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ETHNIC WAGE GAP AND POLITICAL BREAK-UPS: ESTONIA DURING POLITICAL AND ECONOMIC TRANSITION

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ETHNIC WAGE GAP AND POLITICAL BREAK-UPS: ESTONIA DURING POLITICAL AND ECONOMIC TRANSITION[*]

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Abstract

We analyse the ethnic wage gap in Estonia, a former Soviet republic and current EU member, which hosts a substantial Russian-speaking minority. The analysis covers a lengthy period from the final years of the Soviet Union until the first years of EU membership. We document the rise of a substantial wage gap among 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 include different ethnicity-specific returns to education and working in the capital city. The gap for young and established workers is of equal size.

We argue that the most plausible explanations are establishment-level segregation, possibly related to sorting and screening dis-

crimination. Unobserved human capital, related to the segregated school system, may also play a certain role.

1. Introduction

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

However, even if we control for all the relevant information we have, minorities are still paid considerably less in many cases. The examples include blacks and middle-east 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 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 (recent

results controlling for test scores point in 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 as instruments. These analyses should be supplemented with evidence from countries that have experienced major structural changes, completely altering the roles of ethnic groups. Examples include the collapse of the former Soviet Union (where the Russian-speaking population became 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 in ethnic groups serve as a natural experiment, allowing us to shed some new light on the association between status and wages in such ethnic groups.

The little existing evidence from former communist countries suggests that the unexplained wage gap is indeed related to problems with ethnic relations. The countries with a problematic record of ethnic 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 the Ukraine, where ethnicity has not been an issue, the Russian-speaking minority enjoys a small wage advantage (Constant et al., 2006). However, this is not a universal outcome of a shift in power between ethnic groups. The evidence from South-Africa (Allanson et al., 2002; Leibbrandt et al., 2005) suggests the opposite – the first post-

apartheid decade is associated with an increasing white-black wage gap.

The current paper complements this literature. We look at ethnic wage differences in Estonia, a former Soviet republic and current member of the EU. The case of Estonia is particularly interesting because it hosts a considerable Russian-speaking minority (around 30% of population), whoe situation changed completely after the collapse of the Soviet Union. Unlike most previous studies, we look at the development of the wage differential during the whole transition period from the 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 Estonian-speaking men around 1994. Later, the gap slightly increased until to around 20% in 2003. Most of the gap is related to three components: ethno-specific differences in intercept, and differences in wage premiums on the basis of working in the capital and education. The gap is roughly equal for the younger (born 1975 and later) and for the older men (born before 1960). These results point toward discrimination and entry barriers for the Russian-speaking minority in the Estonian labour market, although explanations, related to education- and unobserved characteristics cannot be completely excluded.

The rest of the paper is structured as follows: in the next section we will describe Estonian institutions before- and after transition to a market economy, and provide some background to the roles of ethnic groups. Section 3 is devoted to a 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 discrimina-

tion, differences in school quality, and segregation. The last two sections are devoted to discussions and a brief conclusion.

2.   Background: Estonia since World War II

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

During the last years of the Soviet era, private enterprises were already allowed in the form of "cooperatives", and a 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 had essentially been completed with the government still controlling infrastructure-related firms (such as power plants, railways and telecoms). In 1995, Estonia experienced the first year of economic growth after a 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, income inequality rose as well.

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

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

The large inflow of workers, and the policy of the central government led to the increasing importance of the Russian language in Estonia. Since the 1970s, the country had two *de facto* official languages. Certain areas in the economic and public sphere, such as 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 was used in less and less fields, the language was not directly endangered. Most of the curriculum at Tartu University was available in Estonian, and there were Estonian newspapers and magazines, Estonian radio programs and a TV channel, and a large number of books 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 an unwillingness to participate in mainstream Soviet society. Estonians never felt part of the larger Soviet nation and distinguished clearly between their own, "Estonians" and others, "Russians". Hence, at the basic level, these language groupings managed to co-exist in a fairly segregated country.

The tide turned during the last years of *perestroika*. The Estonian-speaking population became organized relatively quickly and grasped the opportunity to fight for environment protection, larger autonomy, and ultimately for independence. The Russian-speaking minority was slower and less efficient in defending their interests. The country re-gained it's independence on 20 August 1991, during the August Coup in the USSR.

The country continued to practice a segregated school system. However, now the political interest in teaching Estonian to Russian-speaking children skyrocketed while Estonian schools could opt out of teaching Russian altogether. In this way, knowledge of Estonian among the Russian-speaking population has vastly improved while the younger Estonian 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 interethnic 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 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 as far as 1987 and to check the results on an independent data set.

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

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

Path of a Generation (PG) is a panel study of high school graduates from 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 current wage information. The 1987 wave has issues with sample selection. The respondents are around 22 years old, and hence most of those who went to college do not yet have a regular job. Income for that year is based on individuals without a completed college degree.

We also conducted some interviews in order to obtain qualitative information about 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 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 to males in order to avoid complications, related to modelling 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 us to control for 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 Appendix B.

Information on ethnicity is based on a question about the respondents' *ethnic nationality*, present in all the waves of the ELFS and PG. In most cases, this means which ethnic group the individuals identify themselves with. Usually, the identification is language based, but it may differ in certain circumstances; for example 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".

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 paid 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 the previ-
ous January, October and current January is reported. The survey
was conducted quarterly since 2000, and the "last net salary of
the main job" is reported. The switch from gross to net income
lessens the income gap in absolute value as the Estonian tax sys-
tem is slightly progressive[1]. We expect the possible bias from
these structural breaks not to be of major concern as they sup-
posedly affect the data in the same way for both Estonian- and
Russian-speaking individuals.

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

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

PG allows us to use a more accurate control for family- and indi-
vidual human capital, including math grades at the end of primary
school. Unfortunately, the grades are not calibrated at the national
level and hence it is rather a measure of relative performance at

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[1]Estonia introduced a flat tax rate of 26% in early 1990s. The rate has later
been lowered to 24% and further to 23%. However, due to tax exemption (which
has been increased several times), the tax system is still slightly progressive.
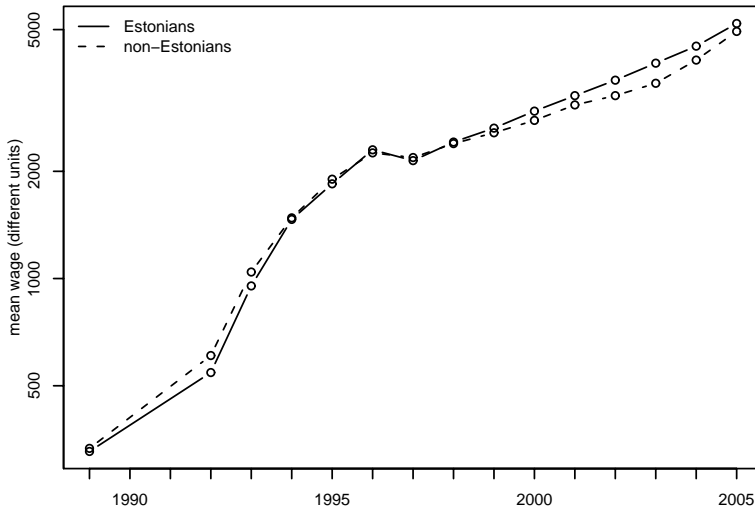
Figure 1. Mean wage across ethnic groups. ELFS data. 1989 wage is measured in Soviet roubles, later Estonian kroons. Gross wage until 1996, net wag esince 1997.

the corresponding school. We also control for fathers' education and the exposition at Estonian and Russian languages at work.

3.3. Descriptive statistics

Sample averages, based on ELFS data, reveal that the mean wage for 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.

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.

Averages of the selected explanatory variables are presented in Table 1. The full table can be seen in the Appendix (Table 12).

These tables reveal several interesting facts. The age distribution 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 at speaking English, the trend is clearly upwards for both ethnic groups. Knowledge of Estonian is also improving among the Russian-speaking population, although at a slower pace than that of English. Around 10% of the non-Estonians speak Estonian at home, here no trend is visible. The regional variables depict a well-known pattern – there are virtually no Russian-speaking people in the south-eastern part of the country, while the opposite is true for industrial nort-east. The capital Tallinn contains roughly 25% of the Estonian-speaking and slightly above a third of the Russian-speaking work-force. Russian-speaking males are over-represented in mining, manufacturing, energy and logistics sectors. Estonians dominate in agriculture, trade, public administration (since mid 1990s) and education. There are 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 using a similar method to Oaxaca (1973). We ignore selection into wage employment (look at the discussion in Section 3.2).

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 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 using 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:

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

The first component, Δ_X, captures the wage differences caused by differences in common individual characteristics, such as age or education; Δ_Z are the differences caused by explanatory variables not present for the other group and Δ_β are differences, caused by different valuations of common skills. The standard errors for the components can be calculated using the delta method. In this study we use the minority-specific explanatory variables $\bar{\boldsymbol{X}}^R$ for reference. This specification answers 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 the early period of transition, around 1990. This development seems to reverse in 2003. This trend is similar for most of the period for all models; however, the initial development during the early 1990s differs. The difference between the models decreases over time, but remains visible until the end of the period of observation.

The Russian-speaking workers earned somewhat more on average in the early 1990s (Model 1). The initial advantage turned into a disadvantage 6–8 years later. Controlling for age and education (Model 2) makes the differential 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 years. This fact is mostly related to wage rates in the capital, Tallinn, where Estonian-speaking workers enjoy much higher wage premiums than Russian-speaking workers. However, the importance of regional controls is fading – in 2005 these explained only 1.7 percentage points of the differential. Part of the wage gap is explained by language skills (model 5), making the unexplained part by 2-4 percentage points less negative. The last set of controls we add – industry and occupation – shows the situation in a slightly paler light; however, the difference is tiny.

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

year			Models			
	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.
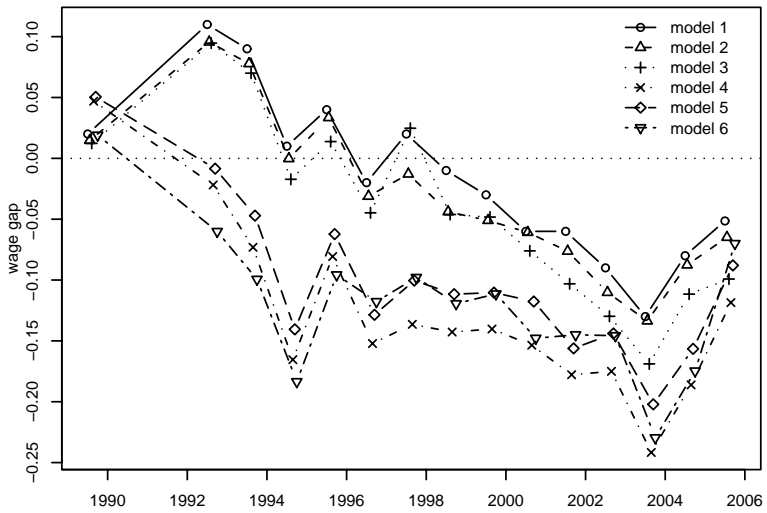*Standard errors in italics.*

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

We can conclude that Russian-speaking workers are apparently earning less, but not because they are employed in worse industries and located in worse regions, but rather the other way around. However, their gain from more favourable characteristics remains less than for the ethnic majority. The only significant disadvantage in the characteristics of the Russian-speaking population that we are able to identify from Figure 2, is their language skills.

The PG dataset basically confirms the main message (Table 13 in the Appendix). We see an unexplained wage advantage in favour of men in the minority in 1987. This advantage becomes insignificant in 1992 and negative in 1997. As the 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 incomes for these ethnic groups. The estimates are rather imprecise, though, because of the small sample size.

5.2.   What determines the differential?

In this subsection we will investigate which of the model coefficients determine the unexplained wage differentials. Here we present model 5 for selected years and selected variables (Table 3); the results for all variables are given in Appendix E (the other models were qualitatively similar).

The coefficients have in most cases an expected sign and size. The most important determinants of wages are education, marriage, part-time work, regional dummies and language skills. In 1989, most of the coefficients were small and insignificant. However, because of the rapid development in the early 1990s, the returns became close to the new stable values already in 1994. It

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.

is interesting to look at the returns for language skills[2]. While knowledge of English (*langENG*) has been related to at least 10% of the wage advantage through almost the entire observed period, we are unable to document any similar effect for the Estonian language (*langEE1–langEE3* and *langEE home*). Although most of the coefficients are positive, they are substantially smaller and only a 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 the 1% level. While Estonian-speaking workers can expect around 30% higher salaries in that area than in the rest of the country, the wage premium for minority workers is virtually non-existent. Another important variable is returns to university-level education – *college degree* – where the difference was significantly in favour of Estonian-speaking workers during the period 1995–2001. Different returns to education for different ethnic groups have been documented earlier by, for example, Arias et al. (2004) for Brazil, and Noorkôiv et al. (1998) for Estonia. Another regional dummy, *Ida-Viru*, has favoured Estonian-speaking workers in recent years. Surprisingly, the differences in the intercept are not significant in most cases.

6. Possible explanations of the wage difference

Discrimination   There is a lot of evidence of racial and ethnic discrimination in Europe (see Riach and Rich (2002) for a re-

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[2]We admit that we do not estimate *returns* in the narrow meaning of thins term. For instance, acquiring language skills may be related to unobserved ability and to occupation (and wage).

view). In Estonia, the relationship between ethnic Estonians and Russians has been somewhat tense, at least in some periods. The mainstream media has never expressed extreme opinions, though web-based forums and news-sites often reflect highly biased and negative images 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 are very few studies related to the question of discrimination in Estonia. According to Pettai (2002), 37% of the minorities find discrimination common (while only 6% of Estonian-speaking people find this to be the case). In general, relations between the ethnic groups have improved during the 1990s.

The results above are consistent with Beckerian discrimination but, as in other similar analyses, this cannot be proven. The interviews we have conducted do not support the idea of discrimination in the sense of lower pay for similar work (though this may be an issue in the case of negotiated salaries). One possible type of discrimination are entry barriers; in one of our interviews 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 estimations include only individuals who receive a positive salary. Could such selection process bias the estimates in favour of Estonian-speaking workers? In the Figure 3, we present the employment, unemployment and non-participation rates (as a proportion of the population) for the Estonian-speaking and minority population.

The figure is easy to interpret. Since the early 1990s, Estonian-speaking males have enjoyed a higher employment rate and lower unemployment rate than minority men. However, despite this less-favourable situation, the non-participation rate in the mi-
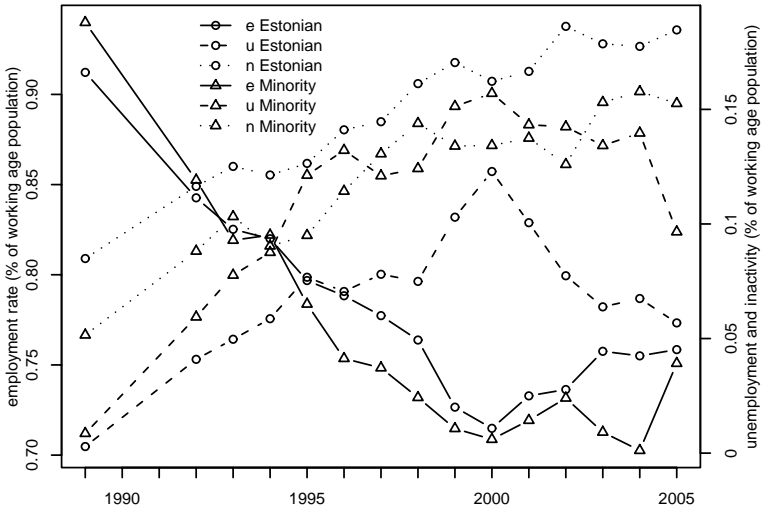
Figure 3. Employment (e), unemployment (u) and non-participation (n) rates (as a proportion of the working age population) for Estonian-speaking and minority workers.

nority population has been *smaller* than that among Estonian-speaking men. This does not support the idea that a less favourable selection of minorities in the group of wage earners exists. Assuming that 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 minority wage earners to be *more* favourably selected from the unobserved distribution of ability. Hence our estimate tends towards the lower boundary of the wage gap.

Unobserved skills A common perception in the Estonian-speaking community is that by far the most important determinant

of inter-ethnic communication is knowledge of the Estonian language (Vihalemm, 2002). Current results, where language skills determine only a minor part of the wage gap, are not in concordance with this view. There are two possible explanations: first, self-reported language skills are severely biased; and second, the level, that Estonian-speaking individuals consider "fluency in the language", is far above what the minority finds reasonable.

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

Unfortunately, there is no information about, what is considered "sufficient fluency". The use of Estonian may not automatically provide easier access to jobs. For example, Ponarin (2000) argues that using the titular language is in fact associated with *a loss of respect* for native speakers in Estonia.

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

First, we compare the average wage rate and the ethnic composition of the workforce by industries (Table 4). The table reveals that almost one third of Estonians were employed in 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

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

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 other, better paid industries (or to non-employment). This process has mostly contributed to the income of Estonian-speaking workers.

Next, we follow the methodology of Jurajda (2003), and 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 industries, we calculate the mi-

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

nority 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).

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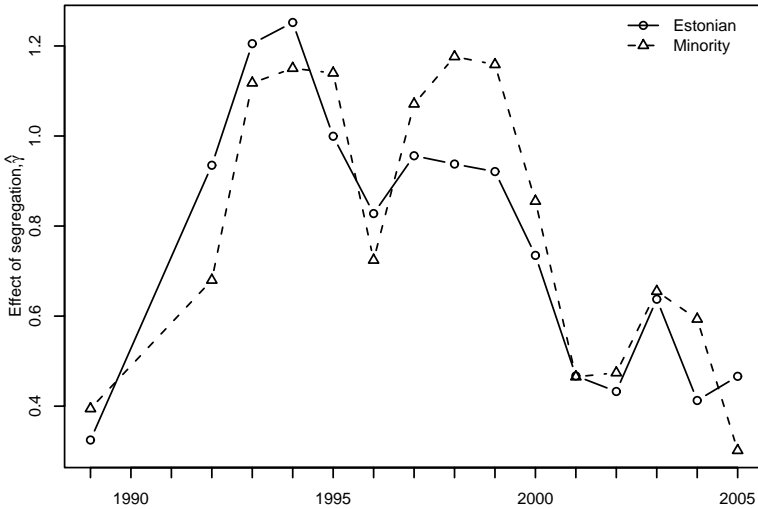
Figure 4. Effect of the minority percentage in industries on wages.

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

Obsolete skills   Could 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 for 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 this led, in general, to better education and occupations (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 the Soviet Union (Helemäe et al., 2000).

We perform a 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 society in the 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 requirements of the new economy while choosing their education and profession.

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

We can see that the younger generation is rather worse than better off. The younger Russian-speaking workers earn around 10% less than the Estonian-speaking workers, regardless of the model specification. The older minority workers have salaries, comparable to those of the majority on 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 in model 4. Surprisingly, the younger cohort does not have this disadvantageous effect for the capital county. However, in their case the different returns to family characteristics and immigrant status seem to play a certain role (the unexplained differential for model 3 is much more negative than for model 2).

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.

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

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

Most of the exam 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 slightly better, while in mathematics 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 high school performance and later labour market outcomes, indicates a negligible effect from individual subjects on the future earn-

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

ings with mathematics as a possible exception (Altonji, 1995;
Dolton and Vignoles, 2002)[4]. Whether these results are informa-
tive in this context – the effect of high school grades on later
earnings – is not quite clear. However, based on the favourable
outcomes for sciences and mathematics, we don't expect school
quality to be the main explanation for worse labour-market out-
comes among Russian-speaking men.

Regional effects: The capital county   In this subsection we
analyse whether the wage differential may be related to imper-
fect controls for region. We look at the residents of the capital
(Harju) county. Harju county essentially forms a single labour
market, where the most jobs by far are concentrated in Tallinn
and its suburbs.

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

The point estimates are rather more negative than for the full sam-
ple (Table 2). The absolute values of the estimates tend to de-
crease 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

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

Table 7. The average results of state exams according 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*
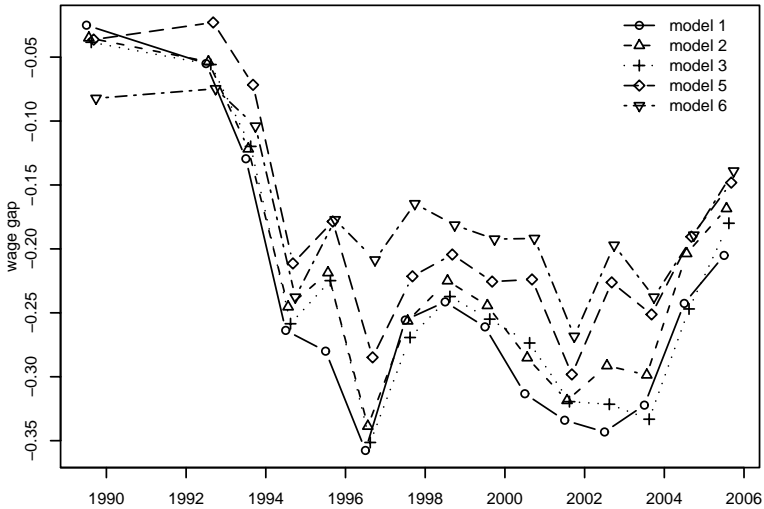
Figure 5. Unexplained wage differential in favour of ethnic Russians. Residents of Harju county.

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 was accompanied by substantial demographic changes. According to estimates, around 150 000 mainly Russian-speaking people left the country early during the transition period, resulting in a significant fall in the total population. The following years have seen even further fall of the population due to low birth rates and increasing emigration to the West. However, the relative proportion of the different ethnic groups have remained roughly stable.

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: Standard errors in italics. ∗ – statistically significant at 5% level.

Immigration to Estonia has been virtually zero since around 1990. According to the census in 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 temporary migration to significantly bias our results in the 1990s. However, those statistics do not include information on those who leave the country permanently. 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   Could 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 employed individuals in both ethnic groups without a reported wage (Table 9). The table reveals that such a mis-report was probably not an issue until the mid-1990s. However, since the late-1990s, up to 37% of Estonian-speaking workers do not report their wage while the figures for the minority remain below 20% in most cases. 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 paid financial services sector should bias the wage gap downward, however, employment in the financial sector is not large.

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

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[5]Statistics Estonia, online-database

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

Year	Estonian	Minority	Industry	
1989	0,029	0,028	agriculture	0,29
1992	0,053	0,036	fishing	0,23
1993	0,053	0,036	mining	0,06
1994	0,045	0,026	manufacturing	0,12
1995	0,044	0,031	electricity	0,08
1996	0,038	0,026	construction	0,19
1997	0,152	0,083	trade	0,25
1998	0,197	0,119	hotelrest	0,20
1999	0,240	0,137	logistics	0,18
2000	0,310	0,199	financial	0,26
2001	0,296	0,124	business	0,22
2002	0,325	0,150	publadm	0,12
2003	0,371	0,189	education	0,08
2004	0,347	0,215	health	0,18
2005	0,320	0,230		

In conclusion, although we are not able to explain the observed
wage gap as a result of misreporting, the problem seems to be of
substantial magnitude. 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 hu-
man capital accumulation, related to schools and cultural back-
ground, and, to a certain extent, measurement errors.

What type of discrimination might be present in a former So-
viet 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 situa-
tion in the Estonian labour market. Other possible candi-
dates are sorting (Blanchard and Diamond, 1994), entry bar-
riers; for example, in the form of screening discrimina-
tion (Cornell and Welch, 1996), or segregated social networks
(Seidel et al., 2000; Calvo-Armengol and Jackson, 2004) com-
bined 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 on
both sides to accept a worker of different ethnic background in an
ethnically homogenous environment. This problem is more im-
portant for white-collar jobs.

The increasing wage gap during the early 1990s fits well with the
fact that this was the time of building up the political and eco-
nomic institutions of the new country. These institutions hired

mostly Estonian-speaking workers (look at the falling minority share in public administration in Table 5). Our results suggest that the politically dominating Estonian-speaking group avoided recruitment of "the others" already during the early stages of the political reforms. This gap has persisted because of small number of contacts between the language groups.

This explanation is closely related to social networks and job referrals (Montgomery, 1991; Kugler, 2003). There is a lot of anecdotal evidence that 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 entry barriers also comes from one of our interviewees: She noticed that Russian-speaking workers often invite their relatives to work in the same plant. It never happens among Estonian-speaking workers. A much more thorough analysis of ethnic networks is necessary.

The falling unexplained wage gap during the increasingly tight labour markets of 2004 and 2005 provides some support for sorting – preferences for Estonian-speaking workers if there is any choice; and for screening discrimination. Both should lead to a 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 necessary.

What type of unmeasured human capital might be related to the wage gap? The general ability does not seem to be 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 regularly conducted in Estonia. More plausible explanations include language skills and cultural background. Although our analysis suggest that language skills play a moderate role, it would

be interesting to know what the expected level of "fluency" is
for Estonian-speaking individuals. Another relevant point here
is the degree of exogeneity of language skills. As language flu-
ency needs practice, one needs either mixed social networks or
workplaces in order to achieve the desired fluency.

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

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

We argue that one possible mechanism behind the unexplained
wage gap could be network segregation. Here, more research is
necessary. Segregated networks may play a much wider role and
can be related to both immigrant labour market outcomes in Eu-
rope or the black-white wage gap in the US. Unfortunately, the
literature dealing with such network discrimination is still consid-
erably less developed than that dealing with wage differentials.

8.   Conclusions

We have analysed the unexplained wage gap between Estonian-
speaking and minority groups in the Estonian labour market dur-
ing the transition period 1989–2005. We use Estonian Labour
Force Survey data and restrict the sample to males only. We de-
compose the mean wage differential using an Oaxaca (1973) type
technique.

We document a substantial rise of in the unexplained wage gap

between Estonian- and Russian speaking males. Whereas there was virtually no unexplained differential in the early 1990s, the gap increased thereafter and reached around 10-15% of the mean wage in favour of Estonian-speaking workers. The gap is mainly related to a difference in wage premiums for jobs in the capital region, and to different returns to education. We show that the unexplained difference is even greater in the largest regional labour market – the capital city – and that 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 discrimination in the form of entry barriers combined with low-level segregation, and explanations related to segregated social networks.

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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-uuringutel põhinevat tööealiste meeste valimit 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 sissetulekute erinevus 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.

A. Interviews

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

1. female, 29 years old, working in human resource management, capital region, Estonian-speaking

2. male, 26 years old, IT specialist, capital region, Estonian-speaking

3. male, 28 years old, IT specialist, Southern Estonia, Estonian-speaking

4. male, 26 years old, marketing research, capital region, Estonian-speaking

5. female, 28 years old, social worker, capital region, Russian speaking.

The questions we asked concentrated on the number, role, methods of acquiring employment, and performance of the workers of different ethnic groups. The more precise points of interest were related to whether there is any Beckerian discrimination present, what is the relationship between the workers of different ethnic 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 that Estonian language skills matter the most in terms of acces to work and salary. None of them confirmed any discrimination present in their establishment in terms of salaries, however, there was some indication of an unwillingness to work with people of a different ethnic background. The Russian-speaking respondent stressed language-based discrimination. Unfortunately she was not able to distinguish between discrimination and productive skills.

B.   List of variables

Here we list and describe all the explanatory variables used in the analysis. A more in-depth discussion of the most crucial variables is provided in section 3.2.

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*

C.   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 – 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.

D.   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						√

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