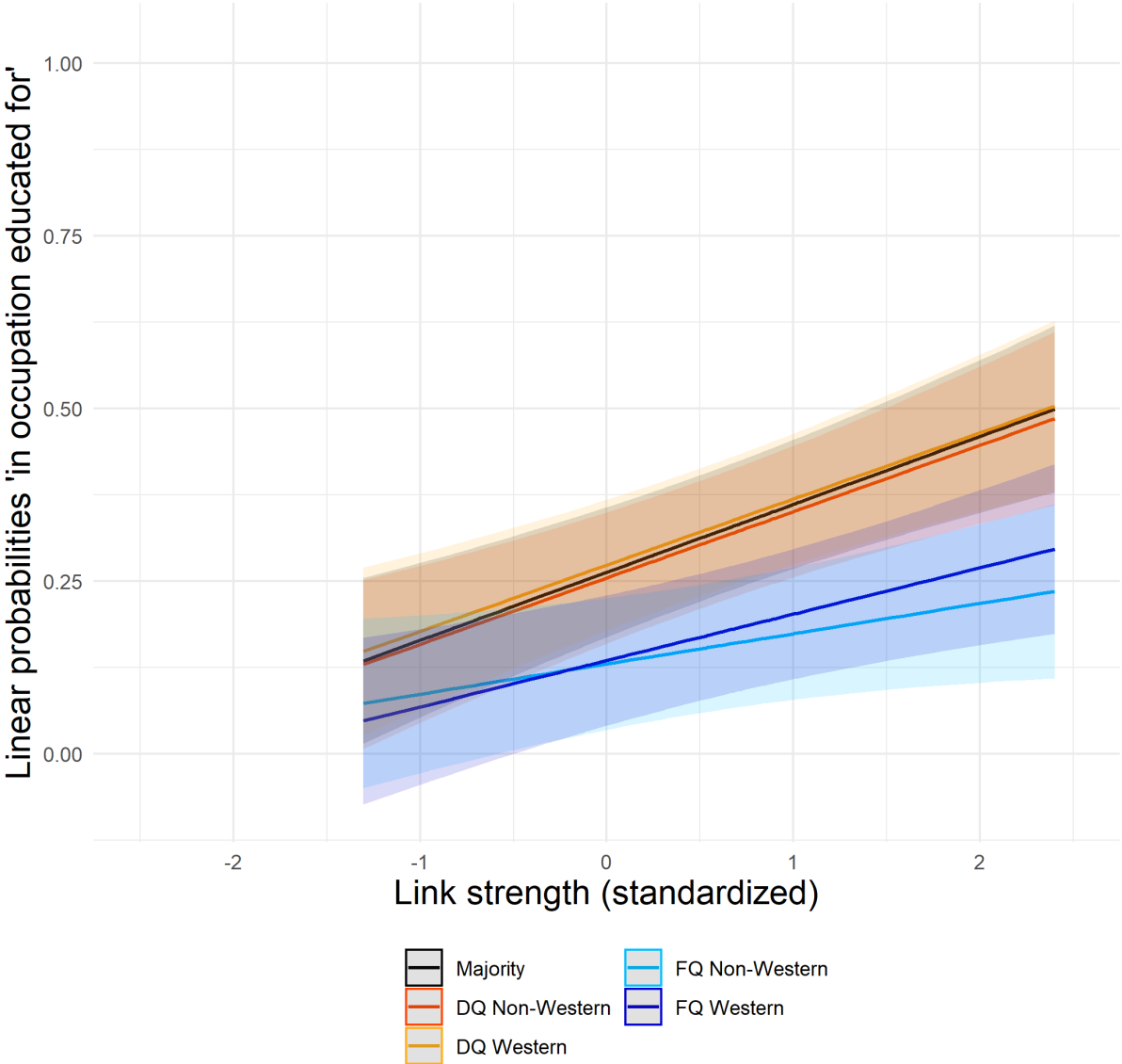


Figure A4: Three-way interaction of link strength and group indicators which differentiate between Western and non-Western immigrants on occupational status.

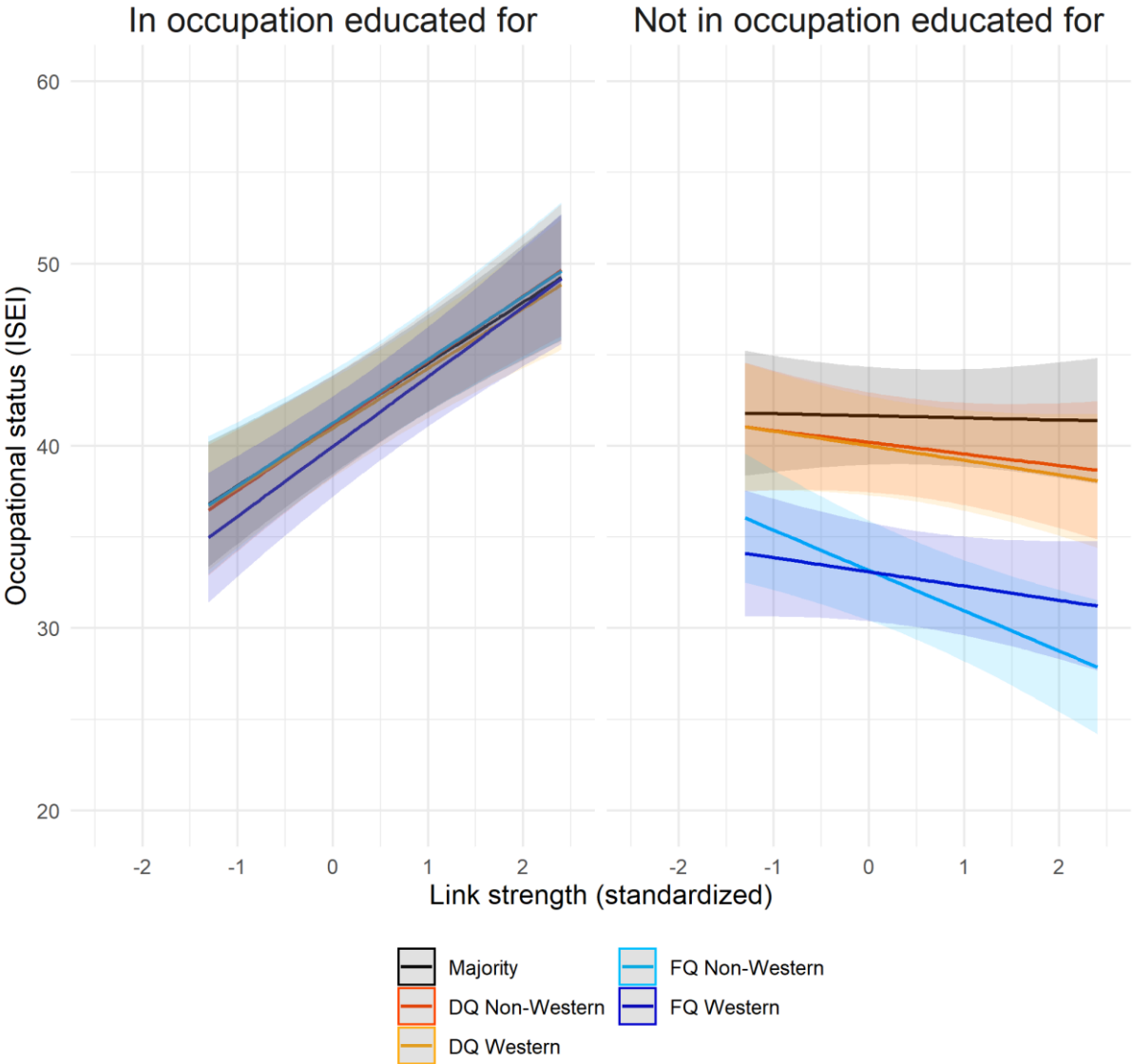


Figure A5: Three-way interaction of link strength and group indicators which differentiate between Western and non-Western immigrants on income.

