The impact of non-cognitive skills and risk preferences on rural-to-urban migration in Ukraine

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Introduction

- The importance of non-cognitive skills (personality traits) on behavior has been discussed in the psychology literature for decades
- Economists have recently begun to explore more the relationship between personality and life outcomes, especially after the Special Issue of JHR 2008 ed. by Bas ter Weel.
- There is also a large literature discussing how risk preferences impact microeconomic behavior.
- However, there is only little economic research on the link between non-cognitive skills and migration behavior.

Introduction

- In this paper we are interested in the impact of non-cognitive skills/personality traits on rural-to-urban migration decisions within a country.
- We study this impact together with risk preferences.
- Why do we expect that non-cognitive skills and preferences might affect migration behavior?

Motivation

- An early study of Sjaastad (1962) points to *psychic costs* of migration including the emotional burden of leaving the familiar surrounding behind, building up new social relations, and adapting to a new social environment.

- Jaeger et al. (2010) and Bauernschuster et al. (2014) explain the channel through which risk attitudes determine geographic mobility by non-monetary costs due to lack of information and uncertainty about other locations.

- Because risk lovers are more able to deal with uncertainties, an obvious expectation would be to find a positive relationship between the willingness to take risk and migration propensity.

Motivation

- We argue the non-monetary (psychic) cost of migration might also be the channel through which non-cognitive skills explain the migration decision.

- For instance, some non-cognitive skills such as openness to new experience may help adapt to a new environment and a different culture, and hence reduce the psychic costs of migration.

- On the other hand, certain skills such as conscientiousness may work in the opposite direction given that a key facet of conscientiousness is a high valuation of persistence and predictability.

Literature Review - (1) Non-cognitive skills/personality traits

- Seminal papers by Heckman et al. on formation of cognitive and non-cognitive skills and contribution of family investment in early vs. older childhood to this formation.
- Four broad themes related to labor market outcomes:
    - Earnings: e.g., Duncan and Dunifon (1998), Osborne Groves (2005), Heineck and Anger (2010)
    - Occupational choice and employment type (full-/part-time employment, self/dependent employment): e.g., Cobb-Clark and Tan (2011), Braakmann (2009), Caliendo et al. (2014)
    - Gender gap related occupational choice and wages: e.g. Mueller and Plug, 2006; Beaudry and Lewis (2014)
    - Job search behavior: e.g., Della Vigna and Paserman (2005)

Literature Review - (2) Preferences

Two strands of literature looking at the relation of risk attitudes and labor market choices:

- Small literature that looks at question whether risk attitudes can be influenced by life events, changes in labor market state or macroeconomic shocks (Malmendier and Nagel 2011, Sahm 2012, Guiso et al. 2014, Cohn et al. 2015, Dohmen et al. 2016).

- Large literature that discusses how risk attitudes impact on the labor market, e.g., self-employment (Caliendo et al. 2013), occupational sorting (Bonin et al. 2007, Skriabikova et al. 2014), informal employment (Dohmen et al. 2016).

Literature Review - (3) Migration as an outcome

To the best of our knowledge, there is only little empirical evidence on the link between migration behavior and:

- risk preferences: Jaeger et al. (2010) and Bauernschuster et al. (2014) focus on the impact of risk attitudes on intra-country migration in Germany.

- non-cognitive skills: a working paper by Butikofer and Peri (2016) focuses on the impact of sociability and adaptability skills on the probability of migrating out of one's region of origin (in Norway).

Research questions

- How do non-cognitive skills/personality traits (the "Big Five") affect rural-to-urban migration behavior of individuals within a country?
- To what extent do risk preferences play a role in this migration decision?
- We answer these questions using the Ukrainian Longitudinal Monitoring Survey (ULMS).

Migration background in Ukraine

- Despite high income disparities across regions within the country, internal migration is not a big phenomenon.
  - due to a number of barriers to internal mobility including a complicated population registry system, weak formal labor market institutions, underdevelopment of housing and credit markets, non-portability of social benefits and skills mismatch.
- Bearing a typical characteristics of developing countries, urban-to-rural migration is the prominent type,
  - given much poorer standards of living, worse quality of facilities and infrastructure and fewer opportunities for skills acquisition and employment in the rural as compared to large urban centers.
- According to our calculations, internal migration rate is around 6%, and the rural-to-urban migration accounts for 3% (and 1.5 % into cities).

Data

- ULMS - 4 year panel: 2003, 2004, 2007 and 2012
- the most comprehensive labor market survey in the transition region with information on:
    - Individual characteristics of respondents
    - Education, cognitive and non-cognitive skills (non-cognitive skills only in 2012)
    - Risk, social and time preferences (only in 2007 and 2012)
    - Main job characteristics (if employed) and non-employment between survey periods
    - Main and secondary job characteristics in the reference week
    - Unemployment and job seeking in the reference week
    - Information on changes of residence

Variables of interest: Outcome variable

The **outcome variable** is generated based on the information on the *type of settlement*:

1. Village (classified as "rural")
2. Town type rural settlement (classified as "rural")
3. Small town (up to 20 thds.) (classified as "town")
4. Medium town (20 – 99 thds.) (classified as "town")
5. City (100 – 499 thds.) (classified as "city")
6. Large city (more than 500 thds.) (classified as "city")

Variables of interest: Outcome variable

- We have information on six types of settlement in the present reference week.
- We define a rural-to-urban movement as a change in the type of settlement from categories (1) or (2) to one category of the set {3,4,5,6} between two survey periods.
- The dependent variable thus comprises a binary indicator which takes the value 1 once such a move has occurred and the value 0 if the respondent resides in a rural area both in the current and last survey period.
- For example, if a person moved between 2003 and 2004, s/he will be assigned a value of 1 for the intervals 2004 to 2007 and 2007 to 2012.

Variables of interest: Big five taxonomy

- **O**penness, **C**onscientiousness, **E**xtraversion, **A**greeableness, **N**euroticism
- Following John & Srivastava (1999) and Kautz et al. (2014), we group the 24 items into 5 categories:
  O: creative, open to new, enjoying nature/art/music
  C: careful, result-oriented, hard-working, patience
  E: talkative, sharing thoughts, sociable
  A: forgiving, polite, generous, asking help
  N: unrelaxed, worried, nervous, negative perceptions about others' attitudes

- The averages of corresponding items are <u>standardized</u> –with a mean of 0, standard deviation of 1.

Variables of interest: Mapping 24 items into big five

How do you see yourself?	
3 Do you come up with ideas other people haven't thought of before?	
11 Are you very interested in learning new things?	Openness
14 Do you enjoy beautiful things, like nature, art and music?	
2 When doing a task, are you very careful?	
6 Do you finish whatever you begin?	
8 Do you work very hard? For example, do you keep working when others stop to take a break?	
12* Do you prefer relaxation more than hard work?	Concientiousness
13 Do you enjoy working on things that take a very long time (at least several months) to complete?	
17 Do you work very well and quickly?	
21 Do you think carefully before you make an important decision?	
1 Are you talkative?	
4* Do you like to keep your opinions to yourself prefer to keep quiet when you have an opinion?	Extraversion
20 Are you outgoing and sociable, for example, do you make friends very easily?	
9 Do you forgive other people easily?	
16 Are you very polite to other people?	Agreeableness
19 Are you generous to other people with your time or money?	
23 Do you ask for help when you don't understand something?	
5* Are you relaxed during stressful situations?	
7 Do people take advantage of you?	
10 Do you tend to worry?	
15* Do you think about how the things you do will affect you in the future?	Neuroticism
18 Do you get nervous easily?	
22 Are people mean/not nice to you?	
24* Do you think about how the things you do will affect other?	

Variables of interest: Risk preferences

- **Risk**: "Are you generally a person who is fully willing to take risks or do you try to avoid taking risks?"
- Scale is from 0 "Completely unwilling to take risks" to 10 "Completely willing to take risks"
- To measure risk attitudes, we use a dichotomous variable indicating 1 for values 6-10.

General risk index in urban and rural areas, in 2007 and 2012
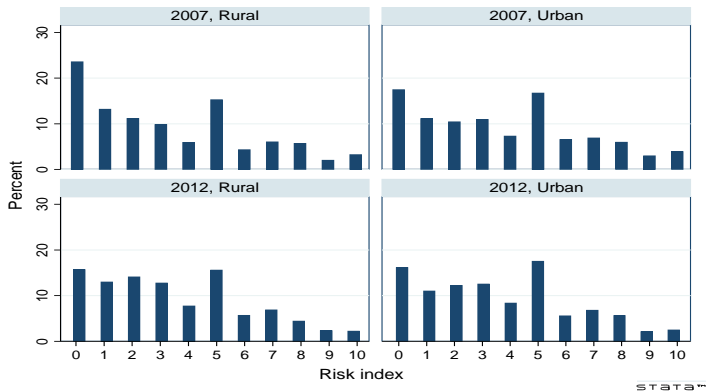
Variables of interest: Demographics & macro variables

- Individual characteristics as control variables include:
    - Pre-determined individual-level variables (i.e., age, sex, Ukrainian/Russian language)
    - Additional individual-level variables that may be jointly determined with migration decisions (i.e., education, marital status, number of kids, employment status, household income)
- Additional controls for a sensitivity check:
    - Regional controls include unemployment rate and log of GDP at region (oblast) level
- Control variables are lagged with respect to previous wave.

Data limitations and how we deal with them

Limitation (1): Non-cognitive skills are only available in 2012.

- Assumption taken from the literature: Non-cognitive skills/personality traits are hardly malleable after adolescence.
- Relying on this assumption, we consider non-cognitive skills fixed over the panel period.
- *Robustness check* through netting-out the age effect on big five factors.

Limitation (2): Risk question is available both in 2007 and 2012.

- We assign the preferences of 2007 to 2003 & 2004 waves.
- *Reverse causality check* using repeated information on risk attitude in 2007 & 2012 waves.

Summary statistics (2012) `Stat. 2004-7`

	Urban sample			Rural stayers			Movers into urban		
	Obs	Mean	Std. Dev.	Obs	Mean	Std. Dev.	Obs	Mean	Std. Dev.
Age	3644	42.84	16.13	2308	47.31	14.98	48	32.44	13.00
Female	3644	0.56	0.50	2308	0.59	0.49	48	0.58	0.50
Ukranian language	3644	0.30	0.46	2308	0.68	0.47	48	0.42	0.50
Married	3643	0.62	0.48	2308	0.66	0.47	48	0.77	0.42
Number of children	3640	1.23	0.95	2308	1.67	1.05	48	0.88	0.87
Education level	3637	3.03	0.88	2305	2.77	0.86	48	3.23	0.93
Employed	3644	0.51	0.50	2308	0.45	0.50	48	0.71	0.46
Household income	3644	4894.72	3484.40	2308	3648.39	2497.21	48	4198.10	2212.40
Risk indicator	3527	0.22	0.42	2270	0.18	0.39	48	0.23	0.42
Risk index	3527	3.62	2.71	2270	3.20	2.64	48	3.75	2.61
Openness	3643	3.05	0.54	2308	3.01	0.57	48	3.19	0.52
Conscientiousness	3643	2.87	0.47	2308	2.99	0.44	48	2.94	0.48
Extraversion	3643	2.63	0.62	2308	2.65	0.60	48	2.66	0.61
Agreeableness	3641	2.85	0.52	2303	2.96	0.49	48	3.05	0.52
Neuroticism	3643	2.09	0.41	2308	2.10	0.40	48	2.02	0.41

Source: Autors' tabulations from the 2012 wave of the ULMS.

Empirical specification

The estimated regression is as follows:

$$Y_{i,t} = \alpha + N_i'\beta + \gamma P_{i,t+\tau} + X_{i,t-1}'\delta + \epsilon_{i,t} \tag{1}$$

where $\tau = \{0, 1, 2\}$. Y is the migration outcome variable, N is a vector of the Big Five factors, P is the risk indicator, and X is a vector of demographic and labor market characteristics.

- Regression tables report marginal effects from the estimation of probit models.
- Breaking down the rural-to-urban migration, we also present results of the rural-to-city and rural-to-town migration.

Effects of the Big Five on migration

	(1) rural-urban	(2) rural-urban	(3) rural-urban	(4) rural-urban	(5) rural-city	(6) rural-city	(7) rural-city	(8) rural-city	(9) rural-town	(10) rural-town	(11) rural-town	(12) rural-town
Openness	0.013***	0.007***	0.006**	0.004*	0.006***	0.003**	0.002*	0.001*	0.008***	0.003**	0.003**	0.002*
	(0.003)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.001)	(0.002)	(0.001)	(0.001)	(0.001)
Conscientiousness	-0.026***	-0.017***	-0.018***	-0.018***	-0.015***	-0.011***	-0.011***	-0.010***	-0.011***	-0.005***	-0.005***	-0.005***
	(0.003)	(0.003)	(0.003)	(0.003)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.001)	(0.001)	(0.001)
Extraversion	-0.002	-0.002	0.000	-0.000	-0.003*	-0.003*	-0.001	-0.001	0.001	0.001	0.001	0.001
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.001)	(0.001)	(0.001)	(0.002)	(0.001)	(0.001)	(0.001)
Agreeableness	-0.021***	-0.016***	-0.016***	-0.015***	-0.011***	-0.007***	-0.007***	-0.006***	-0.012***	-0.008***	-0.008***	-0.007***
	(0.003)	(0.003)	(0.003)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.001)	(0.001)	(0.001)
Neuroticism	-0.010***	-0.007***	-0.007***	-0.006***	-0.005**	-0.003*	-0.003*	-0.003*	-0.005***	-0.004***	-0.004***	-0.003***
	(0.003)	(0.003)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.001)	(0.001)	(0.001)
Age		-0.000	-0.000	-0.002		-0.001	-0.000	-0.001		0.001*	0.000	-0.000
		(0.001)	(0.001)	(0.001)		(0.001)	(0.001)	(0.001)		(0.000)	(0.001)	(0.001)
Age squared		-0.000	-0.000	0.002		0.000	-0.000	0.001		-0.001	-0.000	0.000
		(0.001)	(0.001)	(0.001)		(0.001)	(0.001)	(0.001)		(0.001)	(0.001)	(0.001)
Female		0.002	0.006	0.007		0.003	0.005**	0.005**		-0.000	0.001	0.002
		(0.004)	(0.004)	(0.004)		(0.003)	(0.003)	(0.002)		(0.002)	(0.002)	(0.002)
Ukrainian language		-0.092***	-0.081***	-0.081***		-0.033***	-0.026***	-0.025***		-0.061***	-0.056***	-0.053***
		(0.007)	(0.007)	(0.007)		(0.005)	(0.004)	(0.004)		(0.006)	(0.005)	(0.005)
Married			0.006	0.006			-0.001	-0.001			0.006**	0.005**
			(0.005)	(0.005)			(0.004)	(0.004)			(0.003)	(0.002)
No. children			-0.008***	-0.006**			-0.006**	-0.005**			-0.001	-0.001
			(0.003)	(0.003)			(0.002)	(0.002)			(0.001)	(0.001)
Employed			0.009*	0.007			0.005	0.005			0.004	0.003
			(0.005)	(0.005)			(0.003)	(0.003)			(0.003)	(0.003)
Household income			0.012***	0.009***			0.006***	0.004***			0.005***	0.004***
			(0.002)	(0.002)			(0.001)	(0.001)			(0.001)	(0.001)
Education: Secondary				0.006				0.012***				-0.005*
				(0.005)				(0.004)				(0.003)
Education: Vocational				0.022***				0.011***				0.008**
				(0.005)				(0.003)				(0.004)
Education: Higher				0.030***				0.016***				0.009*
				(0.009)				(0.006)				(0.005)
Observations	6,347	6,336	5,927	5,908	6,170	6,159	5,751	5,733	6,169	6,158	5,757	5,739

Age-free effects of the Big Five on migration

	(1) rural-urban	(2) rural-urban	(3) rural-urban	(4) rural-urban	(5) rural-city	(6) rural-city	(7) rural-city	(8) rural-city	(9) rural-town	(10) rural-town	(11) rural-town	(12) rural-town
Openness	0.012***	0.008***	0.006**	0.004*	0.004*	0.003*	0.002	0.001	0.008***	0.003***	0.003**	0.002
	(0.003)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.001)	(0.002)	(0.001)	(0.001)	(0.001)
Conscientiousness	-0.026***	-0.017***	-0.018***	-0.018***	-0.015***	-0.011***	-0.011***	-0.010***	-0.012***	-0.005***	-0.005***	-0.005***
	(0.003)	(0.003)	(0.003)	(0.003)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.001)	(0.001)	(0.001)
Extraversion	-0.002	-0.002	-0.000	-0.000	-0.003*	-0.003*	-0.001	-0.001	0.001	0.001	0.001	0.001
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.001)	(0.001)	(0.002)	(0.001)	(0.001)	(0.001)
Agreeableness	-0.020***	-0.016***	-0.016***	-0.015***	-0.009***	-0.007***	-0.007***	-0.006***	-0.012***	-0.008***	-0.008***	-0.007***
	(0.003)	(0.003)	(0.003)	(0.003)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.001)	(0.001)	(0.001)
Neuroticism	-0.010***	-0.007***	-0.007**	-0.007***	-0.004*	-0.003*	-0.003**	-0.003*	-0.006***	-0.004***	-0.004***	-0.003**
	(0.003)	(0.003)	(0.003)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.001)	(0.001)	(0.001)
Age		-0.001	-0.001	-0.002*		-0.001**	-0.000	-0.001*		0.001	0.000	-0.001
		(0.001)	(0.001)	(0.001)		(0.001)	(0.001)	(0.001)		(0.000)	(0.001)	(0.001)
Age squared		0.001	0.001	0.003*		0.001	0.000	0.001		-0.001	-0.000	0.001
		(0.001)	(0.001)	(0.002)		(0.001)	(0.001)	(0.001)		(0.001)	(0.001)	(0.001)
Female		0.002	0.006	0.007		0.004	0.005*	0.005*		-0.000	0.001	0.002
		(0.004)	(0.004)	(0.004)		(0.003)	(0.003)	(0.003)		(0.003)	(0.002)	(0.002)
Ukrainian language		-0.092***	-0.081***	-0.081***		-0.033***	-0.026***	-0.025***		-0.061***	-0.056***	-0.053***
		(0.007)	(0.007)	(0.007)		(0.005)	(0.005)	(0.004)		(0.006)	(0.006)	(0.005)
Married			0.006	0.006			-0.001	-0.001			0.006**	0.005**
			(0.005)	(0.005)			(0.004)	(0.004)			(0.003)	(0.002)
No. children			-0.008***	-0.006**			-0.006**	-0.005**			-0.001	-0.001
			(0.003)	(0.003)			(0.002)	(0.002)			(0.001)	(0.001)
Employed			0.009*	0.007			0.005	0.005			0.004	0.003
			(0.005)	(0.005)			(0.003)	(0.003)			(0.003)	(0.003)
Household income			0.012***	0.009***			0.006***	0.004***			0.005***	0.004***
			(0.002)	(0.002)			(0.001)	(0.001)			(0.001)	(0.001)
Education: Secondary				0.006				0.012***				-0.005
				(0.005)				(0.004)				(0.003)
Education: Vocational				0.022***				0.011***				0.008**
				(0.005)				(0.003)				(0.004)
Education: Higher				0.030***				0.016***				0.009*
				(0.009)				(0.006)				(0.005)
Observations	6,347	6,336	5,927	5,908	6,170	6,159	5,751	5,733	6,169	6,158	5,757	5,739

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Effects of the Big Five and risk on migration

	(1) rural-urban	(2) rural-urban	(3) rural-urban	(4) rural-urban	(5) rural-city	(6) rural-city	(7) rural-city	(8) rural-city	(9) rural-town	(10) rural-town	(11) rural-town	(12) rural-town
Openness	0.012***	0.006***	0.005**	0.004*	0.006***	0.003**	0.002*	0.001*	0.006***	0.002**	0.002*	0.001
	(0.003)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.001)	(0.002)	(0.001)	(0.001)	(0.001)
Conscientiousness	-0.025***	-0.017***	-0.018***	-0.018***	-0.015***	-0.011***	-0.011***	-0.010***	-0.009***	-0.005***	-0.005***	-0.005***
	(0.003)	(0.003)	(0.003)	(0.003)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.001)	(0.001)	(0.001)
Extraversion	-0.002	-0.002	-0.000	-0.000	-0.003**	-0.003**	-0.001	-0.001	0.001	0.001	0.001	0.001
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.001)	(0.001)	(0.002)	(0.001)	(0.001)	(0.001)
Agreeableness	-0.020***	-0.014***	-0.014***	-0.014***	-0.010***	-0.007***	-0.007***	-0.006***	-0.010***	-0.006***	-0.006***	-0.006***
	(0.003)	(0.003)	(0.003)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.001)	(0.001)	(0.001)
Neuroticism	-0.008***	-0.006**	-0.006**	-0.006**	-0.005**	-0.003*	-0.003*	-0.003*	-0.004*	-0.003*	-0.003*	-0.002*
	(0.003)	(0.003)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.001)	(0.001)	(0.001)
Risk indicator	-0.008	-0.004	-0.006	-0.005	0.011**	0.007**	0.005**	0.005*	-0.019***	-0.009***	-0.009***	-0.008***
	(0.006)	(0.005)	(0.005)	(0.005)	(0.005)	(0.004)	(0.003)	(0.003)	(0.003)	(0.002)	(0.002)	(0.002)
Age		-0.001	-0.000	-0.002		-0.001	0.000	-0.001		0.001	0.000	-0.000
		(0.001)	(0.001)	(0.001)		(0.001)	(0.001)	(0.001)		(0.000)	(0.001)	(0.001)
Age squared		0.000	-0.000	0.002		0.000	-0.000	0.001		-0.001	-0.000	0.000
		(0.001)	(0.001)	(0.001)		(0.001)	(0.001)	(0.001)		(0.001)	(0.001)	(0.001)
Female		0.002	0.006	0.007		0.004	0.006**	0.006**		-0.001	0.001	0.001
		(0.004)	(0.004)	(0.004)		(0.003)	(0.003)	(0.002)		(0.002)	(0.002)	(0.002)
Ukrainian language		-0.086***	-0.076***	-0.076***		-0.034***	-0.026***	-0.025***		-0.052***	-0.048***	-0.045***
		(0.007)	(0.007)	(0.007)		(0.005)	(0.004)	(0.004)		(0.005)	(0.005)	(0.005)
Married			0.005	0.006			-0.001	-0.001			0.006**	0.005**
			(0.005)	(0.005)			(0.004)	(0.003)			(0.002)	(0.002)
No. children			-0.008***	-0.007**			-0.006**	-0.005**			-0.001	-0.001
			(0.003)	(0.003)			(0.002)	(0.002)			(0.001)	(0.001)
Employed			0.010*	0.008			0.005	0.004			0.005	0.004
			(0.005)	(0.005)			(0.003)	(0.003)			(0.003)	(0.003)
Household income			0.011***	0.008***			0.006***	0.004***			0.004***	0.003**
			(0.002)	(0.002)			(0.001)	(0.001)			(0.001)	(0.001)
Education: Secondary				0.005				0.012***				-0.006**
				(0.005)				(0.004)				(0.003)
Education: Vocational				0.021***				0.011***				0.007**
				(0.005)				(0.003)				(0.004)
Education: Higher				0.029***				0.016***				0.008
				(0.009)				(0.006)				(0.005)
Observations	6,291	6,280	5,872	5,855	6,132	6,121	5,714	5,697	6,113	6,102	5,702	5,686

(1) Reverse causality check: Migration occurs between 2007-2012, after risk is measured in 2007

	(1) rural-urban	(2) rural-urban	(3) rural-urban	(4) rural-city	(5) rural-city	(6) rural-city	(7) rural-town	(8) rural-town	(9) rural-town
Openness	0.008**	0.002*	0.001	0.004**	0.001*	0.000	0.003	0.000	0.000
	(0.003)	(0.002)	(0.001)	(0.002)	(0.001)	(0.000)	(0.002)	(0.001)	(0.001)
Conscientiousness	-0.009***	-0.003*	-0.003*	-0.005***	-0.002**	-0.000	-0.003	-0.001	-0.001
	(0.003)	(0.002)	(0.002)	(0.002)	(0.001)	(0.000)	(0.003)	(0.002)	(0.001)
Extraversion	-0.001	-0.002	-0.000	-0.002*	-0.002**	-0.000	0.001	0.000	0.000
	(0.003)	(0.002)	(0.001)	(0.002)	(0.001)	(0.000)	(0.002)	(0.001)	(0.001)
Agreeableness	0.003	0.003	0.002	0.001	0.001	0.000	0.001	0.001	0.001
	(0.003)	(0.002)	(0.001)	(0.002)	(0.001)	(0.000)	(0.002)	(0.002)	(0.001)
Neuroticism	-0.004	-0.003	-0.001	-0.001	-0.000	0.000	-0.003	-0.002	-0.001
	(0.003)	(0.002)	(0.001)	(0.001)	(0.001)	(0.000)	(0.002)	(0.002)	(0.001)
Risk indicator	0.013	0.004	0.002	0.015**	0.006**	0.001	-0.003	-0.002	-0.001
	(0.008)	(0.005)	(0.003)	(0.007)	(0.003)	(0.001)	(0.005)	(0.003)	(0.001)
Covariates									
Set 1	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes
Set 2	No	No	Yes	No	No	Yes	No	No	Yes
Observations	2,074	2,074	1,971	2,051	2,051	1,948	2,054	2,054	1,955

Note: *Set 1* represents covariates of age, age squared, female and Ukrainian language, and *Set 2* refers to covariates of married, number of children, education level, employed, and log of net household income. The covariates are measured in 2007.

(2) Reverse causality check: The impact of migration on the risk measure

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
(a) Dependent variable: Change in risk index btw. 2007-12									
(i) Rural-urban migration btw. 2007-2012	-0.065	-0.089	0.070						
	(0.199)	(0.201)	(0.207)						
(ii) Rural-city migration btw. 2007-2012				-0.340	-0.368	-0.022			
				(0.354)	(0.349)	(0.438)			
(iii) Rural-town migration btw. 2007-2012							0.158	0.137	0.119
							(0.199)	(0.250)	(0.205)
Observations	1,596	1,596	1,521	1,580	1,580	1,505	1,583	1,583	1,512
(b) Dependent variable: Risk index in 2012									
(i) Rural-urban migration btw. 2007-2012	0.052	-0.116	-0.157						
	(0.176)	(0.173)	(0.178)						
(ii) Rural-city migration btw. 2007-2012				-0.080	-0.273	-0.354			
				(0.309)	(0.301)	(0.317)			
(iii) Rural-town migration btw. 2007-2012							0.160	0.013	-0.008
							(0.191)	(0.224)	(0.185)
Risk index 2007	0.250***	0.209***	0.209***	0.249***	0.208***	0.208***	0.253***	0.212***	0.212***
	(0.025)	(0.026)	(0.026)	(0.025)	(0.026)	(0.026)	(0.025)	(0.023)	(0.026)
Covariates									
Set 1	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes
Set 2	No	No	Yes	No	No	Yes	No	No	Yes
Observations	1,596	1,596	1,585	1,580	1,580	1,569	1,583	1,583	1,573

Note: *Set 1* represents covariates of age, age squared, female and Ukrainian language, and *Set 2* refers to covariates of married, number of children and education level, employed, and log of net household income. The covariates are measured in 2007.

Complementarity between the Big Five and risk in explaining the migration propensity

- Akaike's information criterion (AIC) is a goodness-of-fit measure calculated after the estimation of probit models.
  $AIC = -2 * ln(likelihood) + 2 * k$, where k = number of parameters estimated.
- Specifications control for age, age squared, female and Ukrainian language.

	Obs	ll(null)	ll(model)	df	AIC	Pseudo R2
			Rural-to-urban migration			
Risk	6280	-1313,53	-1170,05	6	2352,11	0,109
Big five	6280	-1313,53	-1112,57	10	2245,14	0,153
Big five and risk	6280	-1313,53	-1112,21	11	2246,42	0,153
			Rural-to-city migration			
Risk	6121	-805,10	-737,27	6	1486,53	0,084
Big five	6121	-805,10	-691,55	10	1403,10	0,141
Big five and risk	6121	-805,10	-689,82	11	1401,65	0,143
			Rural-to-town migration			
Risk	6102	-736,86	-631,63	6	1275,26	0,143
Big five	6102	-736,86	-617,35	10	1254,70	0,162
Big five and risk	6102	-736,86	-611,34	11	1244,69	0,170

Complementarity between the Big Five and preferences in explaining migration behavior

- Results show that the Big Five factors have larger explanatory power, improving the goodness-of-fit measures more than the risk factor.
- As for rural-to-city migration, where the willingness to take risk is consistently estimated as a significant positive determinant of the migration probability, the explanatory power is maximized, i.e., the AIC is smallest, when both non-cognitive skills and risk attitudes are included in the regression.

Further results

- Search models predict that mobility across jobs and across space falls when local macroeconomic and labor market conditions become more adverse.
- We check this through the inclusion of additional controls such as the unemployment rate or the log of GDP, both at the oblast level. results
- Results suggest that regional controls are orthogonal to the Big Five and risk preferences and that these preferences and a subset of the Big Five, namely openness, conscientiousness, agreeableness and neuroticism consistently predict internal migration from rural areas to cities.

To sum up

- Our results show that four of the Big Five traits, namely openness to new experiences, conscientiousness, agreeableness and neuroticism are consistently correlated with rural-to-urban migration.
- While openness to new experiences impacts positively on the migration decision, the other three signficant personality traits lower the willingness to migrate.
- Our risk measure is, however, ambiguous, since persons expressing a greater willingness to take risks have a higher propensity to move from rural areas to cities while we establish a negative correlation when it comes to moves to towns.

To sum up

- The notion that non-cognitive skills might work through the channel of psychic costs of migration seems to be borne out by our results.
- Reverse causality tests allow us to conclude that a causal interpretation of the link between risk attitudes and migration has some validity.
- We also perform a robustness check for non-cognitive skills that demonstrates that the assumption of the time-invariant nature of these skills is reasonable.
- We also show that personality traits and risk preferences are complementary in explaining rural-to-urban migration.

Thanks for your attention!

Appendix Tables

Summary statistics 2004 & 2007 back

2004	Urban sample			Rural stayers			Movers into urban		
	Obs	Mean	Std. Dev.	Obs	Mean	Std. Dev.	Obs	Mean	Std. Dev.
Age	3800	43.20	16.69	1843	41.99	13.55	75	40.17	13.64
Female	3800	0.59	0.49	1843	0.62	0.49	75	0.56	0.50
Ukranian language	3799	0.36	0.48	1843	0.69	0.46	75	0.13	0.34
Married	3782	0.60	0.49	1836	0.72	0.45	74	0.73	0.45
Number of children	3799	1.27	0.98	1842	1.67	1.09	75	1.28	0.97
Education level	3797	2.72	1.02	1842	2.47	0.95	75	2.83	0.78
Employed	3800	0.51	0.50	1843	0.49	0.50	75	0.60	0.49
Household income	3639	866.30	741.70	1762	625.29	565.80	74	847.43	437.99
2007	Urban sample			Rural stayers			Movers into urban		
	Obs	Mean	Std. Dev.	Obs	Mean	Std. Dev.	Obs	Mean	Std. Dev.
Age	3606	43.70	16.91	1851	44.71	13.87	49	40.20	13.94
Female	3606	0.58	0.49	1851	0.62	0.49	49	0.49	0.51
Ukranian language	3595	0.38	0.49	1840	0.67	0.47	49	0.35	0.48
Married	3603	0.62	0.48	1850	0.73	0.44	49	0.69	0.47
Number of children	3603	1.22	0.96	1850	1.70	1.06	49	1.53	1.12
Education level	3585	2.98	0.82	1840	2.77	0.80	49	2.84	0.75
Employed	3606	0.53	0.50	1851	0.51	0.50	49	0.69	0.47
Household income	3438	2452.01	1717.34	1775	1829.06	1288.00	49	2082.53	1260.03
Risk indicator	3533	0.26	0.44	1779	0.19	0.40	49	0.16	0.37
Risk index	3533	3.77	2.90	1779	3.17	2.83	49	2.35	2.69

Source: Autors' tabulations from the 2004 and 2007 waves of the ULMS.

Controlling for regional macro indicators back

	(1) rural-urban	(2) rural-urban	(3) rural-urban	(4) rural-city	(5) rural-city	(6) rural-city	(7) rural-town	(8) rural-town	(9) rural-town
Openness	0.006***	0.006***	0.005**	0.003**	0.003**	0.002**	0.002**	0.002**	0.002**
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)
Conscientiousness	-0.017***	-0.015***	-0.012***	-0.011***	-0.010***	-0.009***	-0.005***	-0.004***	-0.003***
	(0.003)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.001)	(0.001)	(0.001)
Extraversion	-0.002	-0.003	-0.002	-0.003**	-0.003**	-0.003**	0.001	0.000	0.000
	(0.002)	(0.002)	(0.002)	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Agreeableness	-0.014***	-0.013***	-0.007***	-0.007***	-0.007***	-0.003**	-0.006***	-0.005***	-0.004***
	(0.003)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.001)	(0.001)	(0.001)
Neuroticism	-0.006**	-0.005**	-0.001	-0.003*	-0.003*	-0.001	-0.003***	-0.002**	-0.001
	(0.003)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.001)	(0.001)	(0.001)
Risk indicator	-0.004	-0.004	0.002	0.007**	0.007*	0.009**	-0.009***	-0.007***	-0.005**
	(0.005)	(0.005)	(0.005)	(0.004)	(0.004)	(0.004)	(0.002)	(0.002)	(0.002)
Regional covariates									
Unemployment rate		-0.007***			-0.002***			-0.003***	
		(0.001)			(0.001)			(0.001)	
Log of GDP			0.034***			0.016***			0.013***
			(0.003)			(0.002)			(0.002)
Observations	6,280	6,280	6,280	6,121	6,121	6,121	6,102	6,102	6,102

Note: Specifications control for age, age squared, female and Ukrainian language.

OLS estimation: Effects of the Big Five & preferences on migration

	(1) rural-urban	(2) rural-urban	(3) rural-urban	(4) rural-urban	(5) rural-city	(6) rural-city	(7) rural-city	(8) rural-city	(9) rural-town	(10) rural-town	(11) rural-town	(12) rural-town
Openness	0.013*** (0.003)	0.007** (0.003)	0.005* (0.003)	0.004 (0.003)	0.006*** (0.002)	0.002 (0.002)	0.001 (0.003)	0.000 (0.003)	0.007*** (0.002)	0.005*** (0.002)	0.005*** (0.002)	0.004* (0.002)
Conscientiousness	-0.027*** (0.003)	-0.022*** (0.003)	-0.025*** (0.003)	-0.025*** (0.003)	-0.019*** (0.003)	-0.016*** (0.003)	-0.018*** (0.003)	-0.018*** (0.003)	-0.010*** (0.002)	-0.008*** (0.002)	-0.009*** (0.002)	-0.009*** (0.002)
Extraversion	-0.003 (0.003)	-0.003 (0.003)	-0.001 (0.003)	-0.001 (0.003)	-0.004** (0.002)	-0.005*** (0.002)	-0.003* (0.002)	-0.003 (0.002)	0.002 (0.002)	0.002 (0.002)	0.002 (0.002)	0.002 (0.002)
Agreeableness	-0.022*** (0.003)	-0.022*** (0.003)	-0.023*** (0.004)	-0.023*** (0.004)	-0.013*** (0.003)	-0.013*** (0.003)	-0.014*** (0.003)	-0.014*** (0.003)	-0.011*** (0.002)	-0.012*** (0.002)	-0.012*** (0.002)	-0.012*** (0.002)
Neuroticism	-0.009*** (0.003)	-0.010*** (0.003)	-0.010*** (0.003)	-0.009*** (0.003)	-0.005** (0.002)	-0.006** (0.002)	-0.006** (0.003)	-0.006** (0.003)	-0.004** (0.002)	-0.005** (0.002)	-0.005** (0.002)	-0.005** (0.002)
Risk indicator	-0.009 (0.007)	-0.006 (0.007)	-0.007 (0.007)	-0.007 (0.007)	0.012*** (0.006)	0.011*** (0.006)	0.010* (0.006)	0.010* (0.006)	-0.022*** (0.004)	-0.017*** (0.004)	-0.017*** (0.004)	-0.017*** (0.004)
Age		-0.000 (0.001)	-0.000 (0.002)	-0.002 (0.002)		-0.002* (0.001)	-0.001 (0.001)	-0.002 (0.001)		0.002** (0.001)	0.000 (0.001)	-0.001 (0.001)
Age squared		-0.000 (0.001)	-0.000 (0.002)	0.003 (0.002)		0.001 (0.001)	0.000 (0.001)	0.002 (0.001)		-0.002** (0.001)	-0.000 (0.001)	0.001 (0.001)
Female		0.006 (0.006)	0.011 (0.007)	0.012* (0.007)		0.008 (0.005)	0.010** (0.005)	0.011** (0.005)		-0.001 (0.005)	0.002 (0.005)	0.003 (0.005)
Ukrainian language		-0.097*** (0.007)	-0.093*** (0.007)	-0.094*** (0.007)		-0.044*** (0.006)	-0.041*** (0.006)	-0.041*** (0.006)		-0.061*** (0.006)	-0.060*** (0.006)	-0.060*** (0.006)
Married			0.003 (0.007)	0.003 (0.007)			-0.008 (0.006)	-0.008 (0.006)			0.011** (0.005)	0.011** (0.005)
No. children			-0.007** (0.003)	-0.005* (0.003)			-0.006** (0.003)	-0.005* (0.003)			-0.001 (0.002)	-0.001 (0.002)
Employed			0.016** (0.007)	0.014** (0.007)			0.010** (0.005)	0.010* (0.005)			0.007 (0.005)	0.006 (0.005)
Household income			0.017*** (0.003)	0.014*** (0.003)			0.011*** (0.002)	0.009*** (0.002)			0.007*** (0.002)	0.006** (0.002)
Education: Secondary				0.009 (0.008)				0.021*** (0.006)				-0.011* (0.006)
Education: Vocational				0.032*** (0.008)				0.021*** (0.006)				0.014** (0.007)
Education: Higher				0.036*** (0.011)				0.025*** (0.008)				0.014 (0.009)

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