University of Tartu

Faculty of Economics and Business Administration

ETHNICAL WAGE GAP AND POLITICAL BREAK-UPS: ESTONIA DURING THE POLITICAL AND ECONOMIC TRANSITION[1]

Kristian-Olari Leping
Tartu University Pärnu College
Ott Toomet[2]
Tartu University

April 2, 2007

NB! This is a preprint version of the working paper, see http://www.mtk.ut.ee/ for final version.

ETHNICAL WAGE GAP AND POLITICAL BREAK-UPS: ESTONIA DURING THE POLITICAL AND ECONOMIC TRANSITION*

Kristian-Olari Leping
Tartu University Pärnu College
Ott Toomet†
Tartu University

Abstract

We analyse the ethnical wage gap in Estonia, a former Soviet republic and current EU member, which hosts a substantial Russian-speaking minority. The analysis covers a long time period from the last years of Soviet Union till the first years of EU membership. We document the rise of a substantial wage gap for males in favour of the Estonian-speaking population. This result is robust with respect to controls for language skills, education, industry and occupation. The main factors, causing the unexplained wage gap, are different ethnicity-specific returns to education and to working in the capital city, and different intercepts. The gap for young and established workers is of equal size.

We argue that the most plausible explanations are establishment-level segregation, possibly related with sorting and screening discrimination. Unobserved human capital, related to segregated school system, may play a certain role too.

*We are grateful for Jan Svejnar, Stepan Jurajda, Anthony Heath, Aslan Zorlu and seminar participant at Tartu University and Estonian Economic Society for comments and suggestions. We would also like to thank Indrek Seppo for his help with initial data processing. The remaining errors are our sole responsibility.

†corresponding author. Address: Narva-4, Tartu 51009, Estonia. e-mail: otoomet@ut.ee

Key words: wage decomposition, ethnicity, Estonia, former Soviet Union

Jel codes: J15, J31, J71, P23, P36

1. Introduction

Ethnic minorities have lower wages. This seems to be an almost universal fact in Europe and to a lesser extent in the US. Much of this wage differential can be explained by worse qualifications, e.g. education and language proficiency (Dustmann and Fabbri, 2003), or worse family background (Black et al., 2006). As an alternative explanation, macroeconomic shocks may have asymmetric effect on different ethnical groups. For instance, in the case of restructuring and ethnic segregation across the industries (Bound and Freeman, 1992) or a surge in immigration and different skill distribution across the ethnic groups (Borjas et al., 1996).

However, even if we control for all the relevant information we have, the minorities are still payed considerably less in many cases. The examples include blacks and middle-eastern workers in Europe (Clark and Drinkwater, 2005), or blacks in Southern US (Altonji and Blank, 1999; Black et al., 2006). Although lower salaries may, in principle, be compensated by lower unemployment and higher fringe benefits, the bulk of evidence suggests that the case is the opposite.

Despite of a large number of studies over the recent decades, the mechanisms behind the unexplained wage gap are still largely unknown. In most cases, the gap may be related to unobservable characteristics, such as ability and motivation (the recent results, controlling for test scores point to this direction, see Altonji and Blank (1999) for a survey). Another possible explanation is discrimination, evidence of which is found in a number

of studies (Altonji and Blank, 1999; Bertrand and Mullainathan, 2004).

Most of the previous studies use the data for advanced market economies. Although these countries excel in terms of data quality and research skills, the economic environment lacks major shocks, which could be used in a way like instruments. These analyses should be supplemented with evidence from countries which have experienced major structural changes, completely altering the roles of ethnical groups. Examples include the collapse of the former Soviet Union (where Russian-speaking population turned to a minority in the new national states), and the fall of apartheid in South-Africa, where the whites lost their privileged status. To a certain extent, rapidly changing roles of the ethnical groups serve here as a natural experiment, allowing us to shed some new light on the association of the status and wages of the ethnical groups.

The little existing evidence from the former communist countries suggests that the unexplained wage gap is indeed related to the problems with ethnic relations. The countries with problematic record of ethnical relations tend to show a significant wage gap in favour of the majority (see Noorkôiv et al. (1998); Kroncke and Smith (1999); Orazem and Vodopivec (2000) for Estonia; Bhumaik et al. (2006) for Kosovo and Giddings (2002) for Bulgaria). The difference is negligible in Slovenia (Orazem and Vodopivec, 2000). In Ukraine, where the ethnicity has not been an issue, the Russian-speaking minority enjoys a small wage advantage (Constant et al., 2006). However, this is not an universal outcome of shifting power between ethnical groups. The evidence from South-Africa (Allanson et al., 2002; Leibbrandt et al., 2005) is the opposite – the first post-apartheid decade is associated with increasing white-black wage gap.

The current paper complements this literature. We look at the ethnical wage differences in Estonia, a former Soviet republic and current member of EU. The case of Estonia is particularily interesting because that country hosts a considerable Russian-speaking minority (around 30% of population), situation of which changed completely after the collapse of Soviet Union. Unlike most of the previous studies, we look at the development of the wage differential during the whole transition period since late 1980s until 2005.

We analyse the wage gap between ethnic Estonian- and minority males using Estonian Labour Force Survey and Path-of-a-Generation datasets. We document the rise of a substantial unexplained wage gap in favour of the Estonian-speaking men around 1994. Later, the gap has been slightly increasing until around 20% in 2003. Most of the gap is related to three components: ethnicity-specific differences in intercept, and differences in wage premium for the capital region and education. The gap is roughly equal for the young (born 1975 and later) and for the old men (born before 1960). These results point toward discrimination and entry barriers for the Russian-speaking minority in the Estonian labour market, although education- and unobserved characteristics-related explanations cannot be completely excluded.

The rest of the paper is structured as follows: in the next section we describe the Estonian institutions before- and after the transition to market economy, and give some background on the roles of ethnic groups in that country. Section 3 is devoted to the description of the datasets, variables, and summary statistics. Section 4 describes the empirical strategy and section 5 presents the wage gap using different subsamples and estimation techniques. In the section 6 we shed some light on a few possible explanations, including discrimination, differences in school quality, and segregation. The last two sections are devoted to discussion and a brief conclusion.

2. Background: Estonia 1970-2005

The economy in Soviet Union was in many ways very different from the advanced market economies. The wages were set by the central institutions and were not directly related to supply and demand of skills. As a result of the ideology-related highly equalising wage setting, there were virtually no returns to education and other types of qualifications.

Already during the last years of Soviet era, the private enterprises were allowed in the form of "cooperatives", the major wave of privatisation began in 1992. Two years later, around 50% of the former state enterprises were sold, and in 1995 the large-scale privatisation was essentially completed with the government still controlling infrastructure-related firms (such as power plants, railways and the telecom). In 1995, Estonia experienced the first year of economic growth after the long downturn following the collapse of the planned economy. This year may be regarded as the end of the most rapid transition period. The increasingly market-oriented economy led to rapidly increasing returns to human capital. As a result, the income inequality was rising as well.

The two major ethnic groups in Estonia are ethnic Estonians and after World War 2 immigrants and their children, usually called for "Russian-speaking" people. Before the Second World War, Estonia was ethnically relatively homogeonous. Of population about 1 million, far the largest group were Ethnic Estonians (around 94%).

After the War, the Soviet leadership started a forceful industrialisation campaign. A side effect of industrialisation was a steady inflow of workers, mainly Russian-speaking, from the other parts of Soviet Union. The net inflow averaged to around 10 000 people annually and resulted the population in Estonia to increase to 1.57 million by 1989 where about 40% were recent immigrants.

Most of the immigrants arrived to the capital Tallinn, and to the North-Eastern part of the country.

The large inflow of workers, and the policy of central government led to increasing importance of Russian language in Estonia. Since the 1970s, the country had *de facto* two official languages. Certain areas in the economic and public sphere, like the army, railways and the merchant fleet were completely dominated by Russian-speaking workers. In most of the enterprises which were directly controlled from Moscow, Russian was the internal language.

However, although the Estonian language were used in less and less fields, the language was not directly endangered. Most of the curriculum at the Tartu University was available in Estonian. There were Estonian newspapers and magazines, Estonian radio programs and a TV channel, a large number of books was published in Estonian each year.

The widening use of Russian caused increasing concerns about the future of the Estonian people and the language. One particular outcome of these concerns was unwillingness to participate in the mainstream Soviet Union society. Estonians never felt themselves as part of the larger Soviet people and distinguished clearly between their owns, “Estonians” and the others, “Russians”. Hence, on the low level, the language groups remained to co-exist in a fairly segregated country.

The tide turned during the last years of *perestroika*. Estonian-speaking population organized relatively fast and grasped the occasion to fight for environment protection, larger autonomy, and soon for independence. Russian-speaking minority was slower and less efficient in defending their interests. The country regained it’s independence on August 20, 1991, during the August Coup in the USSR.

The country continued to practice the segregated school system. However, now the political interest for teaching Estonian language to Russian-speaking children skyrocketed while Estonian schools could opt out of teaching Russian altogether. In this way the knowledge of Estonian among Russian-speaking population has vastly improved while the younger Estonian-speaking generation has more- and more difficulties understanding Russian.

The relationship between the two main ethnic groups is commonly considered to be "normal". There is no explicit inter-ethnic violence and open discrimination, although media channels may present quite different viewpoints depending on the language (Korts and Kõuts, 2002). In everyday life the ethnic groups are largely living on their own with a limited number inter-ethnic contact. Below the surface anti-Russian sentiments are still quite common among the Estonian-speaking population.

3. Data

3.1. Data sources

We exploit two different data sets, one of which excels in terms of sample size while the other allows us to observe income back to 1987 and to check the results on an independent data set.

Estonian Labour Force Survey (ELFS) was conducted first time in 1995. The first wave includes a retrospective part where the labour market history as far back as in 1989 is observed. The next survey was conducted in 1997 and thereafter the survey was conducted as annual cross-section until 2000. Since that year, the survey was shifted to rotating panel sampling scheme, conducted quarterly. The different waves include mostly similar informa-

tion, although detail may vary. The number of annually sampled individuals varies between around 5000 (1997 wave) and 16000 (from 2000 onwards), resulting to around 3000 males annually with positive income.

ELFS sample includes permanent residents of the country aged between 15 and 74. The 1995 sample of ELFS was based on the 1989 nationwide census database. Hence, it does not include people, who arrived to, or left the country between 1989 and 1994. Fot latter years, the sample is based on the data from Population Register.

Path of a Generation (PG) is a panel study of high school graduates of 1982. We exploit the data from three waves – 1987, 1992 and 1997. The sample size is around 2100 for the individual waves and around 600 males have wage information present. The 1987 wave has issues with sample selection. The respondents are around 22 years old, and hence most of those who went to the college have not yet a regular job. Income for that year is based on individuals without a completed college degree.

We also conducted a few interviews in order to get some qualitative information about the situation of the ethnic groups in the Estonian labour market. This data is used below in Sections 6 and 7 while discussing the results. A short description of the interviewees is given in the Appendix A.

In this paper we focus on the ELFS results. The PG based results are briefly discussed in section 5.

3.2. Sample selection and Variables

We limit ourselves with males in order to avoid the complications, related to modelling the intra-family labour supply decisions. In the case of ELFS we choose individuals between 20 and 60 years old. In the case of PG we do not impose any additional age restrictions as the sample is already age-homogenous.

Both datasets allow to control for the personal characteristics and human capital variables, commonly used in similar studies, such as age, education and family status. Below, we discuss the most important variables in the current context, the complete list of the variables is given in the Appendix B.

Information on the ethnicity is based on a question about the respondents *ethnic nationality*, present in all the waves of ELFS and PG. In most cases, this means which ethnic group the individuals are identifying themselves with. Usually, the identification is language based, but it may differ in certain circumstances, e.g. for individuals, born in multi-lingual families. This variable only allows us to distinguish between Estonian and non-Estonian workers. However, as most of those who are not Estonian-speakers use Russian as their first language, we call them "Russian-speaking" or "minority" below.

We use the monthly salary on the main job as the income variable. The way, this information is collected, is changed several times during the period of observation. For 1989 and 1992-1994, "salary in autumn" is reported. In 1989, it was payed in Soviet roubles, later in Estonian kroons. During the next wave, "salary" in January 1995, October 1995, October 1996 and January 1997 was reported. Since the third wave of ELFS, the net salary in last January, October and current January is reported. Since the third quarter of 2000 (the survey was conducted quarterly since 2000),

the "last net salary at the main job" is reported. The switch from gross to net income lessens the income gap in absolute value as the Estonian tax system is slightly progressive[1]. We expect the possible bias from these structural breaks not to be of major concern as they supposedly affect the data in the same way for both Estonian- and Russian-speaking individuals.

Both datasets include information on self-reported language skills. In ELFS, it is reported whether the responent is able to write and speak (coded as 1), speak (code 2), or simply understands (code 3) the language. We denote the corresponding variables *langEE1–langEE3* for the Estonian- and *langENG* for the English skills. PG has analogous 5-level coding. Language information is extremely relevant while controlling for the Russian-speaking individuals ability to work in Estonian-speaking environment. However, we admit that self-reported information on language skills may be biased, but we still argue that such a multilevel descriptive information is not too far from truth.

We include a dummy about *immigrant status*, which we define as moving to the country at age 8 or above. Hence we call for "immigrants" those individuals who have started their schooling outside of the country.

PG allows us to use more accurate control for family- and individual human capital, including math grade at the end primary school. Unfortunately, the grades are not calibrated at the national level and hence it is rather a measure of relative performance at the corresponding school. We also control for fathers education and the exposition at Estonian and Russian languages at work.

[1] Estonia introduced flat tax rate 26% in early 1990s. The rate has later been lowered to 24% and further to 23%. However, due to tax exemption (which size has been increased several times), the tax system is still slightly progressive.

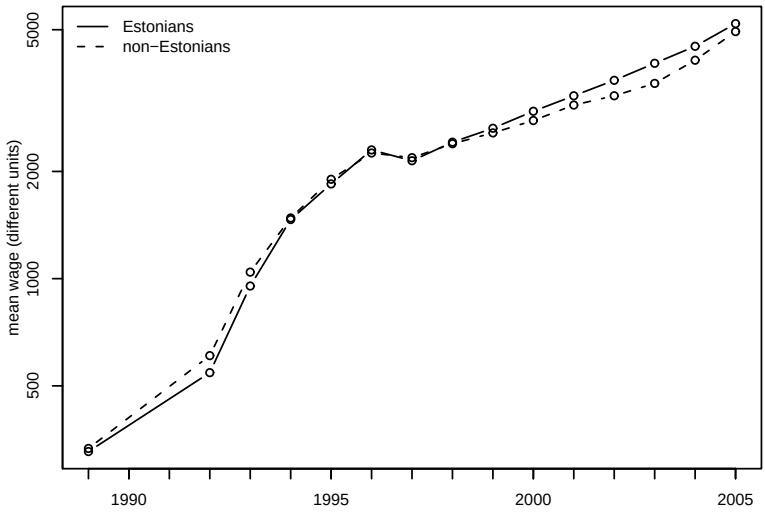

Figure 1. Mean wage across ethnic groups. ELFS data. 1989 wage is measured in Soviet roubles, later Estonian kroons. Gross wage until 1996, net wag esince 1997.

3.3. Descriptive statistics

Sample averages, based on ELFS data, reveal that the mean wage of non-Estonians was slightly above that of Estonians during the time of the most rapid transition 1992-1994 (Figure 1). After that period, the advantage turned increasingly in favour of ethnic Estonians. However, the difference seems to be contracting toward the end of the period.

Averages of the selected explanatory variables is presented in the table 1. The full table is in the Appendix (Table 12).

These tables reveal several interesting facts. The age distribution

Table 1. Means of the selected variables

	1989	1994	1999	2001	2003	2005
college degree E	0.16	0.17	0.15	0.14	0.14	0.15
college degree R	0.15	0.16	0.13	0.12	0.12	0.16
Harju E	0.30	0.34	0.23	0.23	0.23	0.27
Harju R	0.49	0.51	0.36	0.38	0.36	0.43
langEE1 R	0.07	0.08	0.11	0.11	0.11	0.16
langEE2 R	0.11	0.11	0.15	0.13	0.15	0.16
langEE3 R	0.16	0.17	0.16	0.16	0.21	0.24
langEE Home R	0.10	0.09	0.13	0.10	0.10	0.09
langENG E	0.22	0.28	0.30	0.37	0.41	0.45
langENG R	0.10	0.13	0.14	0.19	0.16	0.24
immigrant R	0.57	0.49	0.38	0.36	0.32	0.27
manufacturing E	0.19	0.18	0.24	0.24	0.32	0.27
manufacturing R	0.37	0.26	0.29	0.37	0.32	0.31
publadm E	0.04	0.06	0.08	0.10	0.10	0.09
publadm R	0.04	0.04	0.03	0.04	0.04	0.04
manager E	0.14	0.18	0.14	0.14	0.12	0.13
manager R	0.12	0.11	0.09	0.06	0.06	0.08
professional E	0.10	0.08	0.08	0.08	0.10	0.08
professional R	0.07	0.06	0.04	0.04	0.05	0.05
craft E	0.28	0.24	0.25	0.25	0.24	0.25
craft R	0.42	0.39	0.39	0.40	0.40	0.37

Notes: ELFS data, males. E stands for Estonian-speaking, R for Russians-speaking workers.

seems to be virtually equal for both ethnic groups, although the Russian-speaking population are largely immigrants. The proportion of workers with a college degree is fairly close, however, there are more Estonian-speaking individuals without a high-school degree. Males of the majority group are clearly better in speaking English, the trend is clearly upwards for both ethnical groups. The knowledge of Estonian language is also improving among Russian-speaking population though at a slower pace than that of English. Around 10% of non-Estonians speak Estonian at home, here no trend is visible. The regional variables depict the well-known pattern – there are virtually no Russian-speaking people in South-Eastern part of the country while the opposite is true for industrial Nort-East. The capital Tallinn contains roughly 25% of Estonian-speaking work-force and slighly above a third of that of Russian-speaking. Russian-speaking males are over-represented in mining, manufacturing, electricity and logistics sectors. Estonians dominate in agriculture, trade, public administration (since mid 1990s), and education. There is more professionals and managers among Estonians, Russians dominate craft- and related occupations.

4. Wage decomposition model

We decompose the average wage differential between ethnic Estonians and non-Estonians in a similar way as in Oaxaca (1973). We ignore selection into wage employment (look at the discussion in Section 6). Assume the log wage of individual i can be written as

$$\log w_i^g = \boldsymbol{\beta}^{g\prime} \boldsymbol{X}_i + \boldsymbol{\gamma}^{g\prime} \boldsymbol{Z}_i + \varepsilon_i \tag{1}$$

where w is the wage. $\boldsymbol{X}$ and $\boldsymbol{Z}$ are vectors of individual characteristics where we distinguish between the explanatory variables, common for both groups ($\boldsymbol{X}$) and group-specific variables ($\boldsymbol{Z}$). The leading examples of $\boldsymbol{Z}$ include the Estonian language skills as virtually all ethnic Estonians are fluent in Estonian. $\boldsymbol{\beta}$ and $\boldsymbol{\gamma}$

are corresponding parameter vectors and ε is a random error, distributed independently of $\boldsymbol{X}$. Index g indicates the ethnic group. We denote the groups by E (Estonian), and R (Russian).

Let the upper bar denote the sample average of the corresponding variable and hat the parameter estimate. The difference between group specific average wages can be decomposed as follows:

$$\begin{aligned}\overline{\log w^E} - \overline{\log w^R} &= \hat{\boldsymbol{\beta}}^{E\prime}(\bar{\boldsymbol{X}}^E - \bar{\boldsymbol{X}}^R) + (\hat{\boldsymbol{\beta}}^{E\prime} - \hat{\boldsymbol{\beta}}^{R\prime})\bar{\boldsymbol{X}}^R + \\ &\quad + \hat{\boldsymbol{\gamma}}^{E\prime}\bar{\boldsymbol{Z}}^E - \hat{\boldsymbol{\gamma}}^{R\prime}\bar{\boldsymbol{Z}}^R \qquad (2)\\ &\equiv \Delta_X + \Delta_\beta + \Delta_Z. \qquad (3)\end{aligned}$$

The first component, Δ_X, captures the wage differences, caused by differences in common individual characteristics, such as age or education; Δ_Z are differences, caused by explanatory variables, not present for the other group and Δ_β are differences, caused by different valuation of common skills. The standard errors for the components can be calculated using delta method. In this study we use the minority-specific explanatory variables $\bar{\boldsymbol{X}}^R$ for the reference. This specification answers to the question – what would the wage of Russian-speaking workers be, given their current characteristics, if these were valued in the same way as for Estonian-speaking workers.

5. Results

5.1. The general trend

We estimate the models independently for each year we have wage data for, and for various sets of control variables (Table 2).

The resulting yearly Δ_β for selected models is plotted in Figure 2. The figure reveals a steady negative trend in the wage gap since

Table 2. Unexplained wage differential in favour of ethnic Russians.

	Models					
year	1	2	3	4	5	6
1989	0.020	0.018	0.055	0.090	0.094	0.043
	0.030	*0.027*	*0.054*	*0.057*	*0.058*	*0.067*
1992	0.110*	0.106*	0.053	-0.024	-0.007	-0.073
	0.030	*0.029*	*0.055*	*0.058*	*0.058*	*0.063*
1993	0.090*	0.087*	0.037	-0.069	-0.035	-0.108
	0.030	*0.030*	*0.055*	*0.056*	*0.056*	*0.058*
1994	0.010	-0.000	-0.072	-0.189*	-0.155*	-0.199*
	0.030	*0.029*	*0.053*	*0.056*	*0.056*	*0.057*
1997	0.020	0.020	-0.073*	-0.180*	-0.140*	-0.141*
	0.020	*0.016*	*0.026*	*0.029*	*0.029*	*0.027*
2000	-0.060*	-0.055*	-0.113*	-0.204*	-0.158*	-0.197*
	0.030	*0.025*	*0.037*	*0.050*	*0.050*	*0.048*
2001	-0.060*	-0.055*	-0.110*	-0.185*	-0.156*	-0.152*
	0.020	*0.023*	*0.032*	*0.038*	*0.038*	*0.037*
2002	-0.090*	-0.099*	-0.165*	-0.207*	-0.166*	-0.171*
	0.030	*0.028*	*0.037*	*0.044*	*0.045*	*0.045*
2003	-0.130*	-0.132*	-0.213*	-0.272*	-0.225*	-0.258*
	0.020	*0.022*	*0.029*	*0.038*	*0.038*	*0.037*
2004	-0.080*	-0.075*	-0.174*	-0.242*	-0.198*	-0.206*
	0.020	*0.023*	*0.029*	*0.040*	*0.040*	*0.039*
2005	-0.051*	-0.052*	-0.150*	-0.167*	-0.126*	-0.108*
	0.024	*0.021*	*0.027*	*0.035*	*0.035*	*0.035*
			Controls			
constant	√	√	√	√	√	√
age		√	√	√	√	√
education		√	√	√	√	√
family			√	√	√	√
immigrant			√	√	√	√
region				√	√	√
language					√	√
industry						√
occupation						√

*Notes: * – differential statistically different from 0 at the 5% level.*
Different estimations include different sets of control variables.
Standard errors in italics.

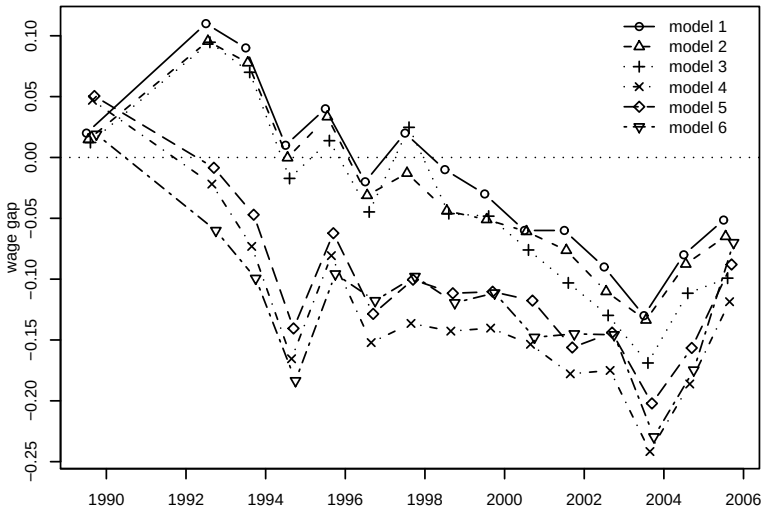

Figure 2. Unexplained wage differential in favour of ethnic Russians (Δ_β).

the early transition times around 1990. The development seems to reverse in 2003. The trend is similar for most of the period for all the models, however, the initial development during early 1990s differs. The difference between models decreases in time, but remains visible until the end of the period of observation.

The Russian-speaking workers earned somewhat more in average in early 1990s (Model 1). The initial advantage turned into disadvantage 6–8 years later. Controlling for age and education (Model 2) makes the differential to look slightly more negative (this effect is almost solely related to education, see below). Adding controls for immigrant status and family structure (Model 3) further decreases the unexplained wage gap. The most important explanatory variables are regional controls (model 4), making the wage

gap between 5 and 10 percentage points more negative for most of the years. This fact is mostly related to wage rate in the capital Tallinn, where Estonian-speaking workers enjoy much higher wage premium than Russian-speaking ones. However, the importance of the regional controls is fading, 2005 these explained only 1.7 percentage point of the differential. Part of the wage gap is explained by language skills (model 5), making the unexplained part by 2-4 percentage point less negative. The last set of controls we add – industry and occupation – show the situation in a little bit more pale light, however, the difference is tiny.

We can conclude that the Russian-speaking workers are apparently earning less no because they are employed in worse industries and located in worse regions, but rather the way around. However, their gain from more favourable characteristics remains less than for the ethnic majority. The only significant disadvantage in the characteristics of Russian-speaking population, we are able to identify from Figure 2, is the language skills.

The PG dataset basically confirms the main message (Table 13 in the Appendix). We see an unexplained wage advantage in favour of the minority men in 1987. The advantage turns insignificant in 1992 and negative 1997. As PG is a panel dataset, the results confirm that the observed trends are not related to sample selection but to the different development of the income of the ethnic groups. The estimates are rather imprecise, though, because of the small sample size.

5.2. What determines the differential?

In this subsection we investigate which of the model coefficients determine the unexplained wage differentials. Here we present the model 5 for selected years and selected variables (Table 3),

the results for all the variables are given in the Appendix E (the other models were qualitatively similar).

Table 3. Selected coefficients for the Model 5.

	1989	1994	2001	2003	2005
E college degree	-0.026	0.408♦	0.570♦∘	0.454♦•	0.470♦•
R college degree	-0.075	0.285♦	0.394♦	0.240♦	0.259♦
E Harju	0.108♦	0.476♦•	0.403♦•	0.277♦•	0.216♦•
R Harju	-0.016	0.195♦	0.137◊	0.035	0.038
E langENG	0.028	0.169♦	0.130♦	0.205♦∘	0.171♦
R langENG	0.179◊	0.100	0.172♦	0.089	0.137♦
R langEE1	0.030	-0.065	0.013	-0.001	0.019
R langEE2	-0.062	-0.093	0.007	-0.063	0.056
R langEE3	0.010	-0.029	0.064	-0.032	0.060
R langEE home	-0.020	-0.028	0.034	-0.098◊	0.052
E intercept	5.603♦	6.922♦	7.670♦	7.972♦	8.157♦
R intercept	5.781♦	7.003♦	7.768♦	7.986♦	8.283♦

Notes: ◊, ♦ – coefficients are statistically significant at 5% and 1% level; ∘, • – coefficients' difference between the ethnic groups is statistically significant at 5% and 1% level.

The coefficients have in most cases expected sign and size. The most important determinants of the wage are education, marriage, part-time work, regional dummies and language skills. In 1989, most of the coefficients were small and insignificant. However, because of rapid development in early 1990s, the returns became close to the new stable values already in 1994. It is interesting to look at the returns to language skills[2]. While knowledge of English (*langENG*) has been related to at least 10% wage advantage during almost all the observed period, we are unable to document any similar effect for the Estonian language (*langEE1–langeEE3*

[2]We admit that we do not estimate *returns* in this word's narrow meaning. For instance, aquiring language skills may be related to unobserved ability and to the occupation (and wage).

and *langEE home*). Although most of the coefficients are positive, they are of substantially smaller size and only few of them are statistically significant.

What coefficients determine the unexplained wage gap? The most consistent of these variables is *Harju* – having a job in the capital region. Since 1994, for every single year the difference in wage premiums for that county is statistically significant at 1% level. While Estonian-speaking workers can expect around 30% higher salary in that area than in the rest of the country, the wage premium for the minority workers is virtually nonexistent. Another important variable is returns to university-level education, *college degree*, where the difference is significantly in favour of Estonian-speaking workers during the period of 1995–2001. Different returns to education for different ethnic groups are documented earlier by e.g. Arias et al. (2004) for Brazil and Noorkôiv et al. (1998) for Estonia. Another regional dummy, *Ida-Viru*, has been favouring Estonian-speaking workers during the recent years. Surprisingly, the differences in the intercept are not significant in most cases.

6. Possible expanations of the wage difference

Discrimination There is a lot of evidence on racial and ethnic discrimination in Europe (see Riach and Rich (2002) for a review). In case of Estonia, the relationship between the ethnic Estonians and Russians has been somewhat tense, at least in periods. Most of the problems are related to different interpretation of of the events of WW2, the Soviet period, and the current status of the Russian-speaking minority in Estonia. The mainstream media has never expression extreme opinions, though the web-based forums and news-sites often reflect highly biased and negative pictures of "the others". In this context it seems possible, that at least part of

the unexplained wage gap is related to ethnic discrimination.

Unfortunately, there is very few studies, related to the question of discrimination in Estonia. According to Pettai (2002), 37% of the minorities find the discrimination common (only 6% Estonian-speaking people do the same). In general, the relations between the ethnic groups have improved during 1990s.

As in the other similar analyses, we cannot prove the presence of discrimination. The interviews, we have conducted, do not support the idea of discrimination in the sense of lower pay for a similar work (though this may be an issue in case of negotiated salaries). However, in one case the respondent admitted that the leadership tries to avoid Russian-speaking workers. The results above suggest that similar entry barriers may play a substantial role in the Estonian labour market.

Selection effects Our estimation includes only individuals who receive positive salary. May the selection process bias the estimates in favour of the Estonian-speaking workers? In the Figure 3 we present the employment, unemployment and non-participation rates (as the proportion of the population) for Estonian-speaking and the minority population.

The figure is easy to interpret. Since the early 1990s, Estonian-speaking males have enjoyed higher employment rate and lower unemployment rate than the minority men. However, despite of the less-favourable situation, the non-participation rate in the minority population has been *smaller* than that of the Estonian-speaking men. This picture does not support the idea of less favourable selection of the minorities into the group of wage earners. Assuming that the labour market status is related to unobserved ability where higher ability leads to both better compensation and higher probability of employment, one should expect the

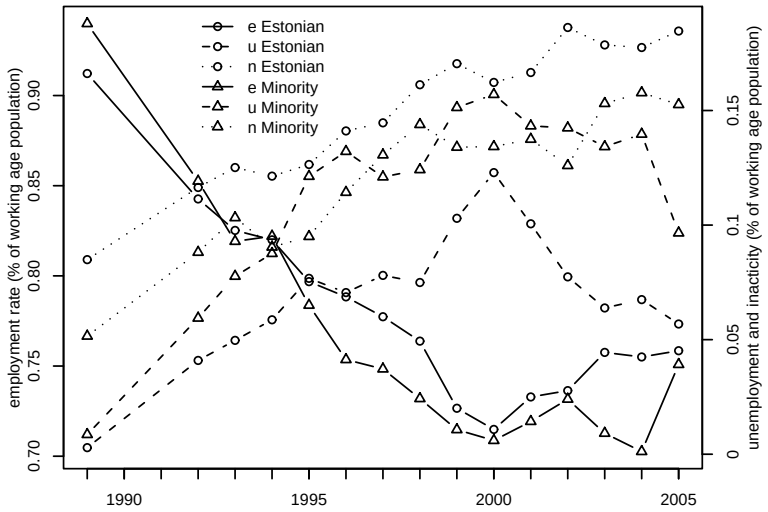

Figure 3. Employment (e), unemployment (u) and non-participation (n) rates (as proportion of the working age population) for Estonian-speaking and minority workers.

minority wage earners to be *more* favourably selected from the unobserved distribution of ability.

Unobserved skills A common perception in Estonian-speaking community is, that far the most important determinant of inter-ethnic communication is the knowledge of Estonian language (Vihalemm, 2002). The current results, where the language skills determine only a minor part of the wage gap, is not in concordance with this view. There are two possible explanations: first, the self-reported language skills are severely biased, and second, the level, what Estonian-speaking individuals consider to be fluency in the language, is far above what the minority finds reasonable.

The first explanation is not particularily convincing. As the language skills are most probably correlated to the ability, one expects the skill level to be endogenous, and hence returns to the language skill (in this word's narrow meaning) to be rather overestimated. It is hard to believe, that an objective measure would change the picture completely.

Unfortunately, there is no information, what is considered to be the "sufficient" fluency. The use of Estonian language may not automatically give an easier access to the jobs, e.g. Ponarin (2000) argues that using the titular language is in fact associated with *loss of respect* of native speakers in Estonia.

Segregation In this subsection we look at the role of ethnic segregation by industries on the wage level. Although our estimates include controls of industry (model 6), we belive that a closer look at industry-wise distribution of ethnical groups may help us to better understand the wage gap.

First, we compare the average wage rate and the ethnic composition of workforce by industries (Table 4). The table revelas that almost one third of Estonians were employed in the agriculture, whereas only 5% of minorities were working in that sector (in 1989). Estonians are also overrepresented in trade, hotels and restaurants, public administration (but not in 1989) and education, whereas there are relatively more minorities in mining, manufacturing, electricity and logistics. The low relative wage in agriculture may be related to the initial wage advantage of the Russian-speaking workers in 1989: During the following years, employment in agriculture dropped sharply and most of the agricultural employees moved to the other, better payed industries (or to non-employment). This process has mostly contributed to the income of Estonian-speaking workers.

Table 4. Percentage of workers of both ethnic groups, employed in selected industries

	% Estonians		% Russians		Relative wage	
	1989	2004	1989	2004	1989	2004
agriculture	0,320	0,089	0,054	0,020	0,84	0,73
fishing	0,041	0,011	0,060	0,008	1,77	0,93
mining	0,009	0,016	0,050	0,072	1,21	0,94
manufacturing	0,186	0,289	0,374	0,330	0,97	0,91
electricity	0,024	0,026	0,036	0,073	0,93	1,00
construction	0,135	0,134	0,129	0,141	1,18	1,10
trade	0,040	0,098	0,032	0,070	1,23	1,07
hotelrest	0,013	0,011	0,010	0,011	1,52	0,75
logistics	0,088	0,096	0,154	0,127	0,97	1,12
business	0,040	0,041	0,031	0,058	0,82	1,03
publadm	0,038	0,091	0,037	0,030	0,79	1,04
education	0,039	0,043	0,013	0,023	0,77	1,07
health	0,028	0,031	0,020	0,025	0,83	0,85

Table 5. Minority shares in selected industries.

	1989	1994	1999	2001	2003	2005
agriculture	0.08	0.09	0.11	0.07	0.07	0.07
fishing	0.43	0.58	0.45	0.27	0.00	0.29
mining	0.75	0.71	0.78	0.77	0.64	0.61
manufacturing	0.51	0.41	0.32	0.40	0.29	0.29
electricity	0.44	0.44	0.44	0.69	0.60	0.46
construction	0.33	0.31	0.29	0.25	0.36	0.28
trade	0.29	0.29	0.22	0.18	0.23	0.18
hotelrest	0.28	0.19	0.19	0.17	0.15	0.24
logistics	0.47	0.51	0.42	0.38	0.35	0.41
financial	1.00	0.26	0.06	0.15	0.00	0.00
business	0.28	0.31	0.23	0.35	0.39	0.29
publadm	0.34	0.23	0.13	0.13	0.14	0.12
education	0.14	0.16	0.23	0.17	0.16	0.12
health	0.27	0.23	0.14	0.12	0.21	0.22

Next, we follow the methodology of Jurajda (2003). We calculate the share of minority employees for different industries (Table 5). One can see that the share has fallen substantially in public administration and manufacturing, while it has not increased considerably in any industry.

In order to analyse the relationship between the minority percentage and the average wage across the industries, we calculate the minority share S_i in the industry where the individual i is working, and estimate the following wage regressions independently for both ethnic groups and for each year:

$$\ln w_i = \boldsymbol{\beta}' \boldsymbol{X}_i + \gamma' S_i + \varepsilon_i, \tag{4}$$

where w_i denotes the individual wage the vector $\boldsymbol{X}_i$ includes the individual- and job-specific characteristics (we control for age, education, family, immigrant status and occupation).

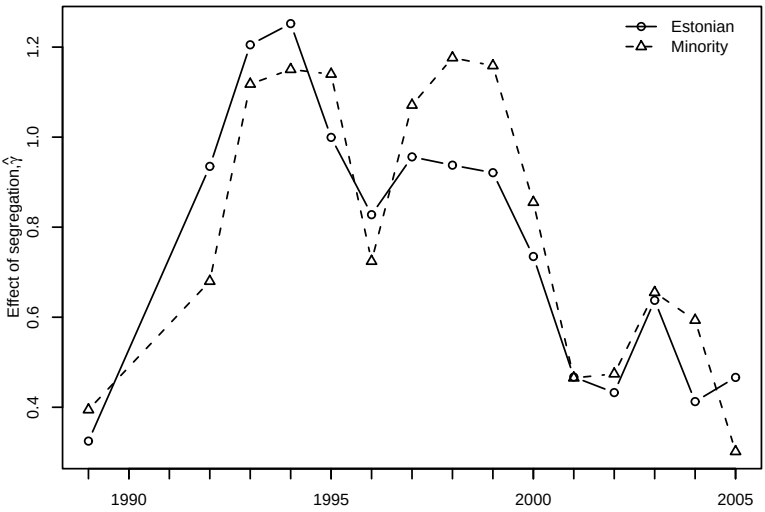

Figure 4. Effect of the minority percentage on wage in industries.

The estimated effects of segregation (parameter γ in (4)) are presented in the Figure 4. The higher share of minority employees in industry is associated with better pay for both Estonian-speaking and minority workers for all the years. The effect seems to be increasing during early 1990s, reaching a peak around 1994, and slightly falling thereafter.

This exercise suggests that the wage gap is not related to minority workers, employed in the worse-payed industries. Although our measure of industries is quite crude (we are only able to control for 14 aggregated industries), it were hard to believe that a finer control would lead to a completely different picture – *all* of our estimates so forth suggest that minorities are, in average, working in better payed industries.

Obsolete skills May the results be related to different expectations about the development of the labour market? It is possible that the Estonian-speaking population was better prepared to the changes in the economy through different educational and occupational choices. The Estonian-speaking tier of the segregated school system was more closely oriented to the local labour market and led, in general, to better education and occupation (often in agriculture, though). The Russian-speaking tier produced primarily blue-collar workers for the local Russian-speaking industrial segment, while the leaders were hired from elsewhere in Soviet Union (Helemäe et al., 2000).

We perform the wage decomposition for two groups – established workers (born before 1960) and young workers (born after 1975). Men, born before 1960 were 30 or more years old during the most important changes in the society in early 1990s. At that time they were in most cases already established workers with a job and some working experience. The men, born 1975 and later, were less than 17 years old during these years. Most of them had not yet started their working career and hence they should have had better information about the requirement of the new economy while choosing their education and profession.

The results are presented in the Table 6. Due to the low number of observations (and selection issues), we have pooled all the years (we added the year dummies into the model specifications).

We can see that the young generation is rather worse than better off. The younger Russian-speaking workers earn around 10% less regardless of the model specification. The older minority workers have salaries, comparable to those of the majority in average. However, in their case the wage premium for the capital region is rather low. This can be concluded from the fact that the unexplained differential turns suddenly negative at model 4. Surprisingly, the younger cohort does not have this disadvantageous

Table 6. Unexplained wage differential in favour of ethnic Russians.

	Models					
	1	2	3	4	5	6
	Born before 1960					
1997-2005	0.035*	-0.001	-0.016	-0.125*	-0.103*	-0.110*
	0.011	*0.009*	*0.009*	*0.013*	*0.013*	*0.013*
	Born 1975 and later					
1997-2005	-0.102*	-0.113*	-0.150*	-0.158*	-0.117*	-0.097*
	0.022	*0.018*	*0.017*	*0.027*	*0.028*	*0.028*
	Controls					
constant	√	√	√	√	√	√
age		√	√	√	√	√
education		√	√	√	√	√
family			√	√	√	√
immigrant			√	√	√	√
region				√	√	√
language					√	√
industry						√
occupation						√

Notes: Results for males, born before 1960, and after 1974. Standard errors in italics.

effect of the capital county. However, in their case the different returns to family characteristics and immigrant status seem to play a certain role (unexplained differential for the model 3 is much more negative than for the model 2).

In conclusion, our analysis of two generations does not support the idea that the unexplained wage gap is related to the obsolete human capital of the older generation. The youth seems to be doing no better than the middle-aged workers.

Differences in schools' quality As the Estonian educational system is almost completely segregated by the language, it is possible that worse labour market performance of ethnic minorities is related to the lower quality of Russian-speaking schools. There is some evidence that already in early 1980s the graduates of the Russian-speaking schools had lower starting position of their careers than those who graduated from Estonian-speaking schools (Helemäe et al., 2000).

Below, we present the results of the state exams 2006 by school language in order to shed some light at the schools' performance. State exams is a unified set of exams, performed when graduating from high school, and which are evaluated using a nationwide scale. This allow us to directly compare the schools. Although high school-graduates of 2006 are not included in the current study, the data from earlier years[3] suggest that the schools' performance did not vary much during the last decade.

Most of the exams' results are slightly better for Estonian-speaking schools (Table 7). However, for a few important subjects this is not the case. In sciences, the Russian-speaking schools do

[3]Before 2006, the results are presented according to the *examinations language*, not according to the schools language.

slightly better, while in math the difference (in favour of Estonian-speaking schools) is less than 10% of the standard deviation. The bulk of the literature, devoted to the relationship between the high-school performance and later labour market outcomes, indicates a negligible effect of the individual subjects on the future earnings with math as a possible exception (Altonji, 1995; Dolton and Vignoles, 2002)[4]. Whether these results are informative in this context – effect of the high school grades on the later earnings – is not quite clear. However, based on the favourable outcomes for sciences and math, we don't expect the school quality to be the main reason behind the worse labour-market outcomes of the Russian-speaking men.

Regional effects: The capital county In this subsection we analyse whether the wage differential may be related to imperfect controls for region. We look at the residents of the capital (Harju) county. Harju county form essentially a single labour market where far the most of the jobs are concentrated to Tallinn and it's suburbs.

Table 8 presents the unexplained wage gap for different years and models. We have removed the model 4 as it is equivalent to the model 3 in this case. Figure 5 represents a graphical view of the table. The first look is not too different from Figure 2. Here, too, one can see a falling trend which stabilises around 1995, and a positive development after year 2000. However, the initial positive effect of Figure 2 is missing. Arguably, the former was related to the geographic location as a very large share of Russian-speaking men are working in Tallinn.

[4] Johnes (2005) finds that different subjects have important complementarities and synergy. There are substantial differences in returns to various sets of subjects.

Table 7. The average results of state exams by school language, 2006.

Subject	lang	N	average	stdd	difference
History	E	1907	68.28	17.29	
	R	232	58.61	21.24	-0.46
Biology	E	3000	63.35	17.13	
	R	708	59.49	20.38	-0.19
Physics	E	490	69.09	20.95	
	R	79	71.97	22.55	0.13
Geography	E	6263	60.94	13.25	
	R	605	51.45	14.47	-0.66
English	E	7158	66.71	15.54	
	R	2051	58.38	15.33	-0.54
Chemistry	E	1721	64.82	19.62	
	R	553	68.42	19.57	0.18
Mathematics	E	4493	52.08	23.05	
	R	1524	50.35	22.45	-0.08
Estonian	E	92	78.21	16.55	
	R	3904	65.62	22.25	-0.57
Society	E	3626	59.96	14.21	
	R	481	46.45	16.17	-0.84
Total	E	39439	61.14	18.86	
	R	13607	59.2	20.78	-0.09

Notes: Bilingual schools are excluded. N *– number of examinees;* lang *– schools language.* Difference *is the difference in mean scores as the percentage of the standard deviation. Source: National Centre of Examination and Qualification*

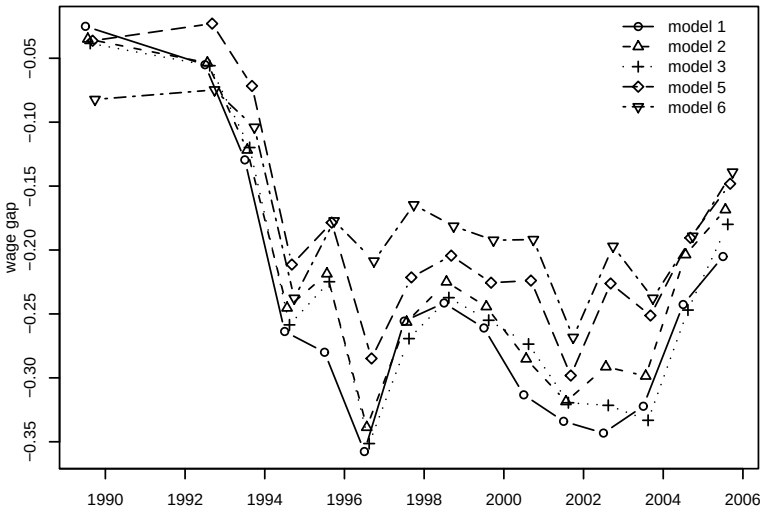

Figure 5. Unexplained wage differential in favour of ethnic Russians. Residents of Harju county.

The point estimates are rather more negative than for the full sample (Table 2). The absolute values of the estimates tend to decrease while adding additional explanatory variables. The most important variables, explaining the wage gap are the controls for language skills. The lower wages of Russian-speaking men are also related to slightly worse occupations, industries and education (until mid 1990s only). However, even controlling for all these characteristics, we are still left with a very large unexplained component, around 20% of the wage.

Migration The break-up of the Soviet Union were accompanied with substantial demographic changes. According to estimates, around 150 000 mainly Russian-speaking people left the country

Table 8. Unexplained wage differential in favour of ethnic Russians. Harju county

	Models				
	1	2	3	5	6
1989	-0.025	-0.035	-0.038	-0.036	-0.082
	0.043	*0.045*	*0.045*	*0.047*	*0.055*
1992	-0.055	-0.054	-0.056	-0.023	-0.075
	0.045	*0.045*	*0.045*	*0.046*	*0.053*
1993	-0.130*	-0.122*	-0.120*	-0.072	-0.104*
	0.043	*0.043*	*0.043*	*0.044*	*0.051*
1994	-0.264*	-0.245*	-0.259*	-0.211*	-0.238*
	0.041	*0.043*	*0.041*	*0.043*	*0.048*
1997	-0.256*	-0.256*	-0.269*	-0.221*	-0.165*
	0.032	*0.032*	*0.031*	*0.032*	*0.035*
2000	-0.313*	-0.285*	-0.274*	-0.224*	-0.192*
	0.054	*0.053*	*0.050*	*0.053*	*0.055*
2001	-0.334*	-0.319*	-0.319*	-0.298*	-0.268*
	0.041	*0.041*	*0.039*	*0.041*	*0.045*
2002	-0.343*	-0.291*	-0.321*	-0.226*	-0.197*
	0.058	*0.052*	*0.051*	*0.055*	*0.062*
2003	-0.322*	-0.299*	-0.333*	-0.251*	-0.238*
	0.042	*0.041*	*0.039*	*0.043*	*0.047*
2004	-0.243*	-0.204*	-0.247*	-0.190*	-0.189*
	0.046	*0.045*	*0.042*	*0.045*	*0.049*
2005	-0.205*	-0.168*	-0.180*	-0.148*	-0.139*
	0.037	*0.036*	*0.035*	*0.036*	*0.038*
	Controls				
constant	√	√	√	√	√
age		√	√	√	√
education		√	√	√	√
family			√	√	√
immigrant			√	√	√
language				√	√
industry					√
occupation					√

Notes: Results for males, born before 1960, and after 1974. Standard errors in italics. $*$ *– statistically significant at 5% level.*

during early transition time, resulting in a significant fall in the total population (from 1.57 to 1.35 million). The following years have seen even further fall of the population due to low birth rates, and increasing emigration to West. However, the proportion of the ethnic groups has remained roughly stable.

Immigration to Estonia has been virtually zero since around 1990. According to the census 2000, around 8300 men in the age group 20-59 were temporarily residing abroad[5]. This is around 3% of the male working population in the same age group. Hence we do not expect the temporary migration to significantly bias our results in 1990s. However, those statistics do not include information on those, who leave the contry permanently. The permanent and temporary migration has increased a lot in recent years and, given that emigrants may form quite a selective sample, a certain effect on the results cannot be excluded for the latter period of the study.

Measurement errors May our results be related to measurement errors? If there is a systematic misreporting bias (e.g. due to more distrust among the Russian-speaking workers), a spurious wage differential may arise. In order to get an idea of the extent of the problem, we report the proportion of the employed individuals in both ethnic groups without reported wage (Table 9). The table reveals that the misreportion was probably not an issue until mid 1990s. However, since late 1990s, up to 37% of the Estonian-speaking workers do not report their wage while the figures for the minority remains below 20% in most cases. The substantial non-reporting in agriculture will probably increase the perceived wages of Estonian-speaking workers. However, the effect should be negligible in the capital area. Underreporting in the relatively well payed financial services sector should bias the

[5] Statistics Estonia, online-database

Table 9. Proportion of employed individuals with missing wage by year (left panel) and by industry (right panel).

Year	Estonian	Minority
1989	0,029	0,028
1992	0,053	0,036
1993	0,053	0,036
1994	0,045	0,026
1995	0,044	0,031
1996	0,038	0,026
1997	0,152	0,083
1998	0,197	0,119
1999	0,240	0,137
2000	0,310	0,199
2001	0,296	0,124
2002	0,325	0,150
2003	0,371	0,189
2004	0,347	0,215
2005	0,320	0,230

Industry	
agriculture	0,29
fishing	0,23
mining	0,06
manufacturing	0,12
electricity	0,08
construction	0,19
trade	0,25
hotelrest	0,20
logistics	0,18
financial	0,26
business	0,22
publadm	0,12
education	0,08
health	0,18

wage gap downward, however, the employment in the financial sector is not big.

The only study, devoted to the tax-evasion in Estonia, we are aware of, does not find any differences between the ethnic groups in the tax-evasion behaviour (Kriz et al., 2007).

In conclusion, although we are not able to explain the observed wage gap by misreporting, the problem seems to be of substantial size. Better data sources are needed for future analysis.

7. Discussion

What can we conclude from our analysis of the unexplained wage gap? We have excluded a number of explanations: selection effects, language skills, segregation, schooling choice based on different expectations, regional segregation, and migration. The most plausible remaining explanations are discrimination and human capital accumulation, related to schools and cultural background, and, to a certain extent, measurement errors.

What type of discrimination might be present in a former Soviet republic in Eastern Europe? Although our results are in concordance with Beckerian discrimination – lower pay for equal work – we do not believe this is a common situation in Estonian labour market. Other possible candidates are sorting (Blanchard and Diamond, 1994), entry barriers in the form of e.g. screening discrimination (Cornell and Welch, 1996), or segregated social networks (Seidel et al., 2000; Calvo-Armengol and Jackson, 2004) combined with establishment-level segregation as in Sattinger (1996). Unfortunately, we cannot test this on our datasets. However, our interviews suggested that there may be a certain unwillingness from both sides to accept a worker of different ethnic background to a ethnically homogenous environment. The problem is more important important for white-collar jobs.

Falling unexplained wage gap during the increasingly tight labour markets in 2004 and 2005 gives some support for sorting – preferences for Estonian-speaking workers if there is any choice, or screening discrimination. Both should lead to to counter-cyclical wage differential. However, our analysis does not reveal any distinct feature around the substantial economic downturn 1998-1999. Here, analysis of the job market mobility is needed.

Another possible mechanism behind the wage differentials is

social networks and job referrals (Montgomery, 1991; Kugler, 2003). There is a lot of anecdotal evidence that the social networks of the ethnic groups are largely separated. Such a separation may be related to prejudices and mutual mistrust, being both the reason and result of segregation. Some indirect support for the entry barriers is also coming from one of our interviewee: She noticed that Russian-speaking workers often invite their relatives to work in the same plant. It never happens to Estonian-speaking workers. A much more thorough analysis of the ethnical networks is needed here.

What type of unmeasured human capital might be related to the wage gap? The general ability seems not a plausible explanation, although one cannot completely exclude selective migration. It would be interesting to include formal test scores, such as AFQT, to our analysis. Unfortunately, such tests are not regularily conducted in Estonia. More plausible explanations are language skills and cultural background. Although our analysis suggest a moderate role of language skills, it would be interesting to know what is the expected level of "fluency" in for Estonian-speaking individuals. Another relevant point here is the degree of exogeneity of the language skills. As language fluency needs practice, one needs either mixed social networks or workplaces, in order to achieve the fluency.

What does our analysis tell us for the other labour markets?

The current results support the idea of a distinct relationship between political and economic roles of the ethnic groups. The group which is leading in the political arena, seems to achieve economic advantages too – at least in the case where ethnicity is an issue. In the light of analogous results from Kosovo (Bhumaik et al., 2006) and Ukraine (Constant et al., 2006), the role of political leadership seems even more plausible.

We argue that a possible mechanism behind the unexplained wage gap is network segregation. Here more research is needed. Segregated networks may play a much wide role and be related to both immigrants' labour market outcomes in Europe or black-white wage gap in the US. Unfortunately, network discrimination literature is still much less developed than that of the wage differentials.

8. Conclusions

We analyse the unexplained wage gap between Estonian-speaking and minority groups in the Estonian labour market during the transition period 1989–2005. We use Estonian Labour Force Survey data and restrict the sample on males only. We decompose the mean wage differential using Oaxaca (1973) type of technique.

We document a rise of a substantial unexplained wage gap between Estonian- and Russian speaking males. Wherease there were virtually no unexplained differential in early 1990s, the gap increased thereafter and reached the size of around 10-15% of the mean wage in favour of Estonian-speaking workers. The gap is mainly related to different wage premium for jobs in the capital region, and to different returns to education. We show that the unexplained difference is even bigger in the largest regional labour market – the capital city, and there is no substantial difference between the size of the gap for young and old workers.

We analyse a number of possible explanations and exclude selection effects, language skills, segregation, schooling choice based on different expectations, regional effects, and migration, as the main reasons for the unexplained gap. The two most important candidates, we consider most plausible for explaining the differential, are entry barriers combined with low-level segregation, and explanations, related to the segregated social networks.

References

Allanson, P., Atkins, J. P., Hinks, T., 2002. No end to the racial wage hierarchy in South Africa? Review of Development Economics 6 (3), 442–459.

Altonji, J. G., 1995. The effects of high school curriculum on education and labor market outcomes. Journal of Human Resources 30 (3), 409–438.

Altonji, J. G., Blank, R. M., 1999. Race and gender in the labor market. In: adn David Card, O. A. (Ed.), Handbook of Labor Economics. Vol. 3C. Elsevier Science Publishers B.V., Ch. 48, pp. 3143–3259.

Arias, O., Yamada, G., Tejerina, L., 2004. Education, family background and racial earnings inequality in brazil. International Journal of Manpower 25 (3-4), 355–374.

Bertrand, M., Mullainathan, S., 2004. Are emily and greg more employable than lakisha and jamal? a field experiment on labor market discrimination. American Economic Review 94 (4), 991.

Bhumaik, S. K., Gang, I. N., Yun, M.-S., 2006. Ethnic conflict and economic disparity: Serbians and albanians in kosovo. Journal of Comparative Economics 34, 754–773.

Black, D., Haviland, A., Sanders, S., Taylor, L., 5 2006. Why do minority men earn less? a study of wage differentials among the highly education. Review of Economic Studies 88 (2), 300–313.

Blanchard, O. J., Diamond, P., 7 1994. Ranking, unemployment, and wages. Review of Economic Studies 61 (3), 417–434.

Borjas, G. J., Freeman, R. B., Katz, L. F., 5 1996. Searching for the effect of immigration on the labor market. American Economic Review 86 (2), 246–251.

Bound, J., Freeman, R. B., 2 1992. What went wrong? the erosion of relative earnings and employment among young black men in the 1980s. Quarterly Journal of Economics 107 (1), 201–232.

Calvo-Armengol, A., Jackson, M. O., 2004. The effects of social networks on employment and inequality. American Economic Review 94 (3), 426–454.

Clark, K., Drinkwater, S., 7 2005. Dynamics and diversity: Ethnic employment differences in England and Wales, 1991-2001. Discussion Paper 1698, IZA, P.O.Box 7240, 53072 Bonn, Germany.

Constant, A., Kahanec, M., Zimmermann, K., 9 2006. The russian-ukrainian earnings divide. Discussion Paper 2330, IZA, P.O.Box 7240, 53072 Bonn, Germany.

Cornell, B., Welch, I., 6 1996. Culture, information and screening discrimination. Journal of Political Economy 104 (3), 542–571.

Dolton, P. J., Vignoles, A., 2002. The return on post-compulsory school mathematics study. Economica 69, 113–141.

Dustmann, C., Fabbri, F., 2003. Language proficiency and labour market performance of immigrants in the UK. Economic Journal 113 (489), 695–717.

Giddings, L., 2002. Has the shift toward markets hurt ethnic minorities? changes in ethnic earnings differentials in bulgaria's early transition. International Journal of Manpower 23 (1), 9–31.

Helemäe, J., Saar, E., Vöörmann, R., 2000. Kas haridusse tasus investeerida. Teaduste Akadeemia Kirjastus, Tallinn, Estonia, Ch. 7, pp. 143–187.

Johnes, G., 2005. 'don't know much about history...': Revisiting the implact of curriculum on subsequent labour market outcomes. Bulletin of Economic Research 57 (3), 249–271.

Jurajda, S., 2003. Gender wage gap and segregation in enterprises and the public sector in late transition countries. Journal of Comparative Economics 31 (2), 199–222.

Korts, K., Kõuts, R., 2002. Inter-ethnic communication in Estonian media (in estonian). In: Valk (2002), pp. 234–245.

Kriz, K. A., Meriküll, J., Paulus, A., Staehr, K., 2007. Why do individuals evade payroll and income taxation in Estonia? Working Paper 49, University of Tartu, Faculty of Economics, Tartu University, Narva 4, Tartu 51009, Estonia.

Kroncke, C., Smith, K., 1999. The wage effects of ethnicity in estonia. Economics of Transition 7 (1), 179–199.

Kugler, A. D., 2003. Employee referrals and efficiency wages. Labour Economics 10, 531–556.

Leibbrandt, M., Levinsohn, J., McCray, J., 5 2005. Incomes in South Africa since the fall of apartheid. Working Paper 11384, NBER, 1050 Massachusetts Avenue, Cambridge, MA 02138, USA.

Montgomery, J. D., December 1991. Social networks and labour-market outcomes: Toward and economic analysis. American Economic Review 81 (5), 1408–1418.

Noorkôiv, R., Orazem, P. F., Puur, A., Vodopivec, M., 1998. Employment and wage dynamics in estonia, 1989-95. Economics of Transition 6 (2), 481–503.

Oaxaca, R., 10 1973. Male-female wage differentials in urban labor markets. International Economic Review 14 (3), 693–709.

Orazem, P. F., Vodopivec, M., 2000. Male-female differences in labor market outcomes during the early transition to market: The cases of Estonia and Slovenia. Journal of Population Economics 13, 283–303.

Pettai, I., 2002. Mutual tolerance of Estonians and non-Estonians (in Estonian). In: Valk (2002), pp. 213–233.

Ponarin, E., 12 2000. The prospects of assimilation of the russophone populations in Estonia and Ukraine: A reaction to David Laitin's research. Aurope-Asia Studies 52 (8), 1535–1541.

Riach, P. A., Rich, J., 11 2002. Field experiments of discrimination in the market place. Economic Journal 112, F480–F518.

Sattinger, M., 1996. Search and discrimination. Labour Economics 3, 143–167.

Seidel, M.-D. L., Polzer, J. T., Stewart, K. J., 3 2000. Friends in high places: The effects of social networks on discrimination in salary negotiations. Administrative Science Quarterly 45 (1), 1–24.

Valk, A. (Ed.), 2002. Estonia and Estonians in a comparative perspective (in Estonian). Tartu University Press, Tiigi 78, Tartu 50410, Estonia.

Vihalemm, T., 2002. The role of Estonian language in inter-ethnic communication (in Estonian). In: Valk (2002), pp. 246–261.

SISUKOKKUVÕTE

Etnilised grupid üleminekuajal: Põhjendamata palgavahe Eestis 1989-2005

Käesolev analüüs käsitleb etniliste gruppide vahelist põhjendamata palgavahet Eestis ajavahemikus 1989-2005. Me kasutame Eesti tööjõu-uuringute põhjal tehtud tööealiste meeste andmeid ning dekomponeerime palgavahe Oaxaca (1973) tüüpi metodoloogia alusel.

Analüüs näitab, et põhjendamata palgavahe etniliste gruppide vahel tekkis Eestis 1990te alguses. Umbes 10 aastat hiljem oli vahe suurenenud ligikaudu 10-15%-ni palgast eestikeelsete töötajate kasuks. Aastatel 2004-2005 on vahe hakanud vähenema. Kõige olulisemad palgavahet põhjustavad tegurid on eestikeelsete töötajate suurem palgavõit Harjumaal töötamisest võrreldes venekeelsetega, ning eestikeelsete töötajate suurem kasu kõrgharidusest. Me näitame, et sissetulekuerinevus Harjumaal – Eesti suurimal geograafiliselt eraldiseisval tööturul – on märgatavalt suurem kui riigis keskmiselt. Me näitame ka, et vanemate ja nooremate töötajate puhul on põhjendamata palgavahe ligikaudu samasugune.

Me näitame antud töös, et hulk võimalikke põhjusi ei suuda nii suurt palgavahet seletada. Siia hulka kuuluvad selektsioon, keeleoskus, segregatsioon, haridustee valik, geograafilised effektid ja migratsioon. Kaks kõige tõenäolisemat tegurit näivad olevat sisenemisbarjäärid koos ettevõtte tasandil segregatsiooniga, ning eraldatud sotsiaalsed võrgustikud.

1. Interviews

We interviewed a few people in order to get some qualitative information about the perspectives of the ethnical groups in the Estonian labour market. The interviewees were

1. female, 29 years old, working with human ressource management, capital region, Estonian-speaking
2. male, 26 years old, working with IT, capital region, Estonian-speaking
3. male, 28 years old, working with IT, Southern Estonia, Estonian-speaking
4. male, 26 years old, marketing research, captial region, Estonian-speaking
5. female, 28 years old, social worker, capital region, Russian speaking.

The questions we asked were concentrated on the number, role, ways of acquiring employment, and performance of the workers of different ethnic groups. The more precise points of interest were related to whether there are any Beckerian discrimination present, what is the relationship between the workers of different ethnical origin, whether there are many Russian-speaking applicants in these firms, and whether the respondents believe the Russian-speaking workers earn less in their establishment.

All the respondents believed the skills of Estonian language matter most in terms of job access and salary. None of them confirmed any discrimination present in their establishment in terms of salaries, however, there was some indication of unwillingness to work together with people of different ethnic background. The Russian-speaking respondent stressed the language-based discrimination.

2. List of variables

Here we list and describe all the explanatory variables, used in the analysis. The more in-depth discussion of the most crucial variables is given in the section 6.

Table 10. Explanatory variables, used for the ELFS data.

variable	description
	Education and family
less than HS	less than high school degree
high school	high school degree, some college
college degree	college degree
married	married or co-habiting
	Age groups
	20-24, *25-34*, *35-49*, *50-60*
	Region
	KaguEesti, *IdaViru*, *Harju*
	Language
langEE1	understanding, speaking and writing skills (only for Russian-speaking workers)
langEE2	understanding and speaking
langEE3	understanding
langEE Home	uses Estonian at home
langENG	understanding and speaking skills (both Estonian- and Russian speaking workers)
	Other individual characteristics
immigrant	moved to Estonia at age 8 or later
partime	working less than 35 hours a week
	Industry
agriculture (reference group), *fishing*, *mining*, *manufacturing*, *electricity*, *construction*, *trade*, *hotelrest*, *logistics*, *financial*, *business*, *publadm*, *education*, *health*	
	Occupation
manager, *professional*, *technican*, *clerk*, *serviceworker*, *skillagri*, *craft*, *operator*, *elementary* (reference group), *publsect*	

Table 11. Explanatory variables used for PG data.

variable	description
	Education and family
high school	reference group
some college	up to 3 years college
college degree	at least 5 years college
g8Math	math score in 8th grade (3, 4, 5)
father edu	father's education (less than HS, HS, college)
married	married or cohabiting
kids	children in the household
siblings	grown up with siblings in the household
	Age control
birthYear	year of birth
	Region
	KaguEesti, *IdaViru*, *Harju*
	Language
langEE1	good knowledge of Estonian
langEN1	English
	Other individual characteristics
ill	working disturbed by bad health
immigrant	born outside Estonia
	Industry
agriculture and fishing (reference group), *mining*, *manufacturing*, *electricity*, *construction*, *trade*, *hotelrest*, *logistics*, *financial*, *business*, *publadm*, *education*, *health*	
	Occupation
manager, *professional*, *technican*, *clerk*, *serviceworker*, *skillagri*, *craft*, *operator*, *elementary* (reference group), *publsect*	

3. Variable averages

Table 12. Means of selected variables. ELFS data

	1989	1994	1999	2001	2003	2005
Education and family						
less than HS E	0.23	0.18	0.29	0.27	0.25	0.24
less than HS R	0.18	0.13	0.19	0.17	0.18	0.20
high school E	0.61	0.65	0.56	0.59	0.60	0.61
high school R	0.67	0.71	0.68	0.71	0.70	0.65
college degree E	0.16	0.17	0.15	0.14	0.14	0.15
college degree R	0.15	0.16	0.13	0.12	0.12	0.16
married E	0.78	0.75	0.75	0.73	0.70	0.72
married R	0.80	0.78	0.80	0.77	0.80	0.77
Age groups						
age2024 E	0.10	0.14	0.11	0.10	0.12	0.12
age2024 R	0.09	0.10	0.10	0.12	0.11	0.10
age2534 E	0.29	0.27	0.27	0.27	0.26	0.24
age2534 R	0.30	0.25	0.25	0.26	0.24	0.24
age3549 E	0.39	0.38	0.40	0.39	0.41	0.42
age3549 R	0.40	0.45	0.47	0.41	0.42	0.41
age5060 E	0.21	0.22	0.22	0.24	0.22	0.22
age5060 R	0.20	0.20	0.18	0.20	0.24	0.24
Region						
KaguEesti E	0.11	0.09	0.14	0.13	0.12	0.13
KaguEesti R	0.03	0.02	0.03	0.02	0.03	0.03
IdaViru E	0.05	0.04	0.03	0.04	0.04	0.02
IdaViru R	0.32	0.33	0.38	0.43	0.43	0.36
Harju E	0.30	0.34	0.23	0.23	0.23	0.27
Harju R	0.49	0.51	0.36	0.38	0.36	0.43
Language						
langEE1 R	0.07	0.08	0.11	0.11	0.11	0.16
langEE2 R	0.11	0.11	0.15	0.13	0.15	0.16
langEE3 R	0.16	0.17	0.16	0.16	0.21	0.24

Table 12 – continues. . .

Table 12 – continued

	1989	1994	1999	2001	2003	2005
langEE Home R	0.10	0.09	0.13	0.10	0.10	0.09
langENG E	0.22	0.28	0.30	0.37	0.41	0.45
langENG R	0.10	0.13	0.14	0.19	0.16	0.24
Other individual characteristics						
immigrant R	0.57	0.49	0.38	0.36	0.32	0.27
partime E	0.02	0.05	0.05	0.05	0.05	0.05
partime R	0.02	0.04	0.06	0.03	0.02	0.01
Industry						
agriculture E	0.32	0.19	0.13	0.12	0.07	0.10
agriculture R	0.05	0.04	0.04	0.02	0.01	0.02
fishing E	0.04	0.02	0.01	0.01	0.00	0.01
fishing R	0.06	0.05	0.01	0.00	0.00	0.01
mining E	0.01	0.01	0.01	0.01	0.01	0.01
mining R	0.05	0.05	0.07	0.05	0.06	0.05
manufacturing E	0.19	0.18	0.24	0.24	0.32	0.27
manufacturing R	0.37	0.26	0.29	0.37	0.32	0.31
electricity E	0.02	0.04	0.03	0.02	0.02	0.02
electricity R	0.04	0.06	0.07	0.09	0.08	0.06
construction E	0.14	0.13	0.12	0.13	0.10	0.15
construction R	0.13	0.12	0.12	0.10	0.15	0.16
trade E	0.04	0.12	0.11	0.12	0.12	0.10
trade R	0.03	0.10	0.08	0.06	0.08	0.06
hotelrest E	0.01	0.02	0.01	0.01	0.01	0.01
hotelrest R	0.01	0.01	0.01	0.00	0.01	0.01
logistics E	0.09	0.09	0.10	0.10	0.09	0.09
logistics R	0.15	0.19	0.18	0.15	0.12	0.18
financial E	0.00	0.01	0.01	0.01	0.01	0.00
financial R	0.00	0.01	0.00	0.00	0.00	0.00
business E	0.04	0.05	0.05	0.05	0.05	0.06
business R	0.03	0.05	0.04	0.06	0.07	0.06
publadm E	0.04	0.06	0.08	0.10	0.10	0.09
publadm R	0.04	0.04	0.03	0.04	0.04	0.04
education E	0.04	0.04	0.04	0.04	0.04	0.04

Table 12 – continues. . .

Table 12 – continued

	1989	1994	1999	2001	2003	2005
education R	0.01	0.02	0.03	0.02	0.02	0.01
health E	0.03	0.04	0.04	0.03	0.03	0.03
health R	0.02	0.02	0.02	0.01	0.02	0.02
			Occupation			
manager E	0.14	0.18	0.14	0.14	0.12	0.13
manager R	0.12	0.11	0.09	0.06	0.06	0.08
professional E	0.10	0.08	0.08	0.08	0.10	0.08
professional R	0.07	0.06	0.04	0.04	0.05	0.05
technican E	0.05	0.07	0.08	0.08	0.08	0.07
technican R	0.04	0.06	0.06	0.05	0.04	0.05
clerk E	0.01	0.01	0.02	0.02	0.03	0.03
clerk R	0.01	0.02	0.02	0.03	0.03	0.04
serviceworker E	0.02	0.05	0.05	0.05	0.07	0.05
serviceworker R	0.03	0.04	0.03	0.04	0.07	0.04
skillagri E	0.04	0.06	0.03	0.02	0.02	0.02
skillagri R	0.02	0.01	0.01	0.01	0.01	0.01
craft E	0.28	0.24	0.25	0.25	0.24	0.25
craft R	0.42	0.39	0.39	0.40	0.40	0.37
operator E	0.33	0.24	0.26	0.24	0.24	0.26
operator R	0.25	0.24	0.25	0.25	0.26	0.27
elementary E	0.04	0.05	0.09	0.12	0.12	0.11
elementary R	0.04	0.07	0.11	0.11	0.10	0.09
publsect E	0.93	0.47	0.25	0.25	0.21	0.19
publsect R	0.94	0.64	0.31	0.28	0.18	0.17

Notes: E stands for Estonians, R for Russians.

4. Results based on PG data

Table 13. Unexplained wage gap for estimated models, PG data

	Models					
	1	2	3	4	5	6
1987	0.142*	0.113*	0.096	0.184*	0.178*	0.117
	0.052	*0.058*	*0.076*	*0.083*	*0.086*	*0.091*
1992	0.172	0.128	0.140	0.055	0.053	-0.113
	0.103	*0.113*	*0.146*	*0.173*	*0.176*	*0.189*
1997	-0.170*	-0.186*	-0.167	-0.313*	-0.405*	-0.457*
	0.081	*0.086*	*0.101*	*0.141*	*0.150*	*0.173*
	Controls					
constant	√	√	√	√	√	√
age		√	√	√	√	√
education		√	√	√	√	√
family			√	√	√	√
immigrant			√	√	√	√
region				√	√	√
language					√	√
industry						√
occupation						√

5. Coefficients

Here we list all the coefficients for the full model (model 5) for selected years.

Table 14. Estimation results (model 5).

	1989	1993	1996	1998	1999
E age2534	0.033	-0.120◇∘	0.038	-0.066♦	0.008
R age2534	0.151	0.145	0.056	0.000	0.030
E age3549	0.033	-0.112◇∘	-0.138 •	-0.108♦•	-0.075◇∘
R age3549	0.056	0.101	0.281♦	0.028	0.077
E age5060	0.019	-0.171♦•	-0.130	-0.173♦∘	-0.167♦∘
R age5060	0.005	0.143	0.043	-0.056	-0.001
E college degree	-0.026	0.363♦	0.464♦•	0.568♦•	0.598♦•
R college degree	-0.075	0.218◇	0.108	0.365♦	0.333♦
E high school	0.048	0.135♦	0.098◇	0.178♦	0.199♦
R high school	-0.085	0.143◇	-0.048	0.178♦	0.200♦
E married	0.153♦	0.121♦	0.164♦	0.183♦	0.176♦
R married	0.119◇	0.110	0.258♦	0.198♦	0.130♦
E parttime	-0.519♦	-0.672♦	-0.679♦	-0.649♦•	-0.685♦•
R parttime	-0.302	-0.591♦	-0.413♦	-0.047	-0.190♦
E KaguEesti	-0.047	-0.186♦	-0.186♦	-0.089♦	-0.063◇
R KaguEesti	-0.051	-0.513♦	-0.213	-0.071	-0.060
E IdaViru	-0.218♦	0.146	0.034	0.125♦	0.103
R IdaViru	-0.167◇	-0.053	0.013	0.061	0.078
E Harju	0.108♦	0.448♦∘	0.484♦•	0.333♦•	0.374♦•
R Harju	-0.016	0.248♦	0.036	0.181♦	0.174♦
E langENG	0.028	0.186♦	0.105◇	0.160♦	0.153♦
R langENG	0.179◇	0.127	0.238◇	0.165♦	0.144♦
R langEE1	0.030	-0.074	0.052	-0.017	0.034
R langEE2	-0.062	-0.034	0.042	0.094◇	0.154♦
R langEE3	0.010	-0.002	0.136	-0.014	0.105◇
R immigrant	-0.058	-0.122	-0.119	0.038	0.055

Table 14 – continues. . .

Table 14 – continued

	1989	1993	1996	1998	1999
R langEE home	-0.020	-0.058	-0.058	0.013	0.060
E intercept	5.603♦	6.581♦	7.437♦	7.515♦•	7.516♦°
R intercept	5.781♦	6.562♦	7.350♦	7.338♦	7.350♦

Notes: ◇, ♦ – coefficients significant at 5% and 1% level; °, • – coefficients' difference between the ethnic groups significant at 5% and 1% level.

Table 15. Estimation results (model 5).

	2000	2002	2003	2004	2005
E age2534	0.138♦	0.020	0.040	0.104◇	0.135♦
R age2534	0.008	0.068	0.079	0.129	0.034
E age3549	0.063	-0.062	0.008	0.014	0.078◇
R age3549	0.073	0.084	0.097	0.081	0.059
E age5060	-0.052	-0.120◇	-0.094◇	-0.094◇	-0.066
R age5060	-0.022	0.023	0.071	0.040	-0.050
E college degree	0.545♦°	0.582♦	0.454♦•	0.418♦	0.470♦•
R college degree	0.344♦	0.451♦	0.240♦	0.319♦	0.259♦
E high school	0.187♦	0.187♦	0.098♦	0.118♦	0.135♦
R high school	0.203♦	0.115◇	0.051	0.086	0.081
E married	0.124♦	0.210♦	0.163♦	0.231♦	0.161♦
R married	0.073	0.131◇	0.189♦	0.239♦	0.118♦
E parttime	-0.908♦°	-0.744♦°	-0.914♦	-0.754♦	-0.824♦
R parttime	-0.656♦	-1.022♦	-1.142♦	-0.586♦	-0.916♦
E KaguEesti	-0.009	-0.085◇	-0.092◇	-0.135♦	-0.116♦
R KaguEesti	-0.007	-0.183	-0.160	-0.035	-0.240♦
E IdaViru	0.106	-0.024	0.097 •	0.125 •	-0.051
R IdaViru	0.022	-0.126◇	-0.148♦	-0.118◇	-0.163♦
E Harju	0.357♦•	0.334♦•	0.277♦•	0.237♦•	0.216♦•
R Harju	0.099	0.041	0.035	0.058	0.038

Table 15 – continues. . .

Table 15 – continued

	2000	2002	2003	2004	2005
E langENG	0.183♦	0.162♦	0.205♦∘	0.175♦	0.171♦
R langENG	0.101	0.192♦	0.089	0.100	0.137♦
R langEE1	0.010	0.053	-0.001	0.053	0.019
R langEE2	-0.012	-0.074	-0.063	0.038	0.056
R langEE3	0.177♦	-0.044	-0.032	0.093	0.060
R immigrant	-0.001	0.037	0.011	0.064	0.064
R langEE home	0.048	-0.042	-0.098◊	0.037	0.052
E intercept	7.552♦	7.799♦	7.972♦	8.017♦	8.157♦
R intercept	7.587♦	7.862♦	7.986♦	7.938♦	8.283♦

Notes: ◊, ♦ – coefficients significant at 5% and 1% level; ∘, • – coefficients' difference between the ethnic groups significant at 5% and 1% level.