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The return to non-cognitive skills on the Russian labor market

The study focuses on non-cognitive skills and their influence on earnings on the Russian labor market. The paper studies the question in general and depending on a sector of the economy using a panel data approach. Additionally, gender differences are investigated. A significant connection between personality traits and income was detected. Openness and neuroticism have shown to be highly influential on wages. Sustainable gender and sector differences in personality impact on wages were found as well.

Keywords: Russian labour market; non-cognitive skills; personality; earnings.

JEL classification: C23; J31.

1. Introduction

Labor economics deals with a range of questions related to earnings and their determinants. High levels of individual heterogeneity associated with the query appear to be a product of human capital and result in income differences on an individual, cross-country, and cross-industry levels (John, Thomsen, 2014).

Human capital includes two main components: cognitive and non-cognitive skills. Where the former is thoroughly researched, the latter is less known due to the lack of available data on non-cognitive ability. Nevertheless, the importance of non-cognitive skills in the labor market for both employers and employees is growing (Edin et al., 2017). Due to the technological changes of recent decades, cognition is no longer the most valuable factor for labor market success as the role of «soft skills» is advancing (Deming, 2017). Personality comprises various characteristics and has a complex influence over an individual labor market outcomes. Understanding this impact would allow the economy to match the labor force with workplaces more efficiently increasing productivity (Xiang, Yeaple, 2018) and encouraging life success (Kautz et al., 2014).

Several studies have already been conducted on the issue in developed (Heineck, Anger, 2010; Heß, Hempfing, 2017) and developing countries (Hilger et al., 2018; Tognatta et al., 2016), however, the empirical evidence on Russian data remains scarce. As a transitional post-Soviet Union economy Russia differs from most states which were previously discussed in the literature. The distinction from developed countries is derived from the natural experiment of the West and East Germanies population of which demonstrate dissimilar effects of personality over earnings decades after the country's unification (Heineck, Süssmuth, 2013).

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While the Russian economy suffers from the mismatch of hard skills (Gimpelson et al., 2010), the evidence on personality was not produced yet. The comprehension of non-cognitive ability value to the labor market could potentially reduce both these discrepancies and improve the state of the economy.

The study deals with the following research question: at what extent personality impacts wages on the Russian labor market with respect to possible gender and sectoral differences? The paper investigates this effect using a panel data approach on a sample of the Russian Longitudinal Monitoring Survey from 2012 to the 2016 year. Accepting the likelihood of discrepancies inside the market, the analysis also takes them into consideration by investigating separately gender and type-of-ownership-specific cases.

The paper is organized as follows: in the first part of the study, the literature review will be presented, concentrating primarily on the definition and important characteristics of personality traits and its impact on the labor market. The second part will cover the methodology and data description. In the third part of the study results and their applications for both policy and research will be discussed.

2. Literature review

The human capital theory dates to the 1960s when the traditional capital-labor framework has been supplemented by an additional component — learning. It is comparable to both capital and labor in size of the positive impact on the production by creating knowledge (Hatch, Dyer, 2004). Knowledge, as a specific kind of human capital, empirically is positively correlated with the growth of productivity in the country (Benhabib, Spiegel, 1994; Nafukho et al., 2004).

Earlier studies accounted for human capital as a cognitive ability measured as schooling and education (Willis, 1986; Becker, 1994). Cognition was proxied by various tests of intelligence such as IQ, KWW and other (Blackburn, Neumark, 1991; Royer et al., 1993). Those studies provided first results on cognitive abilities explaining wage inequality (Blau, Kahn, 2005) and noted that cognition has an immense influence on personal income (Murnane et al., 1995).

Non-cognitive skills (personality traits, soft skills or emotional intelligence) are defined as «observable responses of a person to an external world» (Borghans et al., 2008). A bibliometric study by Heckman and Kautz (2012) notes that the largest part of the earlier research on personality traits is related to psychology. According to the comparably recent studies, a non-cognitive ability not only has a strong connection to schooling and income (Carneiro et al., 2007) but also severely reduces estimates for cognition (Hanushek, Woessmann, 2008). Contemporary, as well as childhood measurements (Viinikainen et al., 2010) of non-cognitive skills, were found to be relevant to wages (Glewwe et al., 2011).

The evidence of personality stability is mixed. It was concluded to be stable across situations (Borghans et al., 2008) and life events (Cobb-Clark, Schurer, 2012), although Schäfer (2017) argues that adverse life situations may have an impact on personality. Ayhan et al. (2017) argue for complete overtime stability of non-cognitive ability whereas other studies indicate a change with soft skills evolving with age (Cunha, Heckman, 2008) and peaking in late years (Heckman, Kautz, 2012). Short-time stability was reported by Schäfer (2017) and Cobb-Clark and Schurer (2012) who concluded that non-cognitive skills are stable on a period up to 5 years.

The results on gender differences in personality influence on wages vary as well. Oaxaca (1973) and Semykina and Linz (2007) present that non-cognitive ability enhance gender gap. Nordman, Sarr, and Sharma (2015) found that non-cognitive abilities are more important for earnings for women than men. Notwithstanding, Gensowski (2018) states that although men personality traits have a direct impact on their wages, women only benefit from extraversion. Arellano et al. (2018) relate the differences in females' lower levels of valuable personality traits such as motivation, self-confidence, and perseverance. A study by Grove et al. (2011) points out a penalized for «good citizen» behavior of women studying for an MBA degree.

There are several classifications of personality traits, but the most widely accepted of them is Big 5 Personality Traits (or Big 5, OCEAN) facets (Brunello, Schlotter, 2010). Five facets of the scheme include the following characteristics:

- openness to experience: welcoming change, variety;
- conscientiousness: following rules, being hardworking;
- extraversion: empathy, openness to human contact;
- agreeableness: cooperativeness, warmth;
- neuroticism (emotional instability): insecurity, anxiety, emotionality.

Evidence on the influence of Big 5 facets on wages varies between countries (Heß, Hempfing, 2017). Studies from developed countries present mixed results. Openness to experience tends to have a small positive influence on wages (Heineck, Anger, 2010). A positive effect of conscientiousness is highlighted by Viinikainen et al. (2010) and Costa et al. (1991) as well. Schäfer (2017) agrees with this conclusion only with respect to women wages whereas Fletcher (2013) and Nyhus and Pons (2005) present evidence that the discussed link is insignificant. Conscientiousness inconsistency might be connected to an interview bias or «social desirability bias» (Díaz et al., 2012). Nyhus and Pons (2005) point out a negative influence of extraversion and a significant positive effect by emotional stability. Whereas the first finding is only supported by theory (Judge et al., 1999) and not common as an empiric result (Heineck, Anger, 2010), the latter is widespread (Viinikainen et al., 2010; Borghans et al., 2008). Schäfer (2017) finds on German data a negative impact by agreeableness. Heineck and Anger (2010) agree with this conclusion. All in all, developed countries demonstrate that emotional stability and conscientiousness have the strongest impact on wages and overall labor market performance (Lindqvist, Vestman, 2011).

The body of research on the topic in developing economies remains scarce. Nevertheless, several distinctive results were found. Openness to experience has a strong significant bond with wages. In Bangladesh (Hilger et al., 2018) workers hired through a formal channel are rewarded for their openness to experience at a higher rate. In Vietnam, males are encouraged for openness as well (Tognatta et al., 2016). Other developing countries such as Peru (Díaz et al., 2012), as well as Kenya and Ukraine (Heineck, Anger, 2010), demonstrate a higher rate of importance for openness to experience than countries with the mature economy. Additionally, emotional stability is highly valuable (Nomura, Adhikari, 2017). At the same time, both cognition and personality are almost equally important in the developing labor markets (Díaz et al., 2012; Hilger et al., 2018).

Although some other developing countries have studied this problem, empirical evidence on Russian data is almost non-existent. The only two known studies on Russian data are Semykina and Linz (2007, 2010). The second study compares the results from the Russian market with Armenia and Kazakhstan. Non-cognitive ability is found to be a significant factor for the gender gap. Returns to broader facets of personality measures were not examined on the Russian data.

Based on the research question and discussed the body of literature several hypotheses were developed:

H0: Non-cognitive ability significantly influences wages on the Russian labor market.

H1: The impact of personality in Russia differs from similar influence in:

H1.1: countries with mature economies;

H1.2: developing countries.

H2: Non-cognitive traits have a diverse influence on workers in different sectors of the economy.

H3: Personality affects differently men and women on the Russian labor market.

These hypotheses address both similarities and distinctions related to the impact of non-cognitive skills on wages of workers in Russia. The former is articulated via **H0**, **H2** and **H3** which correspond with existing research whereas the latter is asserted through **H1** indicating possible distinctive characteristics related to the Soviet Union heritage or a cultural component. The labor market is an integral part of the Russian economy which possesses distinctive features and institutions. Combined these factors are expected to produce original empiric results.

3. Methodology and Data

3.1. Data

The data for the paper was derived from the panel version of the Russian Longitudinal Monitoring Survey (RLMS)² which includes 5 waves from 2012 to 2016. The data on personality traits relate to 2016 wave as the questions were included in the survey starting from this year. The sample includes only employed individuals with a reported wage and does not take into an account of econdary jobs. This approach excludes unemployed and those who did not state their job and wage. Nevertheless, as the study focuses on the investment of personality in earnings and illuminated group lacks them, the step is justified and limits the study to the employed population only. Another restriction is the age of individuals: 18–64 years old which refers to an ‘adult’ category. The data consist of 26406 observations which correspond to 8302 individuals. Only 25.31% of the data includes 5 periods. It will be utilized for robustness check as abalanced panel.

The dependent variable is represented by the logarithm of the hourly wage. Hourly wage allows accounting for both part-time and over-time jobs as a respondent reports both monthly wage and number of hours they worked. The descriptive statistics for the dependent and independent variables are shown in Table A1. All wages were inflated to the prices of January 2017 using CPI (consumer purchasing index)³. This month was chosen as the month of the last interview in the RLMS 2016 wave. Then the data was treated for outliers by ‘winsor’ approach: 1% of the highest and the lowest values were replaced by next values (positioned on the 0.01% and the 99.99% borders respectively) counting inwards from the extremes. Observations with

² «Russia Longitudinal Monitoring survey, RLMS-HSE», conducted by National Research University Higher School of Economics and OOO «Demoscope» together with Carolina Population Center, University of North Carolina at Chapel Hill and the Institute of Sociology of the Federal Center of Theoretical and Applied Sociology of the Russian Academy of Sciences. (RLMS-HSE web sites: <http://www.cpc.unc.edu/projects/rlms-hse>, <http://www.hse.ru/org/hse/rlms>).

³ Source: <http://www.gks.ru/dbscripts/cbsd/dbinet.cgi>.

an improbably high number of working hours exceeding the number of hours in a month were also seen as outliers.

Initial data on personality were collected using 24 questions each related to one of Big 5 factors (see the question in Table A4): openness, conscientiousness, extraversion, agreeableness, and neuroticism. The questions are a self-assessment of personality by a respondent which methodologically corresponds to self-assessed health questionnaires used in health economics. The approach is justified by following: although a person could be biased and subjective, they evaluate their personality on the base of their life experience. Thus, a person's report on their non-cognitive ability also reflects their interactions with society including ones on the labor market. Moreover, interviewee compares their behavior to their friends and colleagues' which adds up an additional weight to these variables.

The survey questions are scaled from 1 (almost always) to 4 (almost never). Their direction was reversed for a higher value of the variable to correspond to the higher level of the non-cognitive trait. Several questions are asked in a reverse manner. For that reason, their initial order is preserved. Five final variables were composed by grouped according to the mapping declared in Table A4. The aggregation method is average of all questions on the trait rescaled from 0 to 1. The technique was partly adopted from a Ukrainian study (Ayhan et al., 2017) which used the same set of questions. The grouping principle corresponds with the study on non-cognitive skills by John and Srivastava (1999). The rescaling method is replaced by 0-to-1 scale to account for the level of personality trait severity better.

The personality traits were investigated for normality using the Shapiro–Wilk test. The test has rejected the null hypothesis of the normality. To ensure the unbiasedness of the results the robust estimator will be used throughout the study. Table A2 demonstrates cross-correlations between five OCEAN variables. The highest rate of correlation is between openness and conscientiousness (0.437), agreeableness also is correlated with openness and conscientiousness (0.339 and 0.341). Variance inflation factors for these variables are at most 1.48 (for openness), consequentially, as they do not rise over 2, multicollinearity problem is unlikely to arise (see Table A3).

The limitation to the data exists as it potentially is a subject to the measurement error attributed to a respondent bias (Brunello, Schlotter, 2010) and differences in test-taking motivation which is higher for people with stronger conscientiousness (Brunello, Schlotter, 2010). Lang et al. (2011) concluded that face-to-face interviews (like the RLMS survey) possess strong and constant results. This fact makes possible use of this data for empirical research. Additionally, Cronbach reliability alphas were calculated for 24 questions. All of them are in the range over 0.7 and, thus, these variables are highly reliable with little random measurement error (Table A4).

The second component of the model is education represented by years of schooling. The variable was constructed by summing up the numeric values from several questions: a number of years spent in school, college, vocational school, university (bachelor, master, specialist degrees, Ph. D.). The variable's higher variance in comparison to other available data (level of education achieved — high school diploma, bachelor's degree) allows to account for not included cognition. Heineck and Anger (2010) excluded education from consideration as strongly correlated with both personality and cognitive ability. However, measures of the latter are unavailable, and current study adopts another approach. It includes education as an explanatory variable to avoid an omitted variable problem.

Gender is controlled for by variable *male* (male equals 1 if a person in question is male and 0 otherwise). This variable is additionally used for splitting the dataset into gender-specific models which allows seeing the differentiation between genders at a more precise level. The study expects to find differences in how men and women's non-cognitive skills influence their earnings. For that reason, separate by gender models are constructed. The sector-related models will be divided by gender as differences on the whole market might be rooted in one of the economic sectors.

Age and its square are included in the model for two main reasons. Firstly, they are a control variable for the wage. Secondly, age influences on non-cognitive skills. According to Heineck and Anger (2010), regression of personality traits on age leads to them becoming time-invariant. The inclusion of the age-related variables in the model accounts for the same effect.

The model also considers a set of control variables used to account for possible geographical differences and overtime changes:

- *Region* — regional dummies which control for regional differences in wages;
- *Year* — yearly dummies: yearly fixed-effects control for the economic situation.

Both types of controls are represented by binary variables of whether a person lives in a particular region (*Region*) or an interview was conducted in a particular wave (*Year*).

The last set of variables is sector-related. The public variable indicates that an individual stated that the government is an owner or co-owner of the place of their employment. The private variable demonstrates that a respondent is either a (co) owner or employee in the business sector. These two variables are not complementary due to the possibility of co-ownership. The regressors are used to account for differences between state- and private-owned workplaces. It is anticipated that in these two sectors personality is rewarded and penalized distinctly. For that reason, separate models for them are constructed as an intercept and coefficient are expected to differ both in sign and magnitude. Co-ownership status leads to the inclusion of some observations in both types of models.

3.2. Methodology

The main theoretical framework in this paper is the Mincer-type regression. It is a traditional instrument for wage analysis on the labor market which was also previously used to investigate the role of personality traits in it (Semykina, Linz, 2007). Heineck and Anger (2010) adopt this technique to produce the results on non-cognitive skills on the German data as well. Mentioned study as well as several others (Ayhan et al., 2017; Budria, Ferrer-i-Carbonell, 2012) utilized a cross-sectional data which is further transformed into a panel dataset allowing to intercept individual effects of the respondents.

Russian data on personality is also available in one wave, and individual effects cannot be detected without a repetition of the personality data for the same respondents. For that reason, this study adopts an extrapolation technique proposed by Heckman et al. (2006) which allows transforming the cross-sectional sample to a panel dataset through a transfer of the respondent personality traits in one wave to the several previous ones.

The reasoning behind the approach relates to the stability of non-cognitive ability under external and internal circumstances (Borghans et al., 2008) as well as in a short period of time (Schäfer, 2017). Although some studies tried to account for life events, this study agrees with

their low influence on stability proposed by Cobb-Clark and Schurer (2012) and similar to Heineck and Anger (2010) only adopts age as a control for personality. Nevertheless, whereas the latter study utilized residuals from the regression of non-cognitive ability on age, this article includes age in the model to control for wage and omitted tenure as well as to account for possible development of the key variables with time. This approach numerically gives the same results as the 'residualized' version of the non-cognitive ability measure.

As the personality considered fixed it can be referred to a respondent up to 5 years prior the questionnaire was filled. The data on non-cognitive skills from the 2016 year duplicated for each year of the dataset by the respondent identification number. The robustness of that approach is discussed in the results section. Thus, the method limits the data to participants of the last wave. Balanced panel robustness checks are implemented to account for this limitation. They are discussed in the results section as well.

The study uses two econometric techniques. Firstly, pooled OLS models used as a benchmark for further analysis. OLS model will be utilized for robustness check on a cross-sectional data from the 2016 year. Secondly, random effects (RE) models are used to account for unobservable individual characteristics including cognitive abilities that were not captured by years of schooling. The extrapolation method results in personality variables being constant across time for respondents. As fixed effects models are unsuitable for dealing with time-invariant variables, random effects models lack this restriction. Thus, possible endogeneity of education can be solved by the inclusion of an unobserved individual effect term in the random effects model.

4. Results and discussion

The empirical results for the Russian labor market presented in three distinct dimensions to answer the question of how personality influence wages in general and in respect to gender and sector of employment. Thus, the research findings presented in order of the stated above hypotheses to facilitate fulfilling the research question of the study.

4.1. Returns to personality and its comparison with other countries

The estimation results on the whole market are presented in Table 1 (columns 1 and 4). Both OLS and RE models are constructed. Nevertheless, the Breusch and Pagan Lagrangian multiplier test for random effects resulted in the rejection of its null hypothesis: variance of the random-error component being equal to 0. For that reason, the random effects model is preferred to OLS. The results on OLS are reported and discussed only for the whole market models as in all further cases the mentioned test has reported the existence of the random effects in the data.

According to both OLS and RE models results, a strong connection between wages and personality traits exists. Whereas non-cognitive abilities are jointly significant (chi-squared distribution with 5 degrees of freedom is 241.84 for RE), they are also highly significant individually. Agreeableness and extraversion are significant at 5% level (RE, in OLS — extraversion at 1%), other variables — at 0.1%. The differences between OLS and RE models are moderately low and refer to the value of coefficients only.

Table 1. Estimation results

	Unbalanced panel					
	OLS	OLS Male	OLS Female	RE	RE Male	RE Female
Openness	0.328*** (0.029)	0.274*** (0.040)	0.389*** (0.040)	0.362*** (0.043)	0.309*** (0.060)	0.420*** (0.060)
Conscientiousness	0.248*** (0.038)	0.304*** (0.052)	0.186*** (0.054)	0.262*** (0.057)	0.341*** (0.078)	0.174* (0.082)
Extraversion	0.076** (0.024)	0.088* (0.035)	0.074* (0.032)	0.074* (0.035)	0.068 (0.052)	0.089 (0.048)
Agreeableness	-0.080* (0.032)	-0.113* (0.047)	-0.071 (0.043)	-0.111* (0.048)	-0.133 (0.071)	-0.106 (0.065)
Neuroticism	-0.322*** (0.036)	-0.370*** (0.054)	-0.257*** (0.049)	-0.348*** (0.055)	-0.387*** (0.081)	-0.287*** (0.073)
Education	0.051*** (0.001)	0.042*** (0.002)	0.058*** (0.002)	0.043*** (0.002)	0.037*** (0.003)	0.048*** (0.003)
Male				0.276*** (0.011)		
Age	+	+	+	+	+	+
Year	+	+	+	+	+	+
Region	+	+	+	+	+	+
Constant	3.157*** (0.0633)	3.422** (0.0941)	3.135*** (0.0837)	3.247*** (0.0897)	3.451*** (0.131)	3.263*** (0.120)
<i>N</i>	24406	12310	14096	26406	12310	14096
Adj. (overall) <i>R</i> ²	0.350	0.328	0.354	0.350	0.330	0.354
<i>rho</i>				0.553	0.539	0.561

Note. Robust standard errors in parentheses. Age is a vector of age and age². Year and Region are vectors of yearly and regional binary controls. * — $p < 0.05$, ** — $p < 0.01$, *** — $p < 0.001$.

All variables have stable coefficients sign in both cases in accordance with theory and expectations. Nevertheless, in contrast to Nyhus and Pons (2005) extraversion positively impacts hourly wage. This influence is low in comparison with other traits: a positive change by 1 standard deviation of extraversion rate gives 1.15% growth in the hourly wage. At the same time openness has the strongest effect: its change by 1 standard deviation leads to 6.11% increase in the dependent variable. This result diverges from the developed countries values with low estimates for openness (Heineck, Anger, 2010) and is closer to the developing countries such as Vietnam and Peru (Tognatta et al., 2016; Díaz et al., 2012).

Several robustness checks were applied to the data. Firstly, OLS model on the cross-section from 2016 wave (Table 2, column 1) demonstrated only openness, conscientiousness, and neuroticism being significant with the second of them at 5% and others — at 0.1%. The result coincides primary with findings from the developing countries in respect to openness and neuroticism. The latter also is intrinsic to the developed countries and thus can be considered common. The conscientiousness is significantly positive which partly contrasts with both developing and developed economies that provide mixed results (Viinikainen et al., 2010; Fletcher, 2013; Díaz et al., 2012). Secondly, the balanced panel (2101 individual from 5 waves) was constructed (see Table 2, column 4). Its results are similar to the previous robustness check with neurot-

icism dropping in significance. The coefficients values changes could be attributed to the development of non-cognitive abilities and their importance over time (Edin et al., 2017). Otherwise, the findings are stable.

Table 2. Robustness checks

	Cross-section of 2016			Balanced panel		
	OLS	OLS Male	OLS Female	RE	RE Male	RE Female
Openness	0.331*** (0.057)	0.296*** (0.079)	0.387*** (0.081)	0.351*** (0.078)	0.260*** (0.106)	0.432*** (0.111)
Conscientiousness	0.178* (0.077)	0.226* (0.103)	0.095 (0.114)	0.258* (0.107)	0.128 (0.150)	0.363* (0.146)
Extraversion	0.070 (0.047)	0.084 (0.068)	0.066 (0.063)	0.104 (0.064)	-0.027 (0.091)	0.190* (0.088)
Agreeableness	-0.087 (0.063)	-0.109 (0.091)	-0.0967 (0.086)	0.047 (0.086)	0.034 (0.129)	0.064 (0.113)
Neuroticism	-0.424*** (0.072)	-0.417*** (0.104)	-0.414*** (0.101)	-0.228* (0.101)	-0.322* (0.147)	-0.187 (0.137)
Education	0.0472*** (0.002)	0.040*** (0.004)	0.053*** (0.003)	0.040*** (0.003)	0.031*** (0.004)	0.047*** (0.004)
Male	0.257*** (0.014)			0.266*** (0.019)		
Age	+	+	+	+	+	+
Year				+	+	+
Region	+	+	+	+	+	+
Constant	3.204*** (0.126)	3.291*** (0.186)	3.294*** (0.165)	3.210*** (0.176)	3.662*** (0.259)	2.946*** (0.239)
<i>N</i>	6177	2968	3209	10505	4895	5610
Adj. (overall) <i>R</i> ²	0.345	0.332	0.342	0.3699	0.3664	0.3771
rho				0.566	0.550	0.570

Note. Robust standard errors in parentheses. Age is a vector of age and age². Year and Region are vectors of yearly and regional binary controls. * — $p < 0.05$, ** — $p < 0.01$, *** — $p < 0.001$.

Based on that fact, **H0** cannot be rejected. Joint significance test on non-cognitive ability demonstrates signals on the existence of the significant link between personality and wages. Thus, **H0** should be confirmed. Additionally, overall robustness of the results especially for openness and neuroticism on the cross-sectional dataset endorse applied to the data extrapolation technique. Other traits significance on the panel data adds up to the validity of the method as the individual effect was distinguished.

The hypothesis **H1** should be partly accepted. Its first part addresses the distinction between results on the Russian data and ones of manure economies which were determined to exist. This hypothesis should be accepted as the strongest effect on wages is produced by openness which is less valuable in developed countries. Although general conclusions on **H0** are in line with the previous research, the Russian labor market is closer to developing economies with its high accent on openness. Thus, the rejection of **H1.2** is farfetched. Nevertheless, some divergences

exist as conscientiousness is shown to be significant on the Russian data when studies from developing countries find this trait more unstable (Díaz et al., 2012).

4.2. Returns to personality by sector

Although hypotheses **H0** was discussed in the previous section, it seems necessary to conduct similar steps on the sector-related samples while detecting existing differences between private and public sectors. The results on the matter are presented in Table 3, columns 1 and 4. As it was mentioned previously, random effects models are preferred in both cases.

Table 3. Estimation results by sector and gender

	Public sector			Private sector		
	RE	RE	RE	RE	RE	RE
		Male	Female		Male	Female
Openness	0.344*** (0.065)	0.335*** (0.100)	0.349*** (0.084)	0.349*** (0.053)	0.289*** (0.071)	0.414*** (0.079)
Conscientiousness	0.169 (0.087)	0.287* (0.135)	0.098 (0.114)	0.329*** (0.069)	0.438*** (0.091)	0.210* (0.105)
Extraversion	-0.040 (0.054)	-0.088 (0.083)	-0.008 (0.069)	0.152*** (0.043)	0.193** (0.060)	0.115 (0.062)
Agreeableness	-0.060 (0.072)	-0.111 (0.120)	-0.006 (0.088)	-0.126* (0.059)	-0.176* (0.081)	-0.105 (0.087)
Neuroticism	-0.390*** (0.082)	-0.438** (0.134)	-0.310** (0.103)	-0.326*** (0.066)	-0.342*** (0.089)	-0.314*** (0.095)
Education	0.050*** (0.003)	0.034*** (0.004)	0.061*** (0.004)	0.041*** (0.002)	0.039*** (0.003)	0.044*** (0.003)
Male	0.296*** (0.016)			0.279*** (0.013)		
Age	+	+	+	+	+	+
Year	+	+	+	+	+	+
Region	+	+	+	+	+	+
Constant	3.345*** (0.140)	3.810*** (0.234)	3.161*** (0.171)	3.124*** (0.114)	3.217*** (0.149)	3.314*** (0.172)
<i>N</i>	10945	3969	6976	13856	7465	6391
Adj. (overall) R^2	0.352	0.350	0.351	0.350	0.311	0.378
rho	0.570	0.560	0.566	0.554	0.548	0.555

Note. Robust standard errors in parentheses; Age is a vector of age and age². Year and Region are vectors of yearly and regional binary controls. * — $p < 0.05$, ** — $p < 0.01$, *** — $p < 0.001$.

Non-cognitive skills are jointly significant in both private (chi-squared distribution with 5 degrees of freedom is 188.60) and public (chi-squared distribution with 5 degrees of freedom is 85.55) sectors. This fact reaffirms the hypothesis **H0**. Additionally, all coefficients signs agree with previous findings.

Nevertheless, notable distinctions between sectors exist as whereas in the private sector all five Big 5 factors are significant at least at the 5% level (agreeableness, other traits — at 0.1%),

in the public sector only neuroticism and openness influence wages. This finding supports **H2** on the existing differences between sectors of the Russian economy.

The robustness check on a balanced panel (see Table 4, columns 1 and 4) has produced similar results. The public sector retained openness and neuroticism stable albeit with a loss of the significance level. Smaller dataset might be a reason for that as personality traits require a higher number of observations to be detected in contrast to education. The private sector also suffered from lower significance rate. Agreeableness is not significant. This finding differs from the previous studies on the matured economies data which see extraversion as the weakest trait.

Table 4. Robustness checks by sector and gender

	Public sector			Private sector		
	RE	RE Male	RE Female	RE	RE Male	RE Female
Openness	0.335** (0.111)	0.136 (0.157)	0.457** (0.150)	0.304** (0.095)	0.254* (0.120)	0.340* (0.155)
Conscientiousness	0.191 (0.153)	0.035 (0.254)	0.257 (0.180)	0.276* (0.129)	0.265 (0.163)	0.392 (0.203)
Extraversion	-0.006 (0.089)	-0.142 (0.139)	0.055 (0.113)	0.180* (0.077)	0.116 (0.101)	0.198 (0.116)
Agreeableness	0.191 (0.118)	0.301 (0.191)	0.173 (0.141)	-0.045 (0.104)	-0.166 (0.143)	0.087 (0.153)
Neuroticism	-0.300* (0.147)	-0.532* (0.242)	-0.272 (0.181)	-0.260* (0.118)	-0.241 (0.154)	-0.284 (0.180)
Education	0.048*** (0.004)	0.028*** (0.007)	0.061*** (0.006)	0.037*** (0.004)	0.032*** (0.005)	0.041*** (0.007)
Male	0.272*** (0.027)			0.304*** (0.023)		
Age	+	+	+	+	+	+
Year	+	+	+	+	+	+
Region	+	+	+	+	+	+
Constant	3.205*** (0.252)	4.039*** (0.412)	2.679*** (0.315)	3.123*** (0.224)	3.493*** (0.291)	3.044*** (0.345)
<i>N</i>	4745	1622	3123	5326	2998	2328
Adj. (overall) <i>R</i> ²	0.3548	0.3764	0.3697	0.3878	0.3423	0.4398
rho	0.563	0.554	0.553	0.550	0.531	0.570

Note. Robust standard errors in parentheses; Age is a vector of age and age². Year and Region are vectors of yearly and regional binary controls. * — $p < 0.05$, ** — $p < 0.01$, *** — $p < 0.001$.

To sum up, the distinctions between personality in public and private sectors of the economy are stable and allow to accept the hypothesis **H2**. This result is particularly important as it not only confirms the existence of a link between personality and wages in both sectors but states that this influence is different. Thus, workers are accessed differently in the private and public sector. One possible explanation for that is a faster evolution of employer-employee relationships in the private sector in comparison to a more stable and slower at taking innovations public sector.

4.3 Gender differences in returns to personality

As gender differences could be related to the whole market and its sectors, respective models were constructed. At first, models related to the former will be discussed. Table 1 reports its OLS (columns 2, 3) and RE results (columns 5, 6). Again, OLS is presented as a benchmark for RE evaluation.

The non-cognitive ability is jointly significant for male (chi-squared distribution with 5 degrees of freedom is 124.33) and female (chi-squared distribution with 5 degrees of freedom is 121.25) population. At the same time, extraversion and agreeableness are insignificant for both genders. Conscientiousness is significant at the 5 and 0.1% level for women and men respectively. The signs of all coefficients on personality traits are consistent with previous results. The finding contrasts with Heineck and Anger (2010) which found different non-cognitive trait being important for males and females.

Men have a higher starting wage (based on a higher intercept) whereas women benefit more from both education and personality. For example, males are rewarded for openness by 5.06 increase in wage and females by 7.3%. Similarly, emotional instability is more penalizing for men than women: 3.18% against 2.47% decrease. Conscientiousness demonstrates the opposite result as its premium for women is lower. The effect corresponds with mixed results on this trait from other countries (Díaz et al., 2012). Nevertheless, whereas schooling was found to be more important for females on the Russian data before (Nesterova, Sabirianova, 1998), the higher importance of personality for them is a novel result. Investments into personality close the gender gap (the estimated difference is 25–30%) in a similar way as the investments in schooling do.

The robustness check performed on both cross-sectional and balanced panel datasets identically as in the first part of this section. The results presented in Table 2: columns 2–3 and 5–6 respectively. The former shows that openness and neuroticism are important for both genders. In the same time, conscientiousness is significant only for males which contradicts Schäfer (2017) who found an opposite result. This finding might be considered a distinction from mature economies and the evidence for this trait instability across countries. The second robustness check reestablishes the role of openness for both males and females. In the same time, neuroticism is important only for wages of men. Women benefit from conscientiousness and extraversion. This result is opposite to some previous findings which add up to the instability of these traits, the former in particular. The latter result is similar to Gensowski (2018) who proposes the trait being important for the marriage market.

The second part of the gender distinctions relates to the public and private sectors of the economy. Since such differences exist on the whole market, the same effects were expected on the sectoral data as well. The random effects results are presented in Table 3 (columns 2–3 and 5–6 for public and private sector respectively).

Openness demonstrates significance for both men and women. This result adds up to the major role of the trait in the wage formation. Further findings on public sector data are similar in signs to the cross-sectional whole market gender differences as men again benefit from their conscientiousness whereas women do not. Both genders are penalized for emotional instability. This results from women being almost 2/3 of public sector employees as conscientiousness is not significant for the public sector. Nevertheless, such a distinction implies not only on the validity of the method but also on the conscientiousness being the leading factor of the men's wage growth whereas other personality traits are more beneficial for women. Similarly,

to the results in the public sector without gender division, only a small number of non-cognitive traits are important.

In the private sector, the situation is the opposite. Wages of men have a stronger connection to personality. Although in both regressions non-cognitive ability is jointly significant, males depend more on these traits. At the same time, women's initial endowment (intercept) is higher. Other variables behave in a comparable way to the previous findings. Openness to experience being more important for women differs from the Vietnamese results where the same effect was found for men (Tognatta et al., 2016).

The results for robustness checks on a balanced dataset for the public and private sector are described in Table 4 (columns 2–3 and 5–6 respectively). Public sector rewards women for openness and men for emotional stability. In the private sector, both genders benefit from openness. The distinctions from the previous findings might be attributed to both smaller datasets sizes and bias in the sample. Nevertheless, the results signify that men and women are evaluated differently for their personality in the public sector whereas in the private sector they considered in an equal manner.

To sum up, the gender differences exist on the Russian labor market and in its sectors. These distinctions only partly agree with previous studies as such traits as *conscientiousness* and *openness* are rewarded in a dissimilar way which implies truthfulness of the hypotheses **H1.1** and **H1.2**. The strong influence of personality traits on wages in this case also speaks for **H0** whereas sectoral dispersions align with **H2**. On top of that, hypothesis **H3** should be strongly accepted as well. Gender differences on the Russian labor market are particularly robust.

5. Conclusion

Non-cognitive skills have shown to be a powerful determinant of a salary earned by workers in many countries. As last studies (Edin et al., 2017) have demonstrated that non-cognitive abilities steadily increase their impact on wages. At the same time, this topic has not been researched thoroughly until recently. In the few past decades, several studies have been conducted in this area. Nevertheless, Russian data has been rarely used. Empirical results for a whole Russian labor market are almost non-existent.

This study attempts to shed light on this problem. Based on a representative sample of microdata of the Russian population, it uses a panel approach to control for unobserved individual heterogeneity of workers and thus accurately distinguish returns to different factors influencing wages. Additionally, the article investigates sectoral and gender-specific differences.

The study determines that non-cognitive skills have a profound impact on wages on the Russian labor market. Mainly, openness to a new experience is the most influential factor for wage formation among all personality traits. Neuroticism is also important as it is a major penalizing factor in full accordance with previous literature. Sectoral and gender-related distinctions exist. The public sector is prone to a slower change in accepting personality as an important factor. The private sector, on the other hand, values non-cognitive ability and additionally treats men and women more similarly. The results of the study differ from findings based on the developed economies data. At the same time, Russian case does not fully resemble developing countries outlook. These differences might be explained by cultural and historical factors as well as mentality.

The study has several limitations related to its data. Personality traits were available for one period only. For that reason, the adoption of an extrapolation technique to convert cross-section to a panel data was required. Thus, in the future when several waves with non-cognitive ability are available, it would be possible to release an assumption on the constant nature of personality made in the study.

Further studies on the topic required as many issues were tackled but not investigated throughout. The study gives an overview of personality influence on wages but does not deepen into any of the questions. For example, future studies might focus on industry differences and non-cognitive ability overtime evolution which requires the panel data on soft skills.

The study aims to interest the research community in the further investigation of personality traits role on the Russian labor market. Additionally, the results of the current study might be of interest to policymakers, educators as well as employers and employees. Understanding the importance of personality for wages could facilitate job placement and skills matching among the latter. The findings will be of use for professional orientation and labor market monitoring purposes. As it was mentioned, the Russian labor market has a high level of mismatch which could be reverted by considering non-cognitive skills as a solution.

Moreover, personality not only acts on an individual level but positively impacts the productivity of the country (Xiang, Yeaple, 2018). Whereas not all spheres of the Russian economy are caught up with the recent trends on the topic, as the public sector, it is important to employ all available human capital to archive higher rates of the economic development. Thus, non-cognitive skills should attract attention not only of the research community but also of professionals and policymakers.

References

Arellano A., Cámara N., Tuesta D. (2018). Explaining the gender gap in financial literacy: The role of non-cognitive skills. *Economic Notes: Review of Banking, Finance and Monetary Economics*, 47 (2–3), 495–518.

Ayhan S. H., Gatskova K., Lehmann H. (2017). The impact of non-cognitive skills and risk preferences on rural-to-urban migration: Evidence from Ukraine. *IZA Discussion Paper* No. 10982.

Becker G. S. (1994). Human capital revisited. In: *Human Capital: A Theoretical and Empirical Analysis with Special Reference to Education*, 15–28. The University of Chicago Press: Chicago.

Benhabib J., Spiegel M. M. (1994). The role of human capital in economic development evidence from aggregate cross-country data. *Journal of Monetary Economics*, 34 (2), 143–173.

Blackburn M., Neumark D. (1991). Unobserved ability, efficiency wages, and interindustry wage differentials. *NBER Working Paper* No. 3857. National Bureau of Economic Research.

Blau F. D., Kahn L. M. (2005). Do cognitive test scores explain higher US wage inequality? *Review of Economics and Statistics*, 87 (1), 184–193.

Borghans L., Duckworth A. L., Heckman J. J., ter Weel B. (2008). The economics and psychology of personality traits. *Journal of Human Resources*, 43 (4), 972–1059.

Brunello G., Schlotter M. (2010). The effect of non-cognitive skills and personality traits on labor market outcomes. Analytical Report for the European Commission prepared by the European Expert Network on Economics of Education.

Budria S., Ferrer-i-Carbonell A. (2012). Income comparisons and noncognitive skills. *SOEP Paper* No. 441.

Carneiro P., Crawford C., Goodman A. (2007). The impact of early cognitive and non-cognitive skills on later outcomes. Centre for the Economics and Education, London School of Economics.

Cobb-Clark D. A., Schurer S. (2012). The stability of Big-Five personality traits. *Economics Letters*, 115 (1), 11–15.

Costa Jr. P. T., McCrae R. R., Dye D. A. (1991). Facet scales for agreeableness and conscientiousness: A revision of the NEO Personality Inventory. *Personality and Individual Differences*, 12 (9), 887–898.

Cunha F., Heckman J. J. (2008). Formulating, identifying and estimating the technology of cognitive and non-cognitive skill formation. *Journal of Human Resources*, 43 (4), 738–782.

Deming D. J. (2017). The growing importance of social skills in the labor market. *The Quarterly Journal of Economics*, 132 (4), 1593–1640.

Díaz J. J., Arias O., Tudela D. V. (2012). Does perseverance pay as much as being smart? The returns to cognitive and non-cognitive skills in urban Peru. *Working paper*, World Bank: Washington, DC.

Edin P. A., Fredriksson P., Nybom M., Ockert B. (2017). The rising return to non-cognitive skill. *IZA Discussion Paper No. 10914*.

Fletcher J. M. (2013). The effects of personality traits on adult labor market outcomes: Evidence from siblings. *Journal of Economic Behavior and Organization*, 89, 122–135.

Gensowski M. (2018). Personality, IQ, and lifetime earnings. *Labour Economics*, 51, 170–183.

Gimpelson V., Kapeliushnikov R., Lukiyanova A. (2010). Stuck between surplus and shortage: Demand for skills in Russian industry. *Labour*, 24 (3), 311–332.

Glewwe P., Huang Q., Park A. (2011). Cognitive skills, non-cognitive skills, and the employment and wages of young adults in rural China. In: *The Annual Meeting of the Agricultural and Applied Economics Association, July 24–26, 2011*. Pittsburgh, Pennsylvania.

Grove W. A., Hussey A., Jetter M. (2011). The gender pay gap beyond human capital heterogeneity in noncognitive skills and in labor market tastes. *Journal of Human Resources*, 46 (4), 827–874.

Hanushek E. A., Woessmann L. (2008). The role of cognitive skills in economic development. *Journal of Economic Literature*, 46 (3), 607–668.

Hatch N. W., Dyer J. H. (2004). Human capital and learning as a source of sustainable competitive advantage. *Strategic Management Journal*, 25 (12), 1155–1178.

Heckman J. J., Kautz T. (2012). Hard evidence on soft skills. *Labour Economics*, 19 (4), 451–464.

Heckman J. J., Stixrud J., Urzua S. (2006). The effects of cognitive and noncognitive abilities on labor market outcomes and social behavior. *Journal of Labor Economics*, 24 (3), 411–482.

Heineck G., Anger S. (2010). The returns to cognitive abilities and personality traits in Germany. *Labour Economics*, 17 (3), 535–546.

Heineck G., Süssmuth B. (2013). A different look at Lenin's legacy: Social capital and risk-taking in the two Germanies. *Journal of Comparative Economics*, 41 (3), 789–803.

Heß P., Hempfing A. (2017). Personality and earnings. University of Bamberg.

Hilger A., Nordman C. J., Sarr L. R. (2018). Cognitive and non-cognitive skills, hiring channels, and wages in Bangladesh. *IZA Discussion Paper No. 11578*.

John K., Thomsen S. L. (2014). Heterogeneous returns to personality: The role of occupational choice. *Empirical Economics*, 47 (2), 553–592.

John O. P., Srivastava S. (1999). The Big Five trait taxonomy: History, measurement, and theoretical perspectives. *Handbook of Personality: Theory and Research*, 2, 102–138.

Judge T. A., Higgins C. A., Thoresen C. J., Barrick M. R. (1999). The Big Five personality traits, general mental ability, and career success across the lifespan. *Personnel Psychology*, 52 (3), 621–652.

Kautz T., Heckman J. J., Diris R. ter Weel B., Borghans L. (2014). Fostering and measuring skills: Improving cognitive and non-cognitive skills to promote lifetime success. *NBER Working Paper* No. 20749. National Bureau of Economic Research.

Lang F. R., John D., Ludtke O., Schupp J., Wagner G. G. (2011). Short assessment of the Big Five: Robust across survey methods except telephone interviewing. *Behavior Research Methods*, 43 (2), 548–567.

Lindqvist E., Vestman R. (2011). The labor market returns to cognitive and noncognitive ability: Evidence from the Swedish enlistment. *American Economic Journal: Applied Economics*, 3 (1), 101–28.

Murnane R. J., Willett J. B., Levy F. (1995). The growing importance of cognitive skills in wage determination. *NBER Working Paper* No. 5076. National Bureau of Economic Research.

Nafukho F. M., Hairston N., Brooks K. (2004). Human capital theory: Implications for human resource development. *Human Resource Development International*, 7 (4), 545–551.

Nesterova D. V., Sabirianova K. Z. (1998). Investment in human capital under economic transformation in Russia. *EERC Working paper* No. 99/04. Economic Education and Research Consortium.

Nomura S., Adhikari S. (2017). The influence of non-cognitive skills on wages within and between firms: Evidence from Bangladesh's formal sector. *Policy Research Working Paper* No. 8053. World Bank, Washington, DC.

Nordman C. J., Sarr L. R., Sharma S. (2015). Cognitive, non-cognitive skills and gender wage gaps: Evidence from linked employer-employee data in Bangladesh. *IZA Discussion paper* No. 9132.

Nyhus E. K., Pons E. (2005). The effects of personality on earnings. *Journal of Economic Psychology*, 26 (3), 363–384.

Oaxaca R. (1973). Male-female wage differentials in urban labor markets. *International Economic Review*, 14 (3), 693–709.

Royer J. M., Cisero C. A., Carlo M. S. (1993). Techniques and procedures for assessing cognitive skills. *Review of Educational Research*, 63 (2), 201–243.

Schäfer K. C. (2017). An investigation into the stability of the Big-Five in Germany. *Hanover Economic Papers (HEP)* 600.

Semykina A., Linz S. J. (2007). Gender differences in personality and earnings: Evidence from Russia. *Journal of Economic Psychology*, 28 (3), 387–410.

Semykina A., Linz S. J. (2010). Analyzing the gender pay gap in transition economies: How much does personality matter? *Human Relations*, 63 (4), 447–469.

Tognatta N., Valerio A., Puerta M. L. S. (2016). Do cognitive and noncognitive skills explain the gender wage gap in middle-income countries? An analysis using STEP data. *Policy Research Working Paper* No. 7878. The World Bank.

Viinikainen J., Kokko K., Pulkkinen L., Pehkonen J. (2010). Personality and labour market income: Evidence from longitudinal data. *Labour*, 24 (2), 201–220.

Willis R. J. (1986). Wage determinants: A survey and reinterpretation of human capital earnings functions. *Handbook of Labor Economics*, 1, 525–602.

Xiang C., Yeaple S. (2018). The production of cognitive and non-cognitive human capital in the global economy. *NBER Working Paper* No. 24524. National Bureau of Economic Research.

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Appendix

Table A1. Summary statistics ($N=26406$)

Variable	Mean	Standard deviation	Minimum	Maximum
lwage_h	4.832	0.658	2.16	8.008
Openness	0.733	0.14	0.25	1
Conscientiousness	0.718	0.108	0.25	1
Extraversion	0.657	0.15	0.25	1
Agreeableness	0.691	0.121	0.25	1
Neuroticism	0.53	0.099	0.25	0.964
Education	13.463	2.863	1	25
Male	0.466	0.499	0	1
Age	40.365	11.297	18	64
Public	0.414	0.493	0	1
Private	0.525	0.499	0	1

Table A2. Cross-correlations

Variable	O	C	E	A	N
Openness (O)	1				
Conscientiousness (C)	0.437	1			
Extraversion (E)	0.243	0.133	1		
Agreeableness (A)	0.339	0.341	0.277	1	
Neuroticism (N)	-0.182	-0.313	-0.021	-0.140	1

Table A3. Variance inflation factors (VIF)

Variable	VIF	1/VIF
Openness	1.48	0.674507
Conscientiousness	1.46	0.684772
Extraversion	1.16	0.863056
Agreeableness	1.35	0.738776
Neuroticism	1.18	0.847311

Table A4. The mapping of questions for Big 5 personality factors

#	Question	Cronbach reliability alphas	Factor
3	Do you come up with ideas other people haven't thought of before?	0.7561	Openness
11	Are you very interested in learning new things?	0.7498	
14	Do you enjoy beautiful things like nature, art and music?	0.7505	
2	When doing a task, are you very careful?	0.7478	Conscientiousness
6	Do you finish whatever you begin?	0.7505	
8	Do you work very hard? For example, do you keep working when others stop to take a break?	0.7505	
12*	Do you prefer relaxation more than a hard work?	0.7726	
13	Do you enjoy working on things that take a very long time (at least several months to complete)	0.7570	
17	Do you work very well and quickly?	0.7478	
21	Do you think carefully before you make an important decision?	0.7521	Extraversion
1	Are you talkative?	0.7577	
4*	Do you like to keep your opinions to yourself or prefer to keep quiet when you have an opinion?	0.7698	
20	Are you outgoing and sociable, for example, do you make friends very easily?	0.7527	Agreeableness
9	Do you forgive others easily?	0.7585	
16	Are you polite to other people?	0.7479	
19	Are you generous to other people with your time or money?	0.7533	
23	Do you ask for help when you don't understand something?	0.7571	Neuroticism
5*	Are you relaxed during stressful situations?	0.7673	
7	Do people take advantage of you?	0.7704	
10	Do you tend to worry?	0.7677	
15*	Do you think about how the things you do will affect you in the future?	0.7472	
18	Do you get nervous easily?	0.7729	
22	Are people mean / not nice to you?	0.7713	
24*	Do you think about how the things you do will affect others?	0.7464	

Note. * — reversed question: positive answer relates to the low value of the trait, whereas direct question: positive answer corresponds to the high value of the personality facet.