

The differences in labour market performance of graduates from real and social sciences in Estonian labour market

Kerly Krillo

Aivi Themas

Jaan Masso

Raul Eamets¹

Abstract

During the last 15 years the participation in the higher education has more than doubled in Estonia. Despite government's ambition to support studying real and technical sciences and steps taken to foster this, social sciences are clearly preferred by young people. In this article we consider different aspects of the youths' labour market position, using two recent surveys of university graduates in 2009 and 2006. In this study we analyze the labour market positions of youth with different kinds of education, to see whether that could explain anything of the educational choices. We analyze their labour market position during and after graduating. The comparison of two surveys gives indication about graduates' positions during economic boom and deep recession. As unemployment of youth reached 40% during recent crises, it is also important to analyse which fields of education were more under pressure, and also what job positions graduates were filling and how they evaluate their university education. The results show that majority of students work during studies, mostly because of the economic reasons. There are some signs of over-education and mismatch between subject learnt and current job tasks. There is a wage-premium observable between social and real sciences graduates only in master/doctoral level, not in bachelor level. This is partly explained by sectors and companies where social and real sciences graduates are employed; however, the unexplained part still remains.

Keywords: labour market, youth employment, Estonia, wage gap

¹ **Kerly Krillo** Deputy head of EuroCollege, University of Tartu, Lossi 3, Tartu, Estonia. E-mail kerly.krillo@ut.ee

Aivi Themas Analyst of EuroCollege, University of Tartu, Lossi 3, Tartu, Estonia. E-mail aivi.themas@ut.ee

Jaan Masso Senior Research Fellow, University of Tartu, Faculty of Economics and Business Administration Narva Rd.4-110, Tartu, Estonia. E-mail: Jaan.Masso@mtk.ut.ee

Raul Eamets Professor, University of Tartu, Faculty of Economics and Business Administration Narva Rd.4-110, Tartu, Estonia. E-mail: raul.eamets@ut.ee

I Introduction

Educated people are the crucial precondition to guarantee sustainable economic growth in the knowledge-based economy. Over the past decade, the number of students at higher education level has more than doubled in Estonia. While in mid-90s there were 24,000 students, in 2008 the figure was about 70,000 (Estonian Ministry of Education and Research). In Estonia the percentage of people with tertiary education among age group 25- 64 was 36% in 2009 (for comparison, OECD average was 28% in 2007).

According to common understanding in Estonia the number of students has increased because the interest to social sciences has increased drastically. If we look at the facts we can see that despite the very fast increase of total number of students, the share of students studying social sciences (in our study this category includes business and law) has been fairly stable (about 40%) since 1998 and the share of real and technical sciences (hereinafter *real sciences*) students has been stable as well (about 10 percent, see appendix 1).

The main concern of Ministry of Education and Science has been that fields of study which are currently of key importance from the viewpoint of knowledge-based economy, such as natural and exact sciences and technological specialties, are not sufficiently attractive for Estonian students today. The European Union set the goal of increasing the number of graduates in these fields at least 15% by the year 2010. Even though the share of graduates in these fields has increased in Estonia and has well exceeded the EU target for 2010, Estonia like most European countries is still characterised by a low preparedness and interest of young people to choose natural and life sciences specialties.

Government has supported the studies in real and technical sciences by providing state-commissioned places, while the majority of social sciences students pay tuition fees. In 2009, about 84% of social sciences students had to pay for their studies, while for real sciences this figure was 25% (Ministry of Education and Research).

There is a general perception that in Estonia there is an overproduction of social sciences specialists and therefore many of them face difficulties after graduation when entering into the labour market. In our view labour market demand is key factor influencing the professional decisions of young people and we believe that in opposite to aforementioned statement, young people with social science degree are doing better after graduation than their fellow graduates of real and technical science subjects. This reflects the demand for social sciences graduates.

The purpose of the paper is to compare the success of social and real sciences university graduates in Estonian labour market. We compare their labour market status during the studies, a year after the graduation. We use data from two recent alumni surveys; the first was launched in 2007 and the second in 2010. People were surveyed a year after graduation. We focus only on graduates of public universities, but this covers the majority of students in Estonia. In addition, we analyse wages of graduates a year after graduation to determine whether there are differences between social and real sciences students and what are key factors explaining wage differences.

The comparison between two years (2006 versus 2009) is important to ascertain whether changes in the economic situation have significantly influenced graduates access to the labour market. The mid-2000s were characterized by vast economic growth and labour scarcity in Estonia. In 2007 youth unemployment rate was in average about 10% (in fourth quarter 6.5%). The global financial crisis hit Estonia quickly and painfully in 2008-2009. Estonia was among those countries that experienced vast increase in unemployment. For youth the increase was particularly high reaching to 40% in the first quarter of 2010.

The rest of the paper is structured as follows. The second section gives a general overview of Estonian educational system. In section three we give an overview of relevant studies in this field. In fourth section we introduce data and in fifth present results. The last section concludes.

II Overview of Estonian higher education system and its funding

In the beginning of 2011 there were 33 educational institutions offering higher education in Estonia. According to the ownership and type of education provided, they can be divided as follows:

- 6 public universities
- 3 privately owned universities
- 10 public professional higher education institutions
- 12 private professional higher education institutions
- 2 public vocational educational institutions.

Estonia signed the Bologna Declaration in 1999. This was an impulsion to large-scale changes – new study programs were rebuilt, autonomy of universities was increased, new credit accumulation system based on student workload and accreditation system was introduced. Since the academic year 2002/2003, the general structure of higher education has three cycles that comply with the bachelor (or professional higher education diploma) – master – PhD model of the European higher education area. Diploma Supplement as well as a degree on the correspondence of qualifications awarded under different qualification systems was introduced in 2004.

Studies at the level of higher education are funded from the budget of the Ministry of Education and Research within the scope of the state-commissioned education. The funding system of state-commissioned study places consists of two main components: the total cost of a student place is calculated by multiplying the base cost of the student place by the coefficient established for a field of study (or a study programme as an exception).

Public expenditure to higher education has been around 1% of GDP in recent years. In 2009 the public expenditure on higher education amounted to 179 mln EUR (1.3% of GDP, see Table 1).

Table 1 Total public expenditure to education in Estonia, 2005-2009

	2005	2006	2007	2008	2009
Total public expenditure on education (mln EUR)	554	626	753	839	831
<i>Share of GDP (%)</i>	<i>4,96</i>	<i>4,73</i>	<i>4,82</i>	<i>5,22</i>	<i>6,06</i>
Total public expenditure on higher education (mln EUR)	101	111	161	172	179
<i>Share of GDP (%)</i>	<i>0,91</i>	<i>0,84</i>	<i>1,03</i>	<i>1,07</i>	<i>1,30</i>

Source: Ministry of Education and Research

In Estonia students are admitted to both state-commissioned and non-state-commissioned study places. The ratio of students in state-commissioned and non-state-commissioned study places has changed significantly over the years (see Table 2). During the 2009/2010 academic year, the number of students engaged in state-commissioned education constituted 48% of all students. However, there are remarkable differences between social and real sciences. While majority of social sciences students have to finance their studies by themselves (84% in 2009), in real sciences most of places are state-commissioned (75% in 2009). This reflects the priorities of the government that supports real sciences.

Table 2 Share of students studying in state commissioned and non-state commissioned places

	No of students, 8.11.2005		No of students, 10.11.2006		No of students, 10.11.2007		No of students, 10.11.2008		No of students, 10.11.2009	
	SC	NSC	SC	NSC	SC	NSC	SC	NSC	SC	NSC
Social sciences	4 090	22 515	4 013	23 326	3 884	23 509	3 898	23 210	3 938	21 174
<i>Share of total</i>	<i>15</i>	<i>85</i>	<i>15</i>	<i>85</i>	<i>14</i>	<i>86</i>	<i>14</i>	<i>86</i>	<i>16</i>	<i>84</i>
Real sciences	5 058	1 802	5 060	1 769	5 038	1 527	5 015	1 480	5 398	1 793
<i>Share of total</i>	<i>74</i>	<i>26</i>	<i>74</i>	<i>26</i>	<i>77</i>	<i>23</i>	<i>77</i>	<i>23</i>	<i>75</i>	<i>25</i>
TOTAL	31 386	36 901	31 268	37 499	31 150	37 018	31 536	36 863	33 080	35 905
<i>Share of total</i>	<i>46</i>	<i>54</i>	<i>45</i>	<i>55</i>	<i>46</i>	<i>54</i>	<i>46</i>	<i>54</i>	<i>48</i>	<i>52</i>

Note: SC – state commissioned; NSC – non-state commissioned

Source: Ministry of Education and Reserach

III Literature Overview

Research of graduate employment is a matter of a great interest both for economists and government representatives all over the world. There is a huge bulk on literature focusing on this topic. However, the studies analysing differences between real and social sciences graduates are almost lacking. In this section we give a short overview of studies analysing graduate position in the labour market undertaken during last decade.

The success of the graduates' entrance into the labour market has been studied from different aspects. We are particularly interested in the field of study and its influence on labour market outcome. Many of the surveys concentrate on the male-female wage gap according to the field of subject and the effect of their educational choices (Livanos and Pouliakas 2009; Machin and Puhani 2003; Goldberg Dey and Hill 2007). It is found that the field of subject explains a significant part of the gender wage gap among graduates. Subjects in which women are relatively over-represented (e.g. education, humanities) are also those with lowest wage returns. Men, on the contrary, concentrate more on financially rewarding subjects than women.

It has been brought out that there are wage differences between graduates of different subject studied (Finnie and Frenette 1999; Thomas and Zhang 2005; Black, Seth and Lowell 2003, Kanep 2005). Fields of study such as law, business, engineering, and health have a very large positive effect on graduates' earnings (Thomas and Zhang 2005; Norton 2008).

The wage differentials exist among study fields due to differences in the types of training that these majors provide. It has been suggested that the wages for individuals majoring in fields of study that provide specific training should exceed those majoring in more general areas. On the one hand specific study fields that create specific skills only produce skills applicable to a small number of firms in the labour market. Study programmes that provide general training, on the other hand, should allow an individual to find employment in a wider range of firms because the skills that they possess are more transportable (Thorson 2005). Employers prefer to hire graduates from specific fields with specific requirements of competences to cover vacancies. Graduation from specific fields is a prerequisite, often imposed by the law, to hold and work in certain occupations. The main result is that the labour market for

higher education graduates is to some extent segmented by the field of graduation. This field related segmentation is confirmed by indicators such as labour force participation rates, unemployment rates, and the proportions of temporary labour contracts, which vary widely among graduates from different field study (Vila *et al* 2007).

The evidence about the effect of the university graduated on labour market outcome is somewhat controversial. Ciriaci and Muscio (2010) analysed determinants of Italian graduates' employability with special reference to university quality measured in terms of research performance. Their results confirmed that the 'better' the university, the higher the likelihood that graduates will be employed. However, there are surveys (for example McGuinness 2003) according to which the impacts on job quality and earnings were mainly limited to graduates in particular disciplines or those obtaining 'poor' degrees from 'good' universities. The results suggested that labour market outcomes for most graduates depended more on the subject studied and degree classification awarded than on the university attended.

From our point of view it was important to analyse how the general economic situation has influenced the graduates' educational choices and labour market outcome. Quite recent survey was conducted in United Kingdom (2010) "Changes in student choices and graduate employment" by the Higher Education Careers Service Unit (HESCU) on behalf of Universities UK. It provides a comprehensive analysis of the way recession impacts graduate income and brings out the evidence that the emergence and experience of the recession has an impact upon student choice and take up of subject; however this impact is not universal across all subject disciplines. The main conclusions were that graduate unemployment is rising but the risk of unemployment is not equal across all subject disciplines. The fields of subject that were adversely affected by the recession have received fewer applications at the universities. Recruitment to some occupations appears to be particularly sensitive to changes in the economy, whilst others appear to be far less so.

Since the number of graduates has increased over the past decade there is a hypothesis that increased supply is not matched by demand and there might be insufficient graduate level jobs. It is also claimed that a significant proportion of graduates do not use their degree of knowledge and skills once in work.

The relationship between the field of study and occupations was explored by Robst (2007). Using data from college graduates he examined the extent to which workers reported that their work activities unrelated to the field of study and what degree fields lead to a greater mismatch. According to the results 45% of workers reported that their job was only partially or not related to their field of study. Majors that provide more general skills than occupation specific skills had a greater likelihood of mismatch (e.g languages, social sciences and liberal arts). In addition the likelihood of being mismatched decreased with the level of the most recent degree. Individuals with Masters, Professional, or Doctoral degrees were less likely to be mismatched than Bachelors degree recipients. Also workers who reported working outside their degree field earned less than workers working in the field of study. He also investigated the wage effect variations by degree field. The results implicated that individuals who majored in business, engineering, health professions, computer sciences or law faced more than 20% wage penalties for working outside the field of study. The wage effects were small or insignificant for liberal arts, social sciences and education. Thus the wage effects from mismatch are greater in fields that teach occupation specific skills.

IV Data

In 2007 and 2010 survey among alumni was conducted in Estonia in a web-based format². With the questionnaire following job-related information was collected: working during studies and labour market status a year after graduation. Different aspects about working after graduation were covered: which channels were used when entering into the labour market, how and to what extent the job was related to the field of study, current position of employment, skills and level of education required on the position, gross wage and other income, etc. In 2007 the response rate was 22.8% (1565 alumni answered out of 6852) and in 2010 24.2% (1735 out of 7156). Weighting³ was used to ensure generalization to the whole population (all graduates). The data was calibrated by university and degree using Bascula.

University graduates were surveyed about one year after graduation, i.e. 2007 survey covered those graduated in 2006 and 2010 survey those graduated in 2009. Graduates from all levels – applied higher, bachelor, master and doctoral – were involved. In 2007 the survey covered five Estonian universities governed by public law – University of Tartu, Tallinn University of Technology, Tallinn University, Estonian Academy of Arts and Estonian University of Life Sciences. In 2010 the survey included more higher education institutions. As our aim is to compare the labour market situation of alumni graduated in 2006 and 2009, in our analysis we include only respondents from aforementioned four universities (excluding Estonian Academy of Arts since it does not provide social or real sciences programs) to guarantee the comparability of the results between two years. The public universities included in the survey cover most of the students of Estonian higher education institutions (see Table 3).

Table 3 University graduates in Estonia in 2006 and 2009

	2006			2009		
	Total	4universities	Sample*	Total	4 universities	Sample
TOTAL all levels	8073	6695	1543	7825	6957	1696
Professional higher education and diploma study	790	735	161	501	546	92
Bachelor's study	5290	4233	954	4533	3850	910
Integrated Bachelor's/Master's study	315	311	58	393	392	75
Master's study	1535	1263	330	2238	2011	580
Doctoral study	143	153	40	160	158	39

Source: Estonian Education Information System EHIS, alumni surveys, authors' own calculations

As the sample size of those graduated applied higher education was too small to make reliable conclusions, we excluded this group from our analysis. Since our interest is to compare the labour market success of the real sciences (i.e. natural and exact sciences) and social sciences (social sciences, including economics and law) students, we excluded other groups from the analysis.

To sum it up, we focus on labour market situation of bachelor, master and doctoral level social and real sciences alumni of four Estonian universities governed by public law (study does not cover Estonian Academy of Arts since it does not provide neither social nor real sciences education).

² In 2010 the questionnaire was a bit adopted, i.e. 2007 and 2010 questionnaires do not overlap one-to-one.

³ The results were weighted across following variables: the institution, field of study and level of graduation.

The comparison of two years indicates that the proportion of graduates in social sciences has increased. The share of those graduated bachelor level has decreased, but this is due to increase of Master/Doctoral level graduation, in absolute terms the number of bachelor graduates has increased about 7.5%.

Table 4 Overview of alumni survey data

	2009		2006	
	Number of alumni	% of total	Number of alumni	% of total
TOTAL	3014		2498	
UNIVERSITIES				
University of Tartu	1301	43	1309	52
Tallinn University of Technology	1113	37	654	26
Tallinn University	458	15	420	17
Estonian University of Life Sciences	142	5	115	5
LEVEL				
Bachelor studies	1952	65	1815	73
Master/Doctoral studies	1062	35	683	27
SUBJECT				
Social sciences	2196	73	1710	68
Real sciences	818	27	788	32

Source: alumni surveys, authors' own calculations, weighed

V Results

5.1. Working during studies

In Estonia working during studies is widespread (Eamets et al 2011, Beerkens et al 2010). (There are remarkable differences in working during studies between students of social sciences and real sciences. While majority of social sciences students worked during studies and this tendency has even widened (while in 2006 every fifth of students did not work during studies, in 2009 the figure was 12%, see Table 5), in real sciences the share of those working during studies is 15 percentage points lower in both years. Remarkable differences appear between working before studies – in social sciences every second and in real sciences about every fifth of alumni worked before studies. However, probably due to difficult economic conditions the share of those not working during studies has decreased about 7 percentage points in both groups.

Table 5 Incidence of working during studies

	Before and during studies	During studies	Before but not during studies	Neither before nor during studies	TOTAL
Natural sciences, 2006	18	46	2	33	100
Natural sciences, 2009	23	47	5	26	100
Social sciences, 2006	48	31	3	19	100
Social sciences, 2009	50	35	3	12	100

Source: alumni surveys, authors' own calculations

Compared to real sciences, full-time working is much more widespread among social sciences students (see table 2). As expected, during master/doctoral studies full-time working is much more widespread than during bachelor studies (there are several reasons: firstly, many jobs require at least some kind of knowledge or experience; secondly, during bachelor studies it is difficult to reconcile studying and working because of the heavy studying load) but still remarkable differences remain between social and real sciences.

Compared to financial boom period full-time working has clearly decreased, especially among social sciences bachelor students, and also remarkably among real sciences students. This reflects well current Estonian overall labour market situation. In Estonia the use of part-time employment has increased the most among the EU countries and part-time work is extensively used to avoid redundancies (see Masso, Krillo 2011).

Table 6 Workload during studies (share of those who worked during studies)

		Full-time	Part-time/occasional	Total
2009				
Bachelor studies	Social Sciences	47	53	100
	Real sciences	17	83	100
Master and doctoral studies	Social Sciences	75	25	100
	Real sciences	30	70	100
2006				
Bachelor studies	Social Sciences	49	52	100
	Real sciences	36	64	100
Master and doctoral studies	Social Sciences	88	12	100
	Real sciences	60	40	100

Source: alumni surveys, authors' own calculations

In both social and real sciences most of students work because of financial reasons, other reasons like getting work experience are less important. It is understandable since Estonian scholarships in all levels of higher education are insufficient to cover even living expenses. During the recession the relative importance of the need to get an income has increased, especially among bachelor students. It is probably due to several reasons. It is highly likely that parents are now less able to support the studies of children due to difficult economic situation which means that students need to finance their studies themselves. In Estonia wages have been decreased in many areas and there is anecdotal evidence that many families face the need to finance their debts in higher levels than in mid 2000s (see Krillo, Masso 2011). It means that disposable income has decreased. Secondly, the availability of loans has clearly worsened due to banks' conservative loan policy which has probably influenced the economic subsistence of youth, too.

Table 7 Main reason for working during studies

		Financial difficulties	To get working experience	Self-determination	A good job offer was made	Other reasons	Total
2009							
Bachelor studies	Social sciences	62	18	6	4	10	100
	Real sciences	72	21	3	2	2	100
Master and doctoral studies	Social sciences	48	23	9	3	17	100
	Real sciences	50	35	7	4	4	100
2006							
Bachelor studies	Social sciences	44	40	6	9	1	100
	Real sciences	43	44	3	4	5	100
Master and doctoral studies	Social sciences	42	33	7	9	9	100
	Real sciences	53	35	4	8	0	100

Source: Alumni surveys 2006 and 2009; authors' calculations.

The financial difficulties reflect in the relationship between subject learnt and the tasks of the job held during studies. During the crisis working in the field closely related to the subject has decreased especially among master/doctoral students (see Table 8).

Table 8 Relationship between tasks of the job held during studies and the subject learnt

		Very closely	Rather closely	At some degree	Not at all	Total
2009						
Bachelor studies	Social Sciences	25	17	31	27	100
	Natural sciences	29	16	22	33	100
Master and doctoral studies	Social Sciences	51	26	16	7	100
	Natural sciences	50	21	14	15	100
2006						
Bachelor studies	Social Sciences	23	28	23	26	100
	Natural sciences	27	30	14	29	100
Master and doctoral studies	Social Sciences	36	44	16	4	100
	Natural sciences	65	24	8	3	100

Source: Alumni surveys 2006 and 2009; authors' calculations

5.2. Working after graduation

There also exist remarkable discrepancies when comparing the labour market status of alumni a year after graduation, similar to working during studies. Compared to real sciences, a considerably higher share of social sciences graduates are working and less continue studying. The differences appear for both bachelor and master/doctoral level in both surveys. In 2009 four out of five social sciences bachelor degree graduates were working a year after graduation (half of them were working *and* studying), among

real sciences bachelor graduates the figure is less than 60% and a considerably higher share of them are only studying.

In master/doctoral level the share of those continuing studies is clearly lower among social sciences students (from 2009 graduates, about 50% of social sciences bachelor students and 10% of master students continued studies, in real sciences the figures were 75% and 40%, respectively). This is probably due to the labour demand – while in social sciences employers often value only the existence of the higher education, in real sciences master degree is often needed because bachelor graduates do not have enough knowledge to successfully enter into the labour market.

Compared to 2006, in 2009 share of those only working or only studying has decreased and share of those studying and working has increased both in social and real sciences (except among master/doctoral students in social sciences). From the working perspectives this probably reflects the developments in the labour market – while in 2006 there was a labour scarcity which meant that young specialists were invited to enter to the labour market and there was no need to get master/doctoral degree after graduation. In 2009 when the Estonia's labour market was characterized by the vast increase in unemployment, the studying was partly used as a mean to avoid unemployment. From the other side, the difficult economic situation forces students to work during studies more and more. The share of unemployed has been really low among graduates (for comparison, in 2010 the unemployment rate was 29.8 percent among youth aged 20-24 and 17.7 percent among youth aged 25-29 in Estonia), but has somewhat increased among master/doctoral level graduates and for social sciences bachelor graduates.

Table 9 Labour market status one year after graduation

		Working	Studying	Working and studying	Unemployed	At home	Other	Total
2009								
Bachelor studies	Social sciences	40	11	40	3	4	2	100
	Real sciences	20	37	38	1	0	3	100
Master and doctoral studies	Social sciences	79	1	10	2	7	0	100
	Real sciences	51	4	37	1	7	0	100
2006								
Bachelor studies	Social sciences	51	25	20	0	4	0	100
	Real sciences	37	34	26	1	1	0	100
Master and doctoral studies	Social sciences	75	10	8	0	6	1	100
	Real sciences	55	27	17	0	1	0	100

Source: alumni surveys, authors' own calculations

Compared to social sciences, a higher share of real sciences graduates have a job closely related to the profession (see

Table 10). Similarly to working during studies, the share of those whose job is not related to the subject learnt has increased during the recession.

Table 10 Relationship between tasks of the current job and the subject learnt

		Very closely	Rather closely	At some degree	Not at all	Total
2009						
Bachelor studies	Social Sciences	41	23	22	15	100
	Real sciences	52	15	20	14	100
Master and doctoral studies	Social Sciences	60	26	8	6	100
	Real sciences	65	15	11	9	100
2006						
Bachelor studies	Social Sciences	38	34	21	7	100
	Real sciences	46	33	10	10	100
Master and doctoral studies	Social Sciences	40	44	16	0	100
	Real sciences	69	24	5	1	100

Source: alumni surveys, authors' own calculations

When it comes to the current profession of the alumni, in social sciences the share of managers and legislators is higher compared to real sciences. When comparing two years, we can see remarkable differences only for bachelor and real sciences graduates (see Table 11 for more details). In this group the share of white-collars (i.e. legislators, senior officials and managers; professionals, technicians and associate professionals) has increased by 15 percentage points. As expected, among those who finished master/doctoral studies the share of white-collars is higher than among bachelor alumni indicating that education really pays off in Estonian labour market.

Compared to 2006, in 2009 fewer alumni are working as legislators, senior officials and managers and more are working as professionals. The result applies both to bachelor and master/doctoral students. This trend is particularly visible among real sciences bachelor alumni – while in 2006 about every fifth of them was a professional, in 2009 this share was as high as 56%. For real sciences the decrease has come mainly from working as a technicians and associate professionals – while in 2006 about every second of real sciences bachelor alumni had this job position, in 2009 the share was about one fourth. For master/doctoral level the proportions are at the same magnitude. Among social sciences the share of alumni working as officials has increased.

Table 11 Current professions of alumni

		Legislators, senior officials and managers	Professionals	Technicians and associate professionals	Officials	Other	Total
2009							
Bachelor	Social sciences	10	29	33	22	6	100

studies	Real sciences	6	56	26	0	11	100
Master and doctoral studies	Social sciences	17	57	20	5	1	100
	Real sciences	5	66	25	3	2	100
2006							
Bachelor studies	Social sciences	21	16	37	16	11	100
	Real sciences	6	22	49	8	17	100
Master and doctoral studies	Social sciences	37	41	13	8	0	100
	Real sciences	9	43	43	3	1	100

Source: alumni surveys, authors' own calculations

The analysis of over- and under-education (i.e. mismatches between educational level obtained and required in the job held) indicates that in both bachelor and master/doctoral level there are signs of over-education and under-education⁴. In the bachelor level there are no remarkable differences between social sciences and real sciences: about 60% of them have a job in accordance of the degree, for 26% of social sciences and 24% of real sciences job requires lower education and for 14% and 17% higher education.

In master/doctoral level the discrepancies are higher. 44% of social sciences and 60% real sciences alumni have a job corresponding to their educational level, for rest the job require lower educational level. In general we can conclude that over-qualification is higher among real sciences graduates.

Table 12 Relationship between actual educational level and educational level required in the current job (subjective evaluation by graduates)

		Educational level is not important	Secondary (general)	Vocational	Bachelor	Professional higher	Master/doctoral	Total
2009								
Bachelor studies	Social sciences	8	18	1	60	4	10	100
	Real sciences	7	17	0	59	3	14	100
Master and doctoral studies	Social sciences	2	4	1	47	3	44	100
	Real sciences	2	1	1	32	4	60	100

Source: alumni surveys, authors' own calculations

5.3. Wages

Detailed wage data is only available for 2009⁵; therefore we will use data of 2009 alumni study. As can be seen from the Figure 1 and Appendix 2, social sciences education pays off more than real sciences education. In both bachelor and master level, the share of those earning high wages is considerably higher among social sciences graduates compared to real sciences graduates.

⁴ As data about this aspect is not available in 2006, the results of 2009 are represented.

⁵ 2009 marked a vast economic downturn in Estonia; however, it is likely that recession did not change the relative situation of real and social sciences graduates drastically and the results are therefore general, not specifically reflecting the economic recession period.

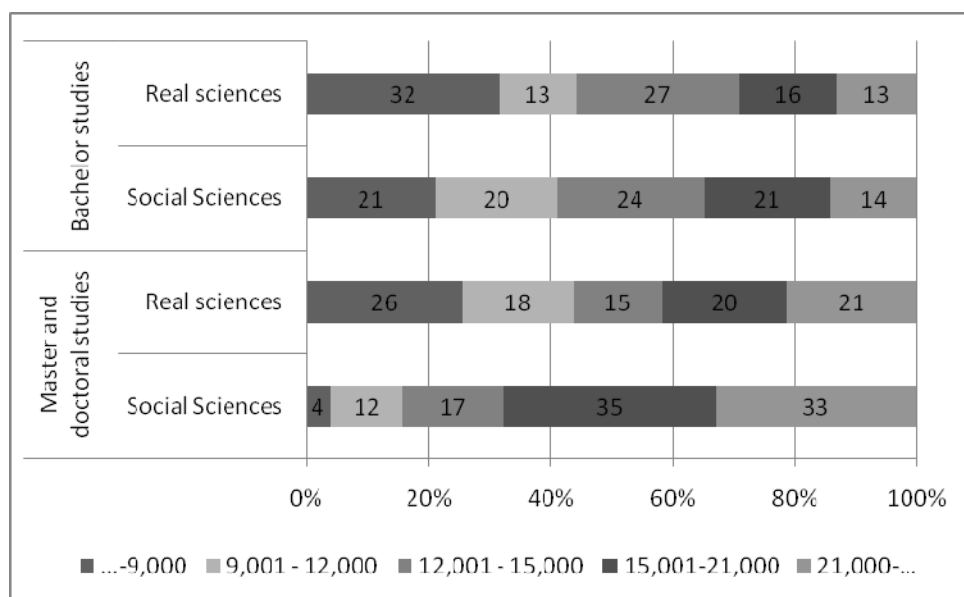


Figure 1 Wage distribution of 2009 graduates by educational level and subject learnt (EEK, 15,6466 EEK=1 EUR)

Source: 2009 alumni survey, authors' own calculations

Social sciences bachelor graduates earn about 10 percent per month more compared to real sciences bachelor graduates, in master/doctoral level the difference is almost 30%⁶ (see Table 13). Moreover, although master/doctoral degree clearly has an impact in both groups, in social sciences the influence is much more remarkable – mean wage of master/doctoral graduates is about 35% EUR higher compared to bachelor students, in real sciences the difference is about 4% EUR.

Table 13 Gross wages of employed alumni a year after graduation (EUR)

	Bachelor		Master/Doctoral		
	Social sciences	Real sciences	Social sciences	Real sciences	
N	889	186	477	236	
Mean	14 849	13 378	20 951	16 272	
Median	14 004	13 503	18 901	14 098	
Std. Deviation	6 493	5 899	8 934	9 388	
Minimum	5 007	3 301	9 998	4 303	
Maximum	39 993	28 993	60 005	52 807	
Percentiles	1	5 195	3 301	4 303	
	5	6 306	4 600	5 179	
	95	24 784	24 096	39 993	38 506
	99	35 001	28 993	60 005	52 197

Source: 2009 alumni survey, authors' own calculations

⁶ We excluded 5% of lowest and 1% of highest end of wage distribution in each group from the analysis to decrease the influence of outliers.

The independent samples ANOVA t-test indicates that the differences between social and real sciences graduates' wages are statistically significant both for bachelor and master/doctoral graduates.

We estimated OLS wage regressions to analyse which factors influence the wages of real and social sciences graduates. Unfortunately the database does not include good instruments to use when estimating the wage equation with 2SLS or Heckman selection model, so we used OLS instead being aware of the fact that due to endogeneity the results obtained may be biased.

However, results obtained indicate that factors influencing wages are quite similar for social and real sciences graduates (see Table 14). Other things equal, white-collars earn more than blue-collars, master graduates more than bachelor graduates, those whose job-tenure is higher earn more than those who are less experienced and those who worked during studies more than those who did not work during studies. The influence of region of job and university finished is mixed. While for social sciences alumni the university matters, it is not so for real sciences students. The influence of region where the job is located is important for social sciences graduated (compared to Northern Estonia, in all other regions except Eastern Estonia wages are lower).

Table 14 Wage equations for social and real sciences graduates

	Real Sciences	Social Sciences
White-collar	0.610***	0.219***
Central Estonia	-0.197*	-0.469***
Eastern Estonia	0.000	-0.087
Southern Estonia	-0.280***	-0.289***
Western Estonia	-0.085	-0.291***
University of Life Sciences	-0.091	-0.259***
Tallinn University of Technology	0.089	-0.087***
Tallinn University	0.024	-0.236***
Working during studies	0.113*	0.098***
Level	0.101**	0.2982***
Job tenure	0.063**	0.041***
constant	8.680***	9.312
F-statistic	15.843***	57.949***
Adjusted R ²	0.279	0.315

Note: dependent variable: ln(wage); white-collar: legislators, senior officials and managers, professionals, technicians and associate professionals.

As the final step of the analysis, we performed also the Oaxaca-Blinder decomposition of the wage difference between the graduates of real and social sciences. The calculations were undertaken by using the Stata package Oaxaca written by Jann (2008). The purpose of the exercise was to find out, to what extent the differences between the graduates of real and social sciences can be accounted for different factors, e.g. gender segregation in education (as Estonia is characterized by very high gender wage gap, that could well explain part of the difference), or due to different returns to these factors among graduates from social and real sciences (e.g. wages increasing more with job experience in one of the groups). Differently, we analyze which part of the wage gap is linked to the differences in the workers' characteristics (i.e. explained or objective gap) and which part is related to the differences in returns to these characteristics (i.e. unexplained or subjective gap). For that purpose, wage regressions were estimated, where the log net wage was regressed on a number of variables characterizing the person (gender, tenure, education, age) and the job (sector of employment, occupation).

As is shown in Figure 1, social sciences graduates have generally higher wages, when we look only on the graduates with master's degree. When looking on those with bachelor's degree, the relation is much less clear, but social sciences graduates are more represented among those with wages between 383 and 640 EUR. When pooling both samples together, the picture seems again to indicate higher wages among social sciences, as real sciences graduates are relatively over-represented among the low-wage earners.

Table 15 Oaxaca-Blinder decomposition of the wage gap between the graduates of real and social sciences: gross wage (lower and upper 5% observations dropped)

	Bachelor	Master/Doctoral	Bachelor and master/doctoral
Social sciences	11482.9	14567.4	12956.0
Real sciences	11565.7	13443.0	12764.3
Wage gap (log difference)	-0.7%	8.0%	1.5%
Explained	-10.7%	-12.9%	-14.1%
Unexplained	10.0%	20.9%	15.6%
Explained part by factors			
University	-0.044 (-2.43)	-0.033 (-2.4)	-0.04 (-3.59)
Gender	-0.046 (-2.15)	-0.011 (-1.03)	-0.019 (-2.35)
Sector	-0.037 (-1.3)	-0.053 (-2.23)	-0.024 (-2.42)
Age	0.029 (1.74)	0.009 (1)	-0.035 (-2.56)
Firm size	-0.017 (-0.78)	-0.053 (-2.53)	0.011 (1.45)
Occupation	0.014 (0.63)	0.007 (0.72)	-0.039 (-2.89)
Tenure	-0.008 (-0.74)	0.006 (1.02)	0.005 (0.46)
Level (master/bachelor)			0 (-0.04)
Unexplained part by factors			
University	0.782 (3.64)	0.045 (0.15)	0.265 (0.86)
Gender	-0.128 (-1.57)	0.118 (1.98)	-0.028 (-0.68)
Sector	0.49 (2.64)	-0.048 (-0.4)	0.054 (1.18)
Age	6.875 (1.89)	-3.035 (-1.33)	-0.021 (-0.25)
Firm size	-0.066 (-0.14)	0.044 (0.15)	1.012 (0.48)
Occupation	-0.293 (-1.23)	-0.212 (-1.21)	-0.081 (-0.55)
Tenure	0.015 (0.04)	-0.344 (-1.4)	0.182 (0.78)
Level (bachelor)			-0.121 (-0.85)
Observations	368	406	774

Note. Z-statistics are in the parenthesis. In order to control for possible measurement errors, we excluded from calculations the lower and upper 5% of observations.

Table 15 presents the results of the Oaxaca-Blinder decomposition (see appendix 3 for statistics of the data used). Generally, the explained component is with negative sign, i.e. the factors in the model would explain the higher wages of real science graduates. Thus, concerning those with bachelor degree, we would expect the real science graduates to earn higher wages, but there is unexplained positive wage gap in favor of those with social science degree; thus, given various characteristics relevant for the earnings, social sciences graduates seem to earn more. Among those with master's degree, total wage gap is around 8% in favor of social sciences. The explained wage gap is -12.9% (i.e. would predict higher wages among real sciences), of which the most important factors are firm size (i.e. real science graduates work in larger firms typically having higher wages), university and sector. When bachelor and masters degree graduates are pooled together, the total gap is close to zero, but there is large explained part of 14%, related to gender (real science graduates are more often males that in Estonian labor market have ca 30% higher

wages), university, sector of employment and occupation (i.e. real science graduates work in sectors and occupations with higher pay).

IV Conclusion

Despite the lack of state-commissioned places social sciences are much more popular than real sciences in Estonia, although Estonian government has declared that the latter is a priority to guarantee the sustainable development. In our study we surveyed reasons for this tendency.

Recession has influenced work-related choices of the students. Most of the graduates have some kind of working experience by the time of graduation – in 2009 85% of social sciences and 70% of real sciences graduates were working during studies. The economic reasons for working during studies were mentioned most frequently, i.e. need for income to finance the costs related to the studies. This is particularly true for bachelor students who work mainly because of the economic reasons; the share of those working because of the need to get funding for studies has considerably increased during economic downturn. Without any additional funding, it is difficult to break even because scholarships in Estonia are quite low and not available for everyone. Another reason may be that parents are less able to support the studies because of the decrease in disposable income (during the economic crises the wage cuts have been quite wide-spread in Estonia).

Students who work during studies do it mostly because of the economic reasons and in the fields not directly related to their studies. Only every fourth of social sciences and 30% of real sciences bachelor students and half of master/doctoral students had a job directly related to the subject learnt during studies (based on subjective reporting). This is a cautionary sign that should not be ignored. It does not say that our educational system is generating too many social and real scientists, but it is clear that problem probably lies not in educational system but in entrepreneurship in general – we should develop the environment that needs real and social scientists educated. Moreover, it would be beneficial to introduce more business-related courses in real sciences curricula to promote establishment of enterprises by real sciences graduates.

After graduation most of the alumni have either continued studying and/or working, the share of those unemployed is low. The proportion of those only working (i.e. not continuing studies) is much higher among social sciences graduates compared to real sciences graduates, for the latter most continue studying. The comparison of two years reveals that in 2009 studying is much more widespread. This reflects well the general situation in the labour market – due to high unemployment rate it is difficult to find job, which induces to continue studies. All in all it is a positive development and at least now over-education is not a serious problem in Estonia.

Today less graduates start working in the management positions compared to the situation a few years ago. The incidence of working in the area not related to the subject learnt has increased, though the share of those working at the position not related to the subject learnt is not remarkable (about 15% of bachelor graduates, 6% of social sciences master/doctoral and 9% of real sciences master/doctoral graduates). It is a good sign taking into account the high unemployment rate and heavy competition in the labour market.

Comparison of profession and wage of real and social sciences reveals the background of the popularity of the latter – in both bachelor and master/doctoral level the wages of graduates are clearly higher for social sciences graduates. The decomposition of the wage differences shows that the key factors determining the differences are sector, university and firm size. Therefore, we can conclude that the

popularity of social sciences is grounded by high wages and successful participation in the labour market, therefore, it is not surprising that this field is continually popular among youth.

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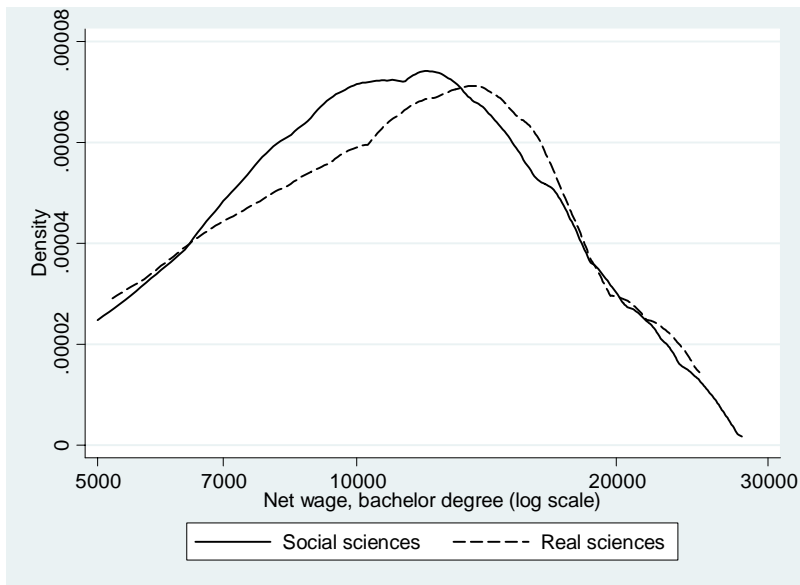
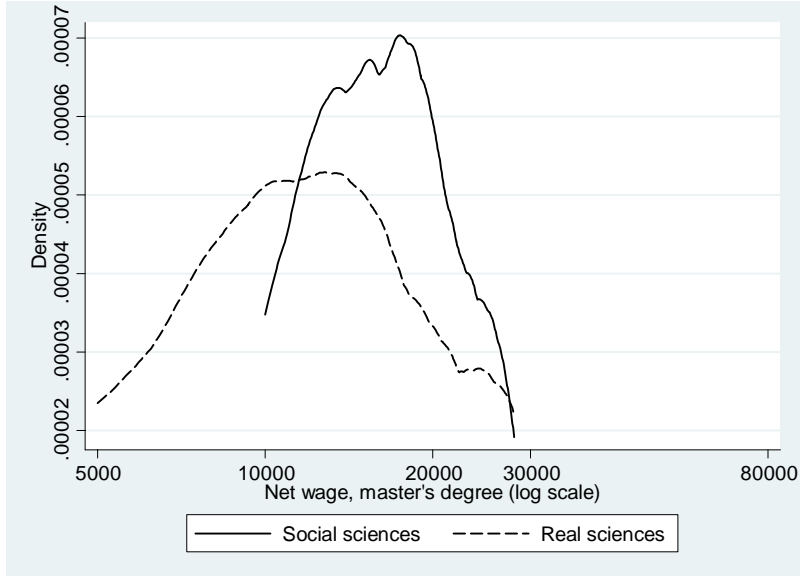
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Appendix 1 Number of students in social and real sciences in Estonia, 1995-2009

		1995/96	1996/97	1997/98	1998/99	1999/00	2000/01	2001/02	2002/03	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09
Social sciences	no of students	8 883	10 286	12 415	16 039	20 254	22 234	23 062	24 029	25 031	25 786	26 605	27 339	27 393	27 108
	share of total	33%	34%	36%	39%	41%	39%	38%	38%	38%	38%	39%	40%	40%	40%
Real sciences	no of students	2 289	2 303	2 920	3 241	3 774	4 883	5 537	6 399	6 580	7 025	6 860	6 829	6 565	6 495
	share of total	8%	8%	8%	8%	8%	9%	9%	10%	10%	10%	10%	10%	10%	9%
TOTAL	no of students	27 234	30 072	34 542	40 621	49 574	56 437	60 409	63 625	65 659	67 760	68 287	68 767	68 168	68 399
	share of total	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%

Source: Ministry of Education and Research

Appendix 2 Kernel density for wage distribution: gross wages, lower and upper 5% observations dropped



Appendix 3 Descriptive statistics of the variables used in the Oaxaca decomposition

Variable	Mean	Standard deviation	Minimum	Maximum
Age	27.88	6.75	21	58
Age squared	822.69	464.11	441	3364
Bachelor degree	0.56	0.50	0	1
Master's degree	0.44	0.50	0	1
Net wage, EEK	11809.41	7286.03	3800	91562
Log net wage	9.25	0.47	8.24	11.42
Construction	0.02	0.15	0	1
Hotels and restaurants	0.03	0.17	0	1
Other business services	0.06	0.24	0	1
Public services	0.33	0.47	0	1
Sales and trade	0.04	0.19	0	1
Industry	0.07	0.25	0	1
Real sciences	0.35	0.48	0	1
Social sciences	0.65	0.48	0	1
Male	0.26	0.44	0	1
Legislators, senior officials and managers	0.09	0.29	0	1
Professionals	0.53	0.50	0	1
Technicians and associate professionals	0.21	0.41	0	1
Clerks	0.10	0.29	0	1
Service workers and shop and market sales workers	0.04	0.21	0	1
Skilled agricultural and fishery workers	0.00	0.05	0	1
Craft and related trade workers	0.01	0.08	0	1
Plant and machine operators and assemblers	0.00	0.06	0	1
Elementary occupations	0.01	0.09	0	1
1-19 employees	0.12	0.32	0	1
20-49 employees	0.18	0.39	0	1
50-199 employees	0.25	0.43	0	1
200-499 employees	0.12	0.32	0	1
More than 500 employees	0.20	0.40	0	1
Job tenure 4-12 months	0.21	0.41	0	1
Job tenure 12-36 months	0.33	0.47	0	1
Job tenure more than 3 years	0.36	0.48	0	1
Estonian University of Life Sciences	0.13	0.34	0	1
Tallinn University	0.26	0.44	0	1
Tallinn Technical University	0.26	0.44	0	1
University of Tartu	0.32	0.47	0	1