

Does personality impact the returns to cognitive skills?

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Motivation



- Much of the variance of individual wages remains unexplained (Bowles, Gintis, and Osborne 2001)
- Little work on the degree of complementarity between cognitive skills and personality traits
- Limited evidence on the role of personality on the labour market in the Eastern Europe

Personality traits: channels of influence on wages



- **Conscientiousness:** tendency to be organized, responsible, and hardworking
 - related to higher productivity, performance in on-the-job training and supervisors' rating of workers' performance
- **Neuroticism (vs Emotional Stability):** vulnerability to stress and a lack of self-confidence, emotional instability
 - related to lower productivity and to lower competitiveness
 - related to lower job search intensity and reservation wage
 - Motivation theory: individuals have imperfect knowledge of their own ability and ability and effort are complements; thus higher self-confidence leads to higher motivation and use of skills.

Personality traits: channels of influence on wages



- **Agreeableness:** tendency to act in a cooperative, unselfish manner
 - valued in occupations requiring client service or team work
 - negative selection into high-skilled occupations
 - wage bargaining outcomes: agreeable individuals accept unfair offers more often
- **Openness to Experience:** the tendency to be open to new aesthetic, cultural, or intellectual experiences
 - positive selection into high-skilled occupations
- **Extraversion:** an orientation of one's interests and energies toward the outer world of people and things rather than the inner world of subjective experience
 - broader social networks

Personality traits & wages: empirical evidence



- **Conscientiousness** is positively related to wages
- Wage penalty for **neuroticism**
- Wage penalty for **agreeableness**
- Mixed evidence on **openness**
 - wage premium for openness
 - Inverted U-shaped relationship between earnings and openness (Rammstedt, Danner, and Lechner 2017)
- No link between **extraversion** and wages in most of the studies

(Drago 2011; Heineck 2014; Heineck and Anger 2010; Mueller and Plug 2006; Nyhus and Pons 2005; O'Connell and Sheikh 2011; Cunningham et al. 2016)

Personality traits & wages: gender differences



- Heterogeneous effects of personality on wages for men and women
- Differences stem from different social **expectations towards genders**: counterstereotypic behaviour is often subject to social and economic sanction. The sanctions may include:
 - limited opportunities for promotion
 - reduced recognition
 - worse interpersonal relations

This paper



- Provides evidence that personality traits are related to wages for both women and men in Poland
- Shows that the returns to cognitive skills depend on the personality of an individual

- **Data sources:**
 - Polish Follow-up Study on PIAAC (postPIAAC)
 - Cognitive skills: OECD Survey of Adults Skills (PIAAC)
- **Time:** PIAAC-OECD 2011/2012, postPIAAC 2014/2015
- **Sample:** Paid workers excluding self-employed, 18-68 years old (n = 2022)

- **Cognitive skills measures:** numeracy
- **Personality measures:** Big Five Inventory-Short (BFI-S) (Gerlitz and Schupp 2005) - 15 self-reported items
- **Individual controls:** age, age squared, years of education, experience, experience squared;
- **Job / occupation controls:** tenure, hours worked per week, public sector dummy, 1-digit ISCO, industry (ISIC)

Methodology



$$\ln y_i = \beta \text{COG}_i + \delta \text{PT}_i + \alpha \text{COG}_i * \text{PT}_i + \theta X_i + u_i$$

y_i is individual i 's gross hourly wage

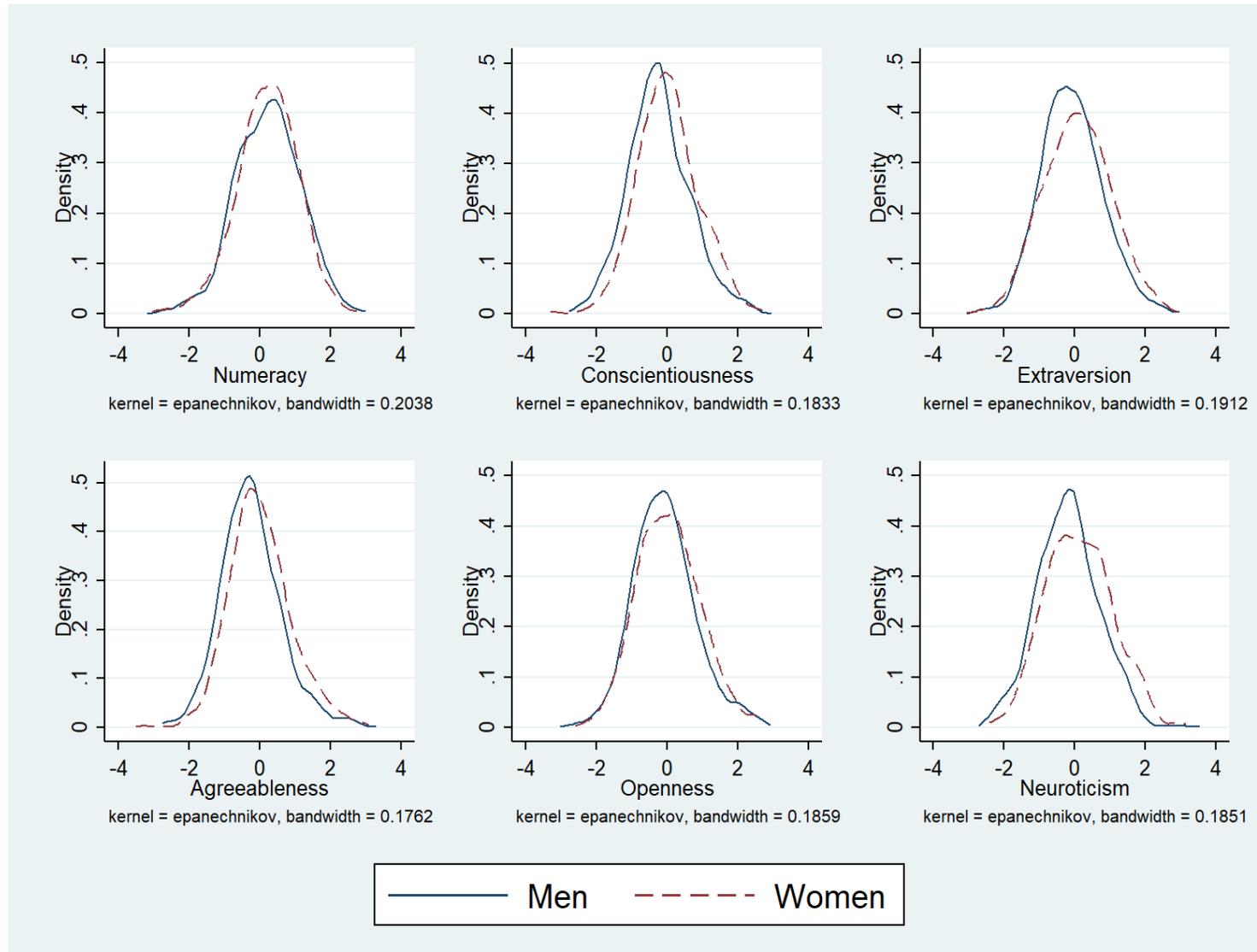
COG_i is the level of cognitive skills

PT_i is a vector of personality traits

X_i is a vector of individual and job characteristics

- Separate models for women and men
- Heckman's selection model to account for sample selection bias. The exclusion restrictions: respondent's female and male guardians were working when he or she was sixteen years old and a dummy for having children 6 years old or younger / alternative: living with partner.
- All models use weights accounting for survey design.

Traits distribution by gender



Personality traits associations with wages



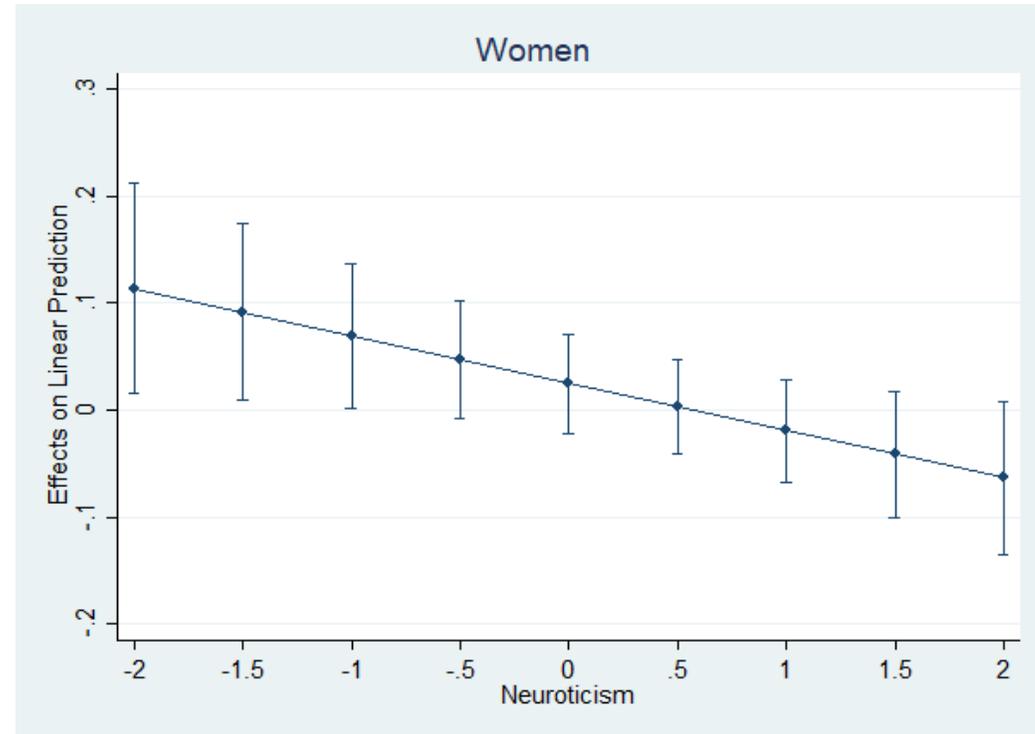
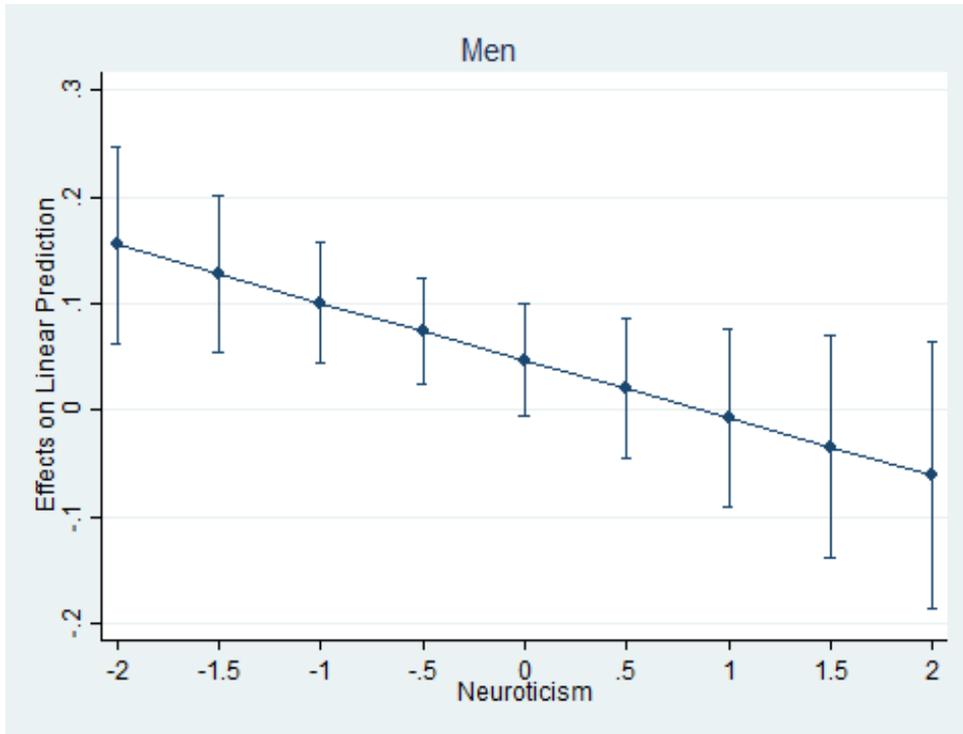
dep. var.: ln(wage)	Men	Women	Men	Women
	(1)	(2)	(3)	(4)
Numeracy	0.066*	0.045+	0.042	0.027
Conscientiousness	0.108+	0.090	0.104*	0.105*
Extraversion	0.010	0.007	0.010	0.011
Agreeableness	-0.132*	-0.085	-0.149**	-0.121**
Openness	0.018	-0.021	0.038	-0.021
Neuroticism	-0.022	-0.028	-0.033+	-0.045*
Numeracy # Con	-0.040	-0.049	0.024	0.021
Numeracy # Ext	-0.030	0.009	-0.044	0.000
Numeracy # Agr	-0.025	0.016	-0.060	-0.041
Numeracy # Opn	0.100+	-0.022	0.084+	0.007
Numeracy # Neu	-0.042	-0.029	-0.054*	-0.044*
Individual controls	+	+	+	+
Job / Occupation controls			+	+
R ²	0.303	0.306	0.467	0.497

Notes: N=937 (females)/1085 (males); **Individual controls**: age, age squared, years of education, experience, experience squared; **job / occupation controls**: tenure, hours worked per week, public sector dummy, 1-digit ISCO, industry (ISIC); ISCO=0 excluded; top and bottom 1% of wage distribution excluded. First PV (plausible value) for numeracy. Logarithm of wages. Numeracy and non-cognitive skills are standardised. + $p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. R² with standard controls only: 0.431 (men) 0.474 (women).

The returns to numeracy by the level of neuroticism



Average marginal effects of numeracy on wages by neuroticism level for men (left pane) and women (right pane)



The returns to numeracy are significantly different from zero for values of neuroticism below the mean.

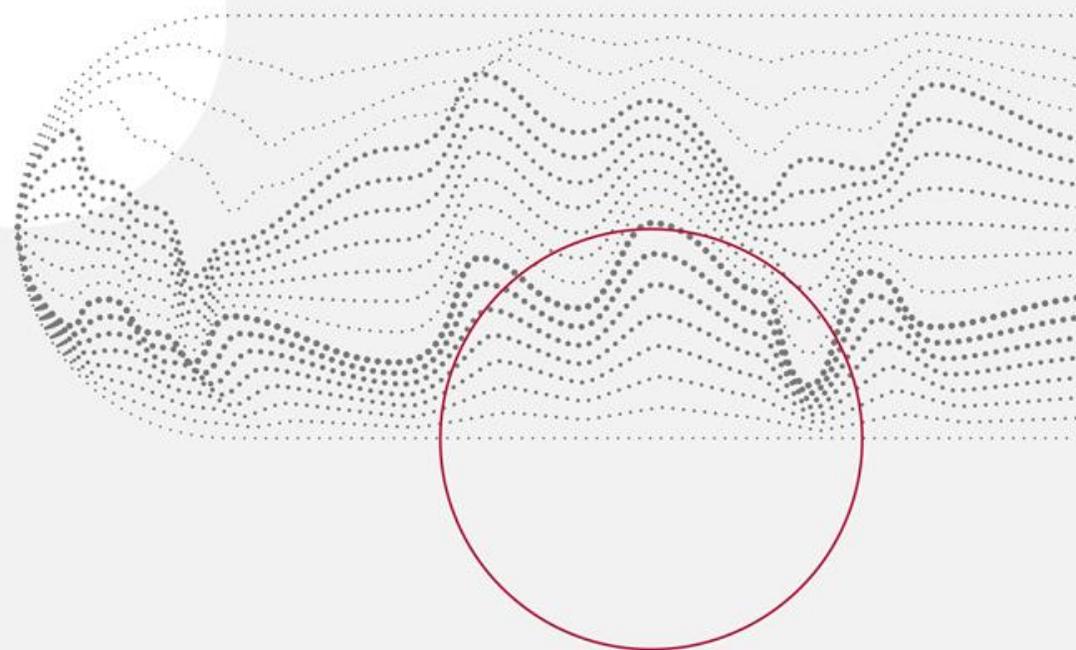
- **Non-linearity**
 - Men with intermediate level of openness have the highest average wages
 - No convincing evidence for non-linearity in other personality-income relationships
- **Tenure with the current employer**
- potentially personality traits are unobserved during recruitment process and only over time employer becomes aware of employee's traits and responds to them
 - Only the relationship of extraversion with wages for men is moderated by tenure: punished more with time

Conclusions



- Personality matters for the individual wages in Poland
 - Employers reward conscientiousness
 - Neurotic and agreeable individuals earn less
 - Neurotic individuals have lower returns to cognitive skills
- There are no gender differences in the effects of personality on wages
- There is a scope for policy interventions as personality is more malleable in adulthood than cognitive skills

Thank you!
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Descriptive statistics



Variable	Men		Women	
	Mean	Std. Dev.	Mean	Std. Dev.
Hourly wages (in PLN)	18.10	10.85	16.48	9.79
Numeracy	274.9	45.07	270.3	44.67
Years of education	13.28	2.78	14.49	2.64
Age	38.21	12.11	39.60	11.64
Experience	16.25	12.30	16.03	11.65
Occupation (ISCO)				
Managers	0.08	0.27	0.07	0.25
Professionals	0.16	0.37	0.31	0.46
Technicians and Associate Prof.	0.10	0.30	0.15	0.36
Clerical Support Workers	0.05	0.22	0.11	0.32
Services and sales workers	0.11	0.31	0.19	0.39
Skilled Agric., Forestry and Fishery Workers	0.00	0.07	0.00	0.06
Craft and Related Trades Workers	0.22	0.42	0.02	0.14
Plant and Machine Operators and Assemblers	0.18	0.38	0.04	0.19
Elementary occupations	0.09	0.29	0.12	0.32

Industry (ISIC)				
Agriculture	0.02	0.15	0.02	0.13
Industry	0.48	0.50	0.19	0.39
Traditional services	0.26	0.44	0.28	0.45
Modern services	0.07	0.26	0.11	0.31
Public administration	0.06	0.24	0.06	0.23
Education	0.07	0.25	0.23	0.42
Health	0.01	0.10	0.09	0.28
Other	0.03	0.16	0.04	0.20
Public sector	0.24	0.43	0.42	0.49
Tenure with current company	8.16	9.25	9.10	9.52
Weekly hours worked	43.9	11.6	38.8	10.0
Living with a partner	0.69	0.46	0.68	0.47
Having kids aged 0-6	0.24	0.43	0.23	0.42
Paid work of mother when 16	0.75	0.43	0.74	0.44
Paid work of father when 16	0.86	0.35	0.88	0.33
Observations	1085		937	