CENTAR
Eesti Rakendusuuringute Keskus

# The Cost of School Failure in Estonia

*Technical report*

Sten Anspal, Janno Järve, Epp Kallaste, Liis Kraut, Mari-Liis Räis and Indrek Seppo



2011

Euroopa Liit
Euroopa Sotsiaalfond
Eesti tuleviku heaks

## Acknowledgements

This report has benefited a lot from many individuals, who devoted their time to making it better. First of all we would like to thank George Psacharopoulos, the methodology advisor of the project team, who brought on board his long term experience in the field of studying school failure.

We would also like to thank the project steering group (Katrin Höövelson, Urve Kask, Mario Lambing, Liina Malk, Kaire Tamm, Andra Reinomägi, Magnus Urb, Ene Raudsepp, Andres Koppel, Tiina Annus, Heli Aru, Katrin Jaaksoo) for insightful comments on draft versions of the report.

The data used in this report comes from several sources. Many thanks to Andri Ahven from the Ministry of Justice, Heljo Jenk and Mart Reinhold from the Ministry of Education and Research, Aet Tummeleht from Tax and Customs Board as well as Mari Plakk and Helerin Rannala from Statistics Estonia, who were of great help in dealing with registry data. Jaanika Meriküll has mastered the art of using the panel features of Estonian Labour Force Survey – our gratitude goes to her for sharing this knowledge with us.

Last but not least, we would like to thank Eve Tõnisson, the coordinator of this project, for her comments and organizational support.

None of the above-mentioned people are responsible for any errors in the report.

# Preface

The catalytic role of education for economic and social development is very recent in the history of scientific thought. It was formalized in academia in the 1960s and slowly embraced by international organizations and governments to the present day.

One basic metric of educational underdevelopment in a given country is the number of students who fail to complete studies beyond lower secondary education. The cost to society of such failure has been estimated to be huge in the United States where such cost was first estimated.

The international research community should welcome Estonia's effort to add new estimates of the cost of school failure. Utilizing a diversity of available data, if only one half of what is defined as school failure could be avoided, the country would gain about 0.7 percent of GDP. Consistent with the findings of other studies, this is a huge number calling for policies to reduce school failure.

Two remarks are in order regarding the many policies that have been proposed in the literature to combat school failure.

First, the roots of school failure are complex and are not limited to what is happening in schools. The family has a role to play, in the sense that an adverse socioeconomic background can have ill effects on a child's educational development. Acting at the school level might be too late to reverse school failure. Thus, preschool programs that compensate for adverse family background might be the most promising policy.

Second, having too many policy instruments to address a given problem, such as school failure, can dilute the implementation and monitoring capacity of any educational system. Based on the particular initial country conditions, only the most effective policy measures should be adopted, implemented and consistently monitored over time.

Let me express the hope that this report will mark a new era of educational development in Estonia.

George Psacharopoulos

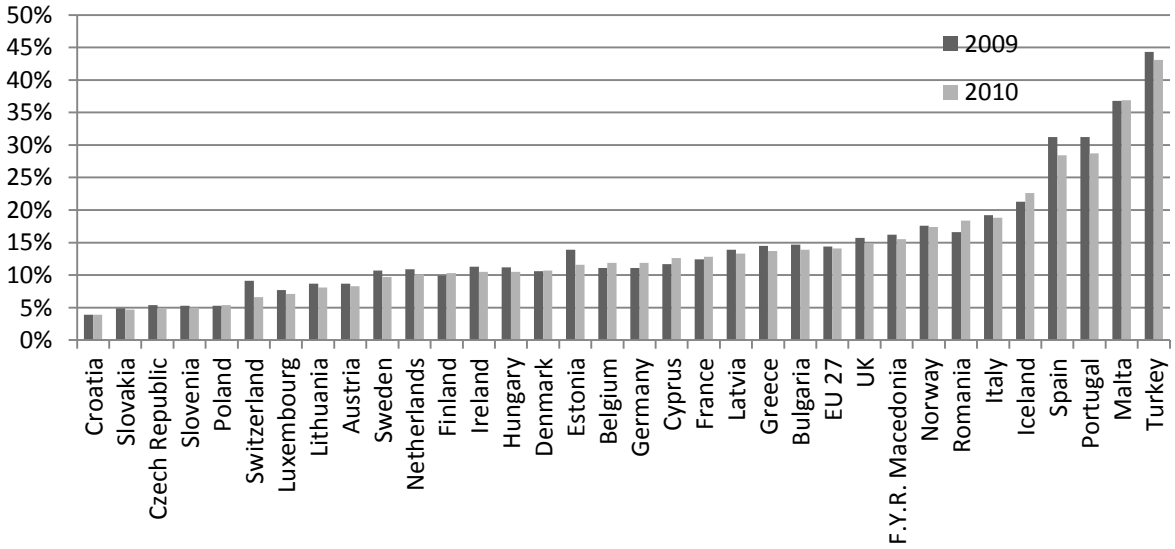
# Table of contents

# Introduction

The Estonian economic environment is rapidly changing, the same is happening all over the world. In order to be successful in the labour market, a person must be able to adapt. One of the major cornerstones of adaptability is solid educational background. Recent results of the PISA test have shown that the quality of education in Estonia is equal to or even better than the average of the European Union, in some subjects even amongst the top of the world.[1]

However, not all children use the benefits of this system as much as they could. In 2010, 11.6% of the Estonian population aged 18-24 with lower secondary education or less did not participate in education or training. They will, with high probability, continue through their working career without higher secondary education. While this estimate is better than European average, it still falls below the Lisbon target of 10%.

**Figure 1.** Early leavers from education and training[2] in 2009 and 2010




*Source: Eurostat*

Failing to obtain upper secondary education is costly for the individual but also for the society. The present report identifies and assesses the cost of school failure in Estonia.

General overview of school failure is given at first and detailed technical explanation of how we arrived to the estimates follows. A short, summarizing version of the results is available for general public.

[1] For example, Estonia ranked 5th on the PISA (survey of the knowledge and skills of 15-year-olds) science ranking (Executive Summary PISA 2006: Science Competencies for Tomorrow's World, p. 22)

[2] Percentage of the population aged 18-24 with at most lower secondary education and not in further education or training.

# 1. School failure – general methodological issues

## 1.1. Defining school failure

There are a variety of definitions of school failure, but they share a notion that students fail to achieve some minimum objectives. These minimum objectives, which often grow from the needs of civic society and labour market, can be defined differently depending on the context – they can be easily countable like occurrences of repetitions and dropouts or quality-orientated like some level of cognitive achievement.

One of the leading international organizations actively involved in combating school failure – OECD – discusses school failure and its implications in the following way (OECD, 2010, p. 9):

> *"School failure can be seen as twofold. On the one hand, from a systemic perspective, school failure is the failure of an educational system, which is unable to provide an education of quality to all. In this case, overcoming school failure implies assuring inclusion: ensuring a basic minimum standard education for each and every student. Secondly, not all individuals are equal facing failure, and consequently, to reduce school failure in a targeted way allows to strengthen equality of opportunities, and to make education system fairer. Therefore, to reduce school failure implies improving both dimension of equity: inclusion and fairness.*
>
> *On the other hand, school failure can also be apprehended from an individual perspective, as failure of a student in obtaining a minimum necessary standard or, in the extreme, dropping out."*

As the quality-oriented objectives are difficult to measure both research and the policies tend to target readily available countable indicators like a failure to complete some minimum level of education or early school leaving (e.g. Belfield, 2008; Enguita, Martinez, & Gómez, 2010; Levin, Belfield, Muennig, & Rouse, 2007). Early school leaving is also the key measure used by European Commission who defines it as (Eurostat 2010):

> *"... a percentage of the population aged 18-24 having attained at most lower secondary education and not being involved in further education or training. The numerator of the indicator refers to persons aged 18 to 24 who meet the following two conditions: (a) the highest level of education or training they have attained is ISCED 0, 1, 2 or 3c short[3] and (b) they have not received any education or training in the four weeks preceding the survey".[4]*

We will be using these terms – school failure and early school leaving – interchangeably here, but one has to keep in mind that this is just an imperfect measure of underlying qualitative indicators.

[3] Less than 2 years.
[4] *Eurostat, 2010, http://epp.eurostat.ec.europa.eu/cache/ITY_SDDS/EN/lfsi_edu_a_esms.htm.*

## 1.2. Costs of school failure

The cost of school failure is the sum of foregone benefits of a counterfactual situation of less early school leaving. If more education carries benefits (e.g. higher private earnings or better health) but people leave the education system and thus cannot gain from these benefits, it is considered a cost.

Calculating the cost of school failure is usually a practical exercise that paves the way for further policy measures in order to combat school failure. Policy measures, however, should be implemented only if the benefits outweigh the costs. This is where the concept of cost-benefit analysis comes in.

The cost-benefit approach to school failure starts from a basic economic principle – whenever the present value of benefits from some intervention is lower than its (direct and alternative) costs, the intervention being considered is economically suboptimal. Thus, the most general economic interpretation of "school failure" would be a systematic and persistent discrepancy between achievable net social benefits and current actions inside the school system in respect to poorly achieving students. This interpretation is usually the starting point for the economic or cost-benefit analysis of school failure (e.g. Belfield, 2008) and should be considered as a guide for economic analysis although the term has gained a narrower meaning of "meeting the minimum" in recent discussions and international operationalizations of its measures.

If school failure is defined as failure to reach some minimum level of education, then should the cost of school failure be measured as the difference between the current status of dropouts and this minimum level, or should we also take into account the probability that without dropping out they would continue to obtain higher levels of education?

Both of these estimates have their value:

- It is realistic to assume that there are dropouts whose potential does not end with reaching the minimal level. They will go further if they are able to get through some hard periods during their studies. Taking into account only the benefits obtained by achieving the minimum level would thus underestimate actual effects achievable by policy action.
- On the other hand, there are a number of different policy actions available. Some of them may only lead to achieving the minimum level while others do much more – push the students from risk groups to study further. It may be reasonable to divide the benefits of different approaches into a) achieving the minimum level and b) achieving additional benefits.

The question is thus not whether we should take the additional benefits into account, but whether we attribute them to the costs of school failure or to additional benefits of a particular policy instrument.

Most of the studies have usually chosen the first approach–the cost of school failure is measured as the difference between dropouts and the group that has acquired only the minimum level of education (upper secondary education).

## 1.3. Problems that are difficult to address

This study is purely observational and the costs are taking place up to more than 50 years in the future. This means that our analysis comes with important caveats.

**The problem of selection** – people are not falling out of school randomly. Heterogeneity between people can arise from genetically or environmentally induced ability differences, personality traits etc. If these differences have a simultaneous effect on both education and costs associated with school failure (early school-leavers tend to have lower cognitive abilities to begin with and would thus earn less than non-leavers even if they completed their education) then if they are not taken into account, the estimates of social costs of school failure would be biased.

It is important to note that the error can be made in both directions – it may be that education is most beneficial for those who are the least likely to complete secondary school, or it may be that the ability to complete schooling has a high correlation with some general ability also valued highly in the workplace, in which case the observed wage difference would overestimate the benefits of additional education for a school leaver.

It is this heterogeneity which makes the precise estimation of benefits (or causal effect of education to any variable of interest) impossible without experiments which themselves are not conceivable.

**The uncertainty of future.** The need to account for social costs of school failure during the entire working life introduces another difficulty – the uncertainty of cost trajectories in the future. A person's work life can last for more than 45 years and some costs of school failure will arise after the end of active work life. It is obvious that the events that will shape e.g. the earnings or health behaviour of people after half a century are impossible to predict with any precision. This is usually solved by taking the current age-earning profiles as the basis of the estimate – if we do not know what the future looks like, we just assume that it will be similar to the present day.

These results should thus be taken as educated guesses hinting towards the order of magnitude of the costs and not as the actual values. The problem is somewhat alleviated though through the discounting of future values – the costs and benefits in the near future and thus probably rather similar to the present day have higher weight in our calculations. An overview of the problems with this approach (assumption of stationarity) is given by Heckman *et al.* (2006).

# 2. Approach of the current study

## 2.1. Definition of school failure

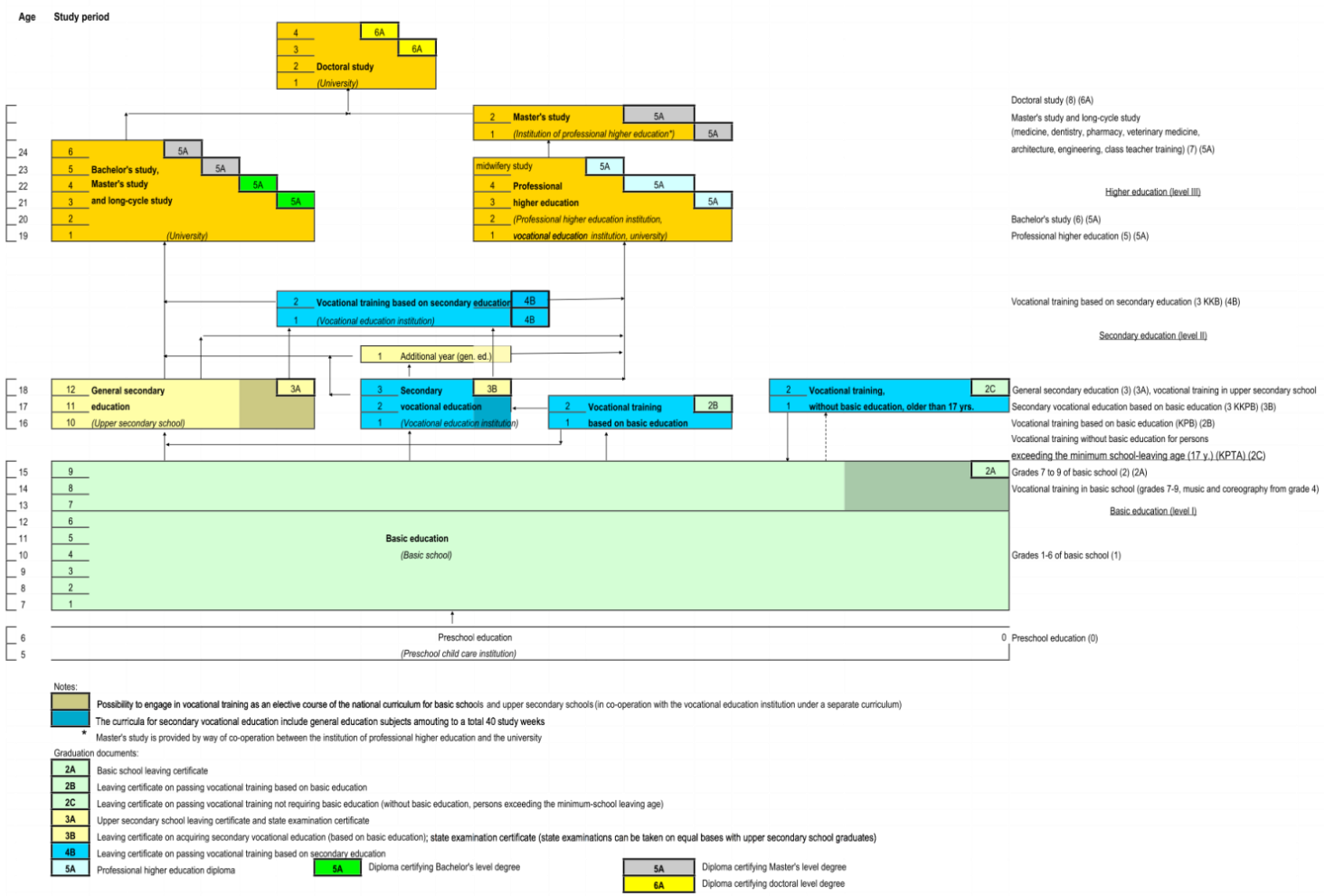
In line with previous comparable studies, we will concentrate on the assessment of benefits from completing upper secondary education compared to failing to do so. The **level of education attained** is the only measure of school failure for which a broad set of life outcomes – labour market behaviour, crime and health status – are readily available. It is also the indicator used by the European Union.

In our approach, school failure refers to people who:

1. have **dropped out**[5] of school in the attempt of acquiring basic education (A)[6] and have not enrolled in any other further education programs;
2. have completed basic education (A) and have **not enrolled** in any other further programs;
3. have **dropped out** of school in the attempt of acquiring lower secondary education (B) and have not enrolled in any other further education programs;
4. have completed lower secondary education (B) and have **not enrolled in** higher secondary education or any other further education programs;
5. have completed lower secondary education (B) and have enrolled in upper secondary education program (C), but **dropped out** before graduating from the respective level, and have not enrolled in any other further education programs.

[5] Dropouts are defined as those students who leave the specified level in the educational system without obtaining a first qualification (OECD Glossary of Statistical Terms 2008).
[6] See Table 1.

**Figure 2.** Structure and educational certificates of formal education in Estonia 2008




*Source: Estonian Ministry of Education (2009)*

** ISCED levels 2B & 2C are re-categorised as ISCED 3C.*

**Table 1.** Education levels[7]

| Group | Education level | Education level | ISCED |
|---|---|---|---|
| A | Basic education | Without basic education;<br><br>Basic education (6 grades);<br>Vocational training without basic education (older than 17 y). | 0,<br>1,<br>2A,<br>2C. |
| B | Lower secondary education | Basic education (9 grades);<br>Vocational training based on basic training (short). | 2A,<br>2B. |
| C | Upper secondary education | General secondary education;<br>Secondary vocational education;<br>Vocational training based on basic training (long). | 3A,<br>3B,<br>2B. |
| D | Higher education | Vocational training based on secondary education;<br>Bachelor studies, professional higher education;<br>Master studies;<br>Doctoral studies. | 4B,<br>5A,<br>5B,<br>6. |

We will calculate the following estimates:

- **Basic costs of school failure** – this will be calculated based on the comparison of benefits and costs of people belonging to **groups B and C**. This approach is motivated mainly by the necessity to provide useful input to policy analysis. It is difficult (although not impossible) to believe that a policy instrument will be devised that will bring large numbers of people from group A to say group D.
- **Net present values (NPV) and (where possible) internal rates of return (IRR) (where possible) for different education levels** – this last indicator cannot be considered directly as a measure of school failure, but as intellectually interesting information – how much do the costs and benefits differ between the different education levels.

Another, alternative way for analyzing school failure would be to concentrate only on **dropouts from secondary school** (students that have entered secondary school and not graduated compared with those who have graduated (taking also into account the probability of further training in vocational or academic education system)). However, there is no information in the Estonian Labour Force Survey that would allow us to identify persons who have enrolled in secondary school but dropped out (we only have information on completed levels of formal education) and the education information system registry data can provide us with only less than 10 cohorts, which is insufficient for analysis of lifetime earnings.

## 2.2. Net present value of different levels of education

The basic idea behind calculating the costs of school failure is to find the net present value of lifetime costs and benefits associated with different levels of education. The net present value of the cash flows is calculated based on the following equation:

[7] This detailed classification will only be used if data allows making the distinction between levels with such precision. If not, appropriate level of aggregation is used.

$$NPV = \sum_{t=0}^{n} \frac{S_t}{(1+i)^t} = \frac{S_0}{(1+i)^0} + \frac{S_1}{(1+i)^1} + \cdots + \frac{S_n}{(1+i)^n}$$

(2-1)

where *NPV* – net present value;
*n* – number of periods;
*S* – cash flow;
*i* – discount rate.

The number of periods is the length of a life cycle. Cash flow is either benefits or costs, depending on the specific component that is under investigation. The discount rate indicates the rate of return that could be earned by investing money into an alternative project. When talking about school failure the potential investor is the government. In large investment projects usually 6% discount rate is used for indicating governments expected rate of return (Ministry of Economic Affairs and Communication 2007). This fairly large discount rate is a by-product of Estonia's situation of catching up in economic development. In studies conducted in developed countries, also a 3.5% discount rate has been used (Levine *et al.* 2007). In order to allow for comparability we will also calculate the *internal rate of return* of obtaining upper secondary education (i.e. the discount rate that equates NPV with zero (the breakeven point)).

The lifetime behaviour of relevant variables is estimated using the **pseudo-cohort method** relying on a steady state hypothesis – e.g. we expect the wages of people failing to obtain secondary education to behave identically to the wages of people similar to them in the current 40 year old cohort when they reach that age.

The cost-benefit analysis will be based on the methodology found in the studies of Psacharopoulos (2007) and Levine *et al.* (2007):

- The effect of education on the following factors will be analysed:[8]
  - Lifetime earnings;
  - Lifetime tax revenue;
  - Lifetime private and public health costs;
  - Lifetime costs of crime associated with policing, sentencing and imprisonment;
  - Lifetime costs of unemployment and social assistance benefits.
- For each factor we find the net present value of costs or benefits;
- These estimates will be corrected for differences in life expectancy for different levels of education;
- The net present values of all factors are aggregated (separately for each education level);
- The cost of school failure is calculated as difference between the aggregate NPV of costs and benefits of groups C and B in Table 1.

[8] One of our research tasks was also to estimate the costs associated with civic activities and equity. We will not calculate exact costs and benefits of the impact of school failure on equity due to the absence of well-defined value weights (see Psacharopoulos (2007), p. 31). The impact of school failure on civic activities as well as on equity will be dealt later on qualitatively. Concerning health costs, the focus is only on heath capital.

The method for calculating the net present values of specific factors is dealt with more closely in following chapters.

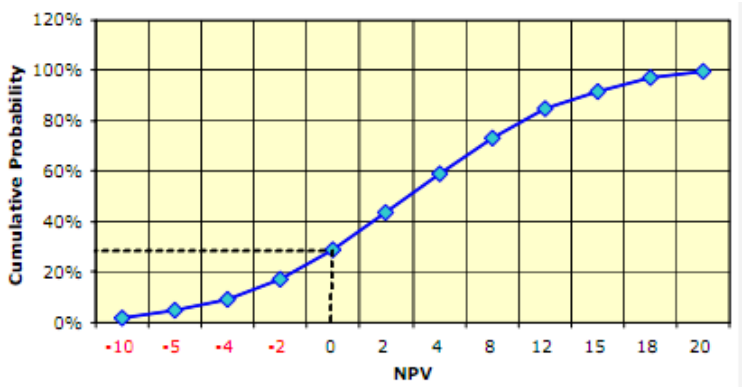
## 2.3. Monte Carlo simulations

Most of the results computed in this exercise are derived from regression analysis, with which it is possible to assess the statistical significance and confidence intervals of the estimated coefficients. Usually confidence intervals are not estimated for the end results of cost-benefit analysis. However, as the probability distributions of the regression parameter estimates are known, it is possible also to calculate the probability distribution of the IRRs or NPVs.

For estimating the probability distributions of IRR and NPV, the Monte Carlo method will be used. Monte Carlo simulation consists of repeated random extraction of a set of values for the parameter estimates of regression functions underlying the estimations of different components of school failure and then calculating the performance indices for the project (IRR or NPV) resulting from each set of extracted values. By repeating this procedure for a large enough number of extractions (usually 500), one can obtain a pre-defined convergence of the calculation as the probability distribution of the IRR or NPV.

The cumulative distribution function will allow one to assess the cumulative probability that the IRR or NPV that is analysed will remain under certain critical value (in case of NPV this value could be for example 0). (Florio *et al.,* 2008).

**Figure 3.** An example of cumulative probability distribution for NPV




*Source: Florio et al. 2008, p 64.*

The confidence intervals should not be interpreted here as an indication of our confidence that exactly these costs will be occurring. They are instead the measure of statistical uncertainty in our estimates – we do not measure the current wages or mortality perfectly and we have to take this into account. Measurement errors of current values are clearly not the main reasons for uncertainty in our models, but it is informative to understand it´s impact.

# 3. Empirical estimates of costs of school failure

## 3.1. Earnings, employment and payroll taxes

### Introduction

Analysis of the mechanisms through which education affects earnings has produced two Nobel laureates in economics – Gary Becker with human capital theory and Michael Spence with signalling theory.

**Human capital theory** (Becker, 1964) sees education as investment in one´s productivity. If the wages are connected to productivity, they are also directly related to level of education.

**Signalling theory** (Spence, 1973) shows that exactly the same relationship between education and wages can also emerge if education by itself would not affect productivity at all. It is sufficient if there are underlying qualities (like abilities) affecting both wages and education and the level of education is only used to signal the innate abilities which have to be otherwise hard to observe.

There has been a vast amount of literature trying to disentangle the two effects and while the signalling effect has indeed been shown to contribute, there is a firmly established consensus that there are causal effects of education on productivity, with the **rate of return of an additional year of schooling being around 10%** (Card 1999 is a good starting point on research on this topic).

The following gives an overview about how the private wage premium, the probability of being employed and payroll tax revenues associated with education are found.

Our approach is to:

- form a pseudo-cohort using the aggregated data from Estonian Labour Force Survey to provide enough observations and average out the effects of the recent economic cycle,
- compute smoothed age-earning[9] (and payroll taxes) profiles for each group formed by gender, ethnicity (Estonian/not ethnic Estonian) and education group (basic or less, lower secondary, upper secondary, tertiary) for earners[10]
- find smoothed age-employment profiles for these groups
- combine the two to find average earnings (and payroll taxes) profiles for the whole population

Assuming these historical profiles to be an approximation of the future and taking into account the long term forecast of the Estonian economy, we find the expected value of the wage premium associated with gaining upper secondary education[11] compared to lower secondary education and tertiary education compared to upper secondary education over the lifetime, internal rate of return and net present value of these choices using discount rates used in public investment projects in Estonia. All of the nominal values have been expressed in the price levels of 4$^{th}$quarter of 2009.

[9] In current analysis the term earnings refers to wage income.
[10] The basic or less category of education is represented by very few observations. As it is also not in the focus of this analysis, it is dropped from the subsequent results and graphs.
[11] For students who will not continue in tertiary education.

Crucially, we note that we do not address the question of causal inference here, but provide observed average differences in labour market behaviour for people having different levels of education. It is usual to assume a correlation between the education level attained and general ability, which is also valued in the labour market – people who will continue studying might have fared better in the labour market without studying than those who did not go further with their education.[12] This would mean that the values found here are probably the upper bounds for the true values. On the other hand, by excluding the possibility of continuing to tertiary education we are underestimating the value of attaining secondary education.

## Method

### Dataset and initial data manipulation

*Estonian Labour Force Survey*

The data comes from Estonian Labour Force Survey (ELFS) – the main survey of official labour-market related estimates for the country, conducted by Statistics Estonia, the national statistics office.

In each quarter around 2,000 households (3,500-5,000 people) are surveyed with reference weeks uniformly distributed throughout the quarter. The target population contains all working age residents in Estonia (aged 15-74). Stratified sampling is used. The sample is selected from the population register with the probability of inclusion proportionally dependent on the number of working age people having each address. Weights accounting for non-response and survey design and calibrated by gender, 5-year age groups and place of residence are provided for expanding the results to whole population.

The survey is a rotating panel with the individuals interviewed four times – two quarters in a row and another two quarters in a row after a pause of two quarters.

*Inclusion criteria*

Pooled data from years 2002 to 2009 is used. For the wage and participation regressions the following inclusion criteria are used:

- Only population aged up to one year less than pension age are included (the age is computed from birth year, which introduces a measurement error). This means men up to age 62 and women up to age 57 for 2002 and 2003, 58 in 2004 to 2006, 59 for the rest of the period.
- People reporting upper secondary education but younger than 18, people with tertiary education but younger than 22 or younger than 24 and studying in formal education are excluded from wage and participation regressions. These people would not represent an average for their age for wages (this would have a potential for biasing the results); as we are comparing lower secondary education to obtaining and stopping at upper secondary education, then we need to measure the employment probability by not taking into account people who went for further studies and will probably reach tertiary education.

[12] Note however that returns to education are different for different people and private returns – the relative gain they would get from a higher education level – may well be and is frequently found to be higher for people who are least likely to continue with education. Jennie E. Brand (2010) provides a recent estimate on US data.

- 0.3% of the lowest wages are excluded from wage equations (after controlling for wage growth) – these are usually wages reported as 0 or close to 0 (people reporting these wages are still considered to be employed).

*Removal of time effect from wages*

The data is pooled from a long period of time characterized by considerable changes in the wages even within a year, with average yearly nominal wage growth over 20% in some years. There are two ways to deal with this:

- adding the time dummies to wage regressions and predicting the age-earning profile later using the estimated coefficient of time dummy of preferred time to get the nominal values of wages at this time;
- inflating the wages in the dataset to the nominal level of desired point in time.

The latter approach is chosen here, as it simplifies some calculations which need nominal values (taxes with tax-free allowances) and allows for quick visual diagnostics of data.

Nominal wages are normalized to the levels of the 4$^{th}$ quarter of 2009 by eliminating the time fixed effects in the data, which are interpretable as a combination of inflation and average productivity changes. While a somewhat sophisticated technique is used here, it is also shown that a shortcut of using changes in the average wage level can be used without losing much precision in this dataset.

Coefficients for quarterly dummies from the wage regression for full time workers are used (0.3% of the lowest wages from each quarter are removed to get rid of the wages reported as 0 or extremely low), including all of the interactions of gender, education levels and fourth order polynomial of age.

$$\ln w = \beta_0^G + \beta_{age}^G g(age) + \beta_t D_{quarter} + \epsilon$$

(3-1)

Where superscript G denotes groups formed by gender, ethnicity and education, $g(age)$ is the fourth order polynomial of age, $D_{quarter}$ denotes quarterly dummies.

In effect we find the time effects controlling for age-earning profiles which are estimated separately for all gender-education groups.

The coefficients are then adjusted with a retransformation factor of average residual for each year to eliminate the bias introduced by predicting the logarithmic value of wages, not wages themselves (in line with Duan (1983)).

$$w_a = w \frac{\exp(\beta_t) \cdot \frac{\sum \exp(\epsilon_t)}{N_t}}{\exp(\beta_{t=2009q4}) \cdot \frac{\sum \exp(\epsilon_{t=2009q4})}{N_{t=2009q4}}}$$

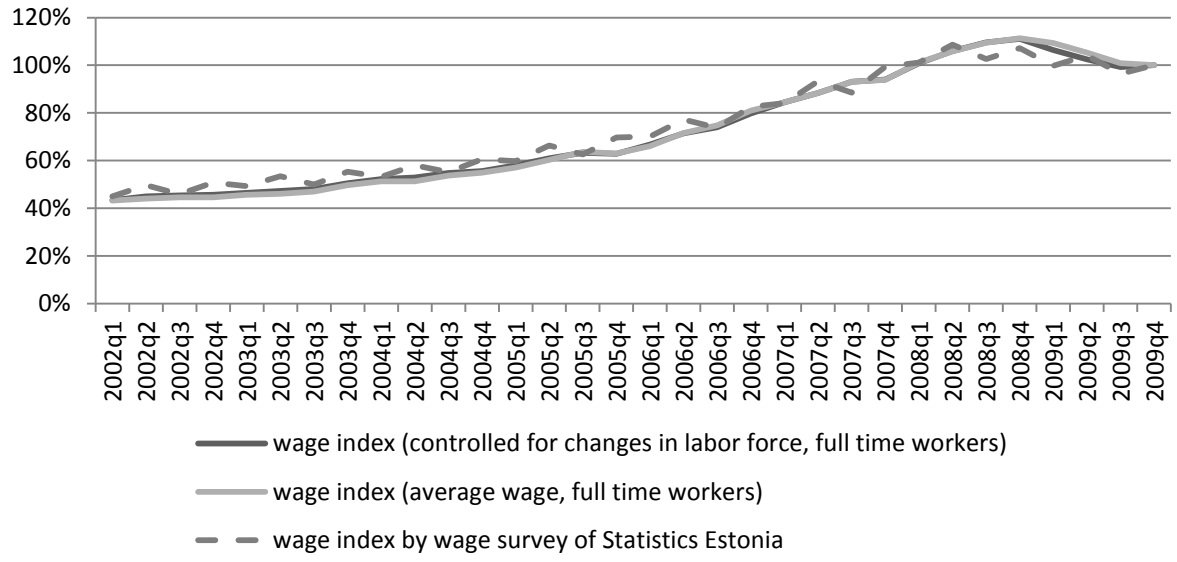
(3-2)

Where $w_a$= wage adjusted to the level of Q4 2009, exp is an operator for exponent function, $\beta_t$ = coefficient for dummy for year and quarter t, $\frac{\sum \exp(\epsilon_t)}{N_t}$ is the (weighted) average of exponents of residuals of year and quarter t.

As the time dummies are not interacted with any of the explaining variables, this estimated wage will not change the inner structure of returns to education, nor to other predictors.

The index takes into account the changes in labour force structure by age, education, gender and ethnicity. As it covers only full-time workers, it does not take into account the effect of selection to employment, unemployment or part-time employment in part that is not explained by predictors used. It is indeed possible that during the period of high unemployment the most productive workers would have lower probability of becoming unemployed and thus the wage growth will be overestimated or decline underestimated. The resulting wage index is however close to identical to the average wage index (for full time workers) in this dataset (Figure 4), meaning that changes in aggregate wages are clearly dominating the changes in labour force structure. This may not be the case in the future due to the quick decrease in the size of young cohorts entering the labour market.

**Figure 4.** Empirical wage index for full time workers (2009 Q4 = 1)




*Source: Estonian Labour Force Survey, Wage survey, authors' calculations*

Statistics Estonia uses a much larger sample, reported by firms, for its average wage calculation, also shown on the graph. The fluctuation of wages, not seen in the labour force survey data, is probably related to the seasonality of vacation pays and bonuses.

**Smoothed age-earnings profiles**

As the pooled dataset is large, we use less restrictions for age-earning profiles than standard Mincer equation, allowing the age-earnings profiles to vary for each group formed by gender, ethnicity and education level. We do not use place of residence or industry in our analysis by choice – these variables tend to be endogenous, i.e. they are chosen after the educational choices have been made

and according to the education obtained. As such, some of the effect that would be assigned to these variables would actually be the result of education.

Self-reported wage net of taxes from the main job is used as a measurement of wage (around 5% of the workforce has secondary jobs, but the wages from these are not available for the whole period).

The empirical age-earnings profiles are smoothed by local regression (LOESS) separately for each group.[13]

Wage instead of logarithm of wage is predicted due to the large sample (as wages follow a log-normal distribution, there is low probability of observing high values, which can have a big effect on the results for small sample sizes) – the tacit assumption being that the heteroscedasticity in the data comes from actual wage-forming process, not only from sampling.[14] Only the earners are considered here (the effect of unemployment and inactivity on the average earnings for each age-group is found separately).

Local regression smoothing is chosen to allow enough freedom for the functional form. These estimated functions of age-earnings profiles are strictly a convenient way of smoothing them and do not have any theoretical underpinnings. The model is not expected to perform well in out-of-sample extrapolations (like predicting the wages for 65 year olds after extension of retirement).

**Activity, employment and unemployment**

Two age-employment profiles are found. In one the share of people being employed in the whole population is considered,[15] in second the share in active labour force is found (employed and unemployed, but not inactive people). The self-reported unemployment status is used (the person is considered unemployed if he or she does not have a job, is seeking for a job and reports being ready to start working within two weeks).

From here the age-earnings profiles accounting for employment and mortality are found by multiplying the probability of being employed by the average wage for earners found in previous step and by the probability of being alive found in the Predicted life expectancy chapter.

**Payroll taxes**

We compute a rough estimate of payroll taxes for each wage earner using the tax rates currently in use (2011):

- Income tax rate ($R_{TI}$) is 21% (flat) with tax free exemption ($E_{TI}$) of 144 EUR per month.

[13] We use span=0.65 as a smoothing parameter and overweight the first four years in the labour market (by a factor of 4) to get what we consider an adequate fit for the data. R package mgcv (Wood, 2011) is used for fitting the models.

[14] If logarithm of wage is predicted the model would describe the behaviour of median wage, not average wage. This would mean that for the age-groups with higher variance of wages the wage level would be underestimated (compared to groups with lower variance of wages). We would expect the variability of wages to differ for age-groups. This can also be taken into account with explicit modelling of the changes in variance during the lifetime. In this case the log-wage would initially be predicted and then a retransformation factor for age-groups estimated similarly to what was done with time effects in previous subchapter.

[15] Note that due to inclusion criteria people who are studying in formal education until age 24 are excluded also from the whole population here. Thus we are computing the share of employment from people who are not in formal education system up to this age.

- Social contribution tax rate ($R_S$) is 33% of gross wage.
- Unemployment insurance contribution is 2.8% for employee ($R_{UE}$) and 1.4% for employer ($R_{UR}$).

There are a number of tax deductions available (tax free exemption can be carried over within a year and within partners in marriage, some of the investments into education are tax deductible etc), but these are not taken into account. Neither is the minimum of the social contribution tax (33% of the minimum wage) as it is hard or impossible to decide from the data who is or is not eligible for it. We may thus underestimate the taxes for some of the lower income people.

Income tax is found using the following algorithm:

$$T_i = \frac{\frac{w}{1-R_{UE}} - E_{TI}}{1 - R_{TI}} R_{TI}$$

(3-3)

Where $T_i$ denotes income tax, *w* is the observed wage net of taxes and other symbols are defined above.

Unemployment tax payable by employee is found using:

$$T_{UE} = \frac{w + T_i}{1 - R_{UE}} R_{UE}$$

(3-4)

where $T_{UE}$ is unemployment insurance contribution by employee, *w* is the observed wage net of taxes and $T_i$ is the income tax found previously.

The social contribution tax is found using:

$$T_S = (w + T_i + T_{UE}) * R_S$$

(3-5)

where $T_S$ is the social contribution tax.

The algorithm for finding the unemployment insurance contribution payable by employer is:

$$T_{UR} = (w + T_i + T_{UE}) * R_{UR}$$

(3-6)

where $T_{UR}$ is the amount of unemployment insurance contribution payable by employer.

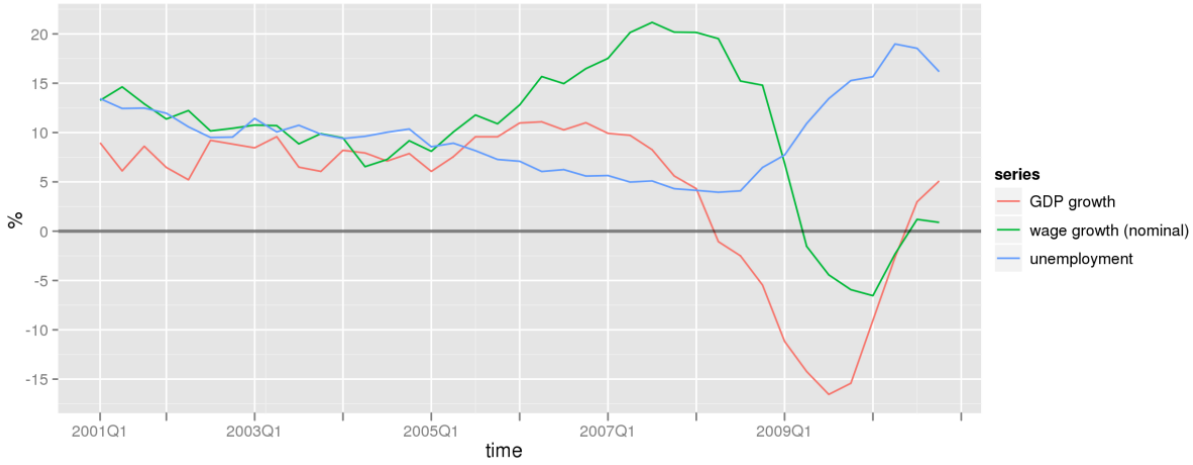
The resulting tax income per age group is then smoothed exactly as the age-earnings profiles.

As with the age-earnings profiles, new profiles accounting for employment are found multiplying the probability of being employed with average payroll tax for earners found here and with probability of being alive found in the Predicted life expectancy chapter.

## Results

Data from 2002 to 2009 is used in this analysis. During this time Estonia saw considerable economic growth, but also huge economic swings. The average yearly real GDP growth was 8.3% between 2000 and 2007, turned into recession starting with -3.6% in 2008 and reaching -14% in 2009 (Figure 6).

**Figure 5.** General economic environment in Estonia (2001-2010)




*Source: Statistics Estonia*

This has been accompanied by initial quick growth in wages followed by decline during the recession, but also by changes in unemployment and participation rates. The unemployment rate declines from 10% in 2004 to below 5% in 2007-2008 before rising sharply from the second part of 2008. Participation rate (employed and unemployed out of total labour force) rises from 64-67% before 2005 to 70-73% in 2006-2008 and reaches its minimum of 60% at the start of 2010.

This recent turbulence poses a challenge for making predictions of the wage premium offered by education level in the future. Considering the structural changes the economy is going through, the most recent information on wages should have the highest weight and estimates from previous periods should be an indicator of trends or volatility in returns to education. In current case it is not possible to discriminate the underlying trends from cyclical effects and average values between 2002 and 2009 are used. The wage level and nominal prices are anchored to 4$^{th}$quarter of 2009 in this analysis.

**Earnings and employment by education level**

Returns to education are notable in Estonia, especially for tertiary education. Figure 6 gives an overall picture of age earning profiles in the aggregated data. The graph depicts the average wage level; there is of course considerable heterogeneity within the groups (a separate chapter “School Failure and Inequality” gives an overview of earnings inequality within and between groups).

**Figure 6.** Smoothed age-earnings profiles by education and gender (2001-2009, pooled)


*Source: Estonian Labour Force Survey, authors' calculations*

*Note: structure of the wages from Estonian Labour Force Survey, pooled data from 2002-2009, wages inflated to the levels of 4$^{th}$quarter of 2009, smoothed.*

As expected, wages tend to rise quickly after entering the labour market, but cohorts over 40 have faced lower wages than younger people during this period. This may either be due to considerable structural changes or the ability of young cohorts to adapt better to the opportunities offered by economic cycle. With either explanation we should note that the wage behaviour of older generation may not be precise in predicting what will happen to the wages of younger people as they get older and we may thus be underestimating the total wage and wage differences of the current cohort in the future.

Table 2 presents the numerical values of the calculated wage gain associated with education. Tertiary education is associated with a wage gain of around one third compared to the previous level. Gains from upper secondary education are smaller but economically significant.

**Table 2.** Relative wage gain for people who are continuously employed (age 24-65, wage at higher education level / wage at lower education level - 100%), productivity level of 2009

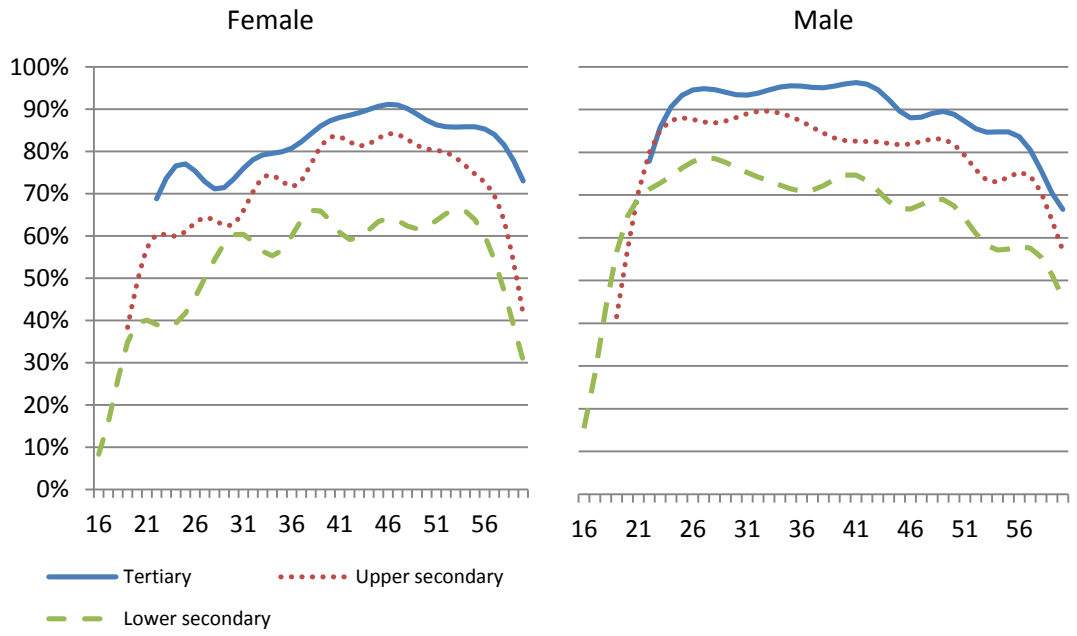
| Gender | Tertiary over upper sec | Upper sec over lower sec |
|---|---|---|
| Male | 30% | 4% |
| Female | 35% | 10% |

*Source: authors' calculations*

The values in Table 2 do not take into account the probability of being unemployed or out of the labour force, which is again strongly related to educational attainment (Figure 7). This inactivity

includes both voluntary and involuntary inactivity – child care, unemployment, also studying after age 24.

**Figure 7.** Smoothed probability of being employed by education, gender and ethnicity (2001-2009, aggregate)




*Source: Estonian Labour Force Survey, authors' calculations*

*Note: structure of employment from the Estonian Labour Force Survey, pooled data from 2002-2009.*

While the wage levels of upper secondary and lower secondary education are quite similar for some demographic groups, taking the probability of employment into account will considerably increase the empirical wage income provided by upper secondary education over lower secondary education (Table 3, these numbers also include the differences of mortality).

**Table 3.** Relative wage gain compared to lower level of education, corrected for differences in employment probability and mortality (age 24-65, productivity level of 2009)

| Gender | Tertiary over upper sec | Upper sec over lower sec |
|---|---|---|
| Male | 52% | 35% |
| Female | 66% | 46% |

*Source: authors' calculations*

**Economic value of investment in education in Estonia**

Combining the two numbers, the probability of being employed and average wage, the expected private wage benefits associated with educational attainment can be found.

Assuming that the structure of wages will remain the same in the future as they were during this period and that the Estonian economy will continue to grow in line with the long run estimates used by the government, we can compute the two main characteristics making education comparable to

other investment choices and finding the economic value of investment in education. First the internal rate of return, which states the discount rate leaving the net present value of investment equal to zero.

Considering only the alternative costs, namely wages that would have been earned during the studies[16] (for upper secondary education the wages of people with lower secondary education for ages 15-18 are considered, for tertiary education salaries of 19-21 year old employees with higher secondary education), and expecting the inactivity to be voluntary (apart from unemployment), the internal rate of return estimates are given in Table 4.

**Table 4**. Internal rate of return for education, voluntary inactivity

| Education level | Female | Male |
|---|---|---|
| Upper secondary (at age 16) | 10% | 10% |
| Tertiary (at age 19) | 21% | 17% |

*Source: authors' calculations*

The returns will be much higher if being out of the labour force is not considered voluntary (Table 5).

**Table 5**. Internal rate of return for education, involuntary inactivity

| Education level | Female | Male |
|---|---|---|
| Upper secondary (at age 16) | 43% | 19% |
| Tertiary (at age 19) | 29% | 23% |

*Source: authors' calculations*

It is clear that some cases of being out of labour force are indeed voluntary (taking care of young children) and this probably affects the second set of estimates a lot. As these calculations rely heavily on opportunity costs – earnings during the time which would be otherwise spent studying, it is dependent on the reasons why people with lower secondary education are not studying and not working. For females, the reason for dropping out and being inactive (neither working nor searching for a job) is probably child care and these estimates for females are thus not correct (as most of the students will not consider either studying further or having a child). Estimates for males provide a more adequate measure. It shows that investment in upper secondary education is comparable of other investment opportunities, providing a 19% annual return (or is rational if people discount their future revenues by less than 19% per year).[17]

An alternative way to measure the value of investment is deriving the net present value (discounted sum of initial costs and future revenues) for a given discount rate. This is interpretable as the maximum investment that would still leave the project economically profitable.

Large government investment projects use a relatively high discount rate of 6% in Estonia. This is due to Estonia's rapid catch-up growth which has presented a number of highly profitable investment opportunities. Developed countries use usually much lower discount rates for social projects and it

[16] This is a reasonable simplification for upper secondary education, which is provided by state.
[17] These estimates are rather unstable, but remain above 10-15% for different sets of assumptions.

would be rational to expect that the discount rate falls during the period in question. Table 6 reports the NPV for 6% discount rates, Table 7 for 3% as a comparison.

**Table 6.** NPV of investment in next level of education (EUR), 6% discount rate

| Gender | Tertiary over upper sec | Upper sec over lower sec |
|---|---|---|
| Male | 55,000 | 24,000 |
| Female | 42,000 | 20,000 |

*Source: authors' calculations*

**Table 7.** NPV of investment in next level of education (EUR), 3% discount rate

| Gender | Tertiary over upper sec | Upper sec over lower sec |
|---|---|---|
| Male | 114,000 | 52,000 |
| Female | 83,000 | 41,000 |

*Source: authors' calculations*

These estimates can be considered to be as the values of investment opportunities. If completing upper secondary education costs less than EUR 20,000 for a female (with foregone earnings already considered and with the discount rate of 6%), then it would be rational for her to make the investment and continue the path (even without taking into account the possibility of continuing to tertiary education). The value has been higher for males during the last decade.

**Estimations for the cohort of current early school leavers**

We estimate the composition of early school leavers from the same dataset, acknowledging that the results are not very accurate – the youngest cohorts are notoriously hard to reach with a survey based on address data as these are the ones most mobile. We use data pooled over the last five years available (2004-2009) and define early school-leavers as people aged 18 to 24, not currently studying and not having obtained upper secondary education.

There are a total of 2,429 persons matching the description in the survey data, more than 2000 of them having lower secondary education, 400 having basic or less. Table 5 provides an expansion of the sample to the whole population. While this information can be used for calculating gender distributions of early school leavers, the absolute figures will lead to significant overestimation of future early school leavers, as the size of cohorts currently graduating from lower secondary education is half the size it used to be a couple of years ago. In order to correct for this, the average size of the cohort currently in basic, primary and lower secondary education is used. In 2011, this figure was 12,500 persons. In 2010, 11.6% of the population aged 18-24 was early school leavers. Assuming that the same rate will hold also for coming years then altogether 1,450 could be considered early school leavers in 2011. This estimate will be used for calculating yearly total costs of school failure.

The estimate of the total net present value of earnings-related benefits from reaching upper secondary education for half of the people who have obtained lower secondary education (725 people, current division of early school leavers between groups is assumed) would be **16.5 mil EUR (23,000 EUR per person)** with 6% discount rate and **35.2mil EUR (49,000 EUR per person)** with 3%

discount rate. This should be considered the upper bound, as the differences in ability have not been taken into account.

**Table 8**. Estimation of the number of early school leavers for each birth year (18-24 year olds, 2004-2009)

| Group | With lower secondary education | % | Early school leavers in 2011 |
|---|---|---|---|
| Male | 2,299 | 68% | 994 |
| Female | 1,065 | 32% | 456 |
| Total | 3,364 | 100% | 1,450 |

*Source: authors' calculations*

**Additional tax revenue**

In addition to private benefits for people attaining upper secondary education, the government can gain an increase in payroll tax receipt due to the higher productivity of labour force. If the tax structure remains the same (with the tax exemption growing in line with average wage growth), the increase in NPV of future taxes is presented in Table 9 (discounted by 6%) and Table 10 (discounted by 3%).

**Table 9**. NPV of future taxes (EUR) per school leaver, 6% discount rate

| Gender | Tertiary over upper sec | Upper sec over lower sec |
|---|---|---|
| Male | 39,000 | 17,000 |
| Female | 29,000 | 13,000 |

*Source: authors' calculations*

**Table 10.** NPV of per capita future taxes (EUR) per school leaver, 3% discount rate

| Gender | Tertiary over upper sec | Upper sec over lower sec |
|---|---|---|
| Male | 80,000 | 37,000 |
| Female | 58,000 | 28,000 |

*Source: authors' calculations*

If people who fail to complete upper secondary education behaved similarly to graduates in the labour market after completion, then these values would be the direct financial gain (as net present values) for state in taxes for each person according to historical data of wage behaviour and current prediction of future economic conditions. The average current early school leaver costs the state up to **EUR 15,000** in foregone revenue in future taxes using the higher 6% discount rate.

Halving the previously estimated group of early school leavers could provide up to **11.4 mil EUR** NPV in payroll taxes (discounted by 6%). Together with private benefits, the total net present value would be **27.5 mil EUR or 38,000 per each pupil graduating** (Table 11 lists the numbers for both discount rates).

**Table 11**. NPV from increase of earnings

| | Estimate of the number of early school leavers in 2011 | Value from increased earnings (private earnings and tax revenue) if half of the people with only lower secondary education obtained upper secondary education, EUR | |
|---|---|---|---|
| | | Discount rate 6% | Discount rate 3% |
| Men | 994 | 20,370,000 | 44,200,000 |
| Women | 456 | 7,530,000 | 15,800,000 |
| TOTAL | 1,450 | 27,900,000 | 60,000,000 |

*Source: author´s calculations*

## Constraints and limitations

The usual constraints and limitations apply – we cannot control for selection effects and we do not know the future using data from present day instead.

Education itself is not always the only cause of the benefits shown here. While education increases productivity and thus salaries, people with better education tend to have higher innate abilities on average to begin with. Without controlling for these abilities, the direct causal effect of education cannot be shown.

It is also possible, that the abilities interact with education in exactly the opposite way with the people in question – education may well be crucial for overcoming deficiencies that will lead to school failure in the first place.

The only way to really estimate causal effect of policy interventions is to use some kind of experimental settings. As the interventions are planned and phased in there should be considerations for designing the initial evaluation (forming treatment and control groups among the first cohorts affected). Sometimes things that work are counterintuitive (increasing, not decreasing the demands of curriculum can work for some people at the risk of early school leaving) and ideas that should self-evidently work fail to do so.

## 3.2. Effect of education on health costs

### Introduction

For the individual person, health is probably one of the most important topics. Almost everybody prefers good health to bad. Although health is considered an important topic also at the government level, measuring health and incorporating this information into investment decisions is quite complicated. In order to assign monetary value to different health conditions, Grossman (1972) has proposed the concept of **health capital**. Grossman (1972) proposes to treat a person's health as a stock that degrades in time. A person can influence his or her health by making investments into health (e.g. by regular exercise, healthy nutrition and proper medical treatment). If one is familiar with financial analysis, then this approach is similar to the behaviour of capital in a company – over time, equipment depreciates and the capitalist can increase or sustain the level of capital by making investments. This similarity is also the reason why the term health capital is used.

There are several mechanisms through which schooling might directly and indirectly influence health capital. Grossman (1972) proposes that **education can improve personal technology for health production** by altering either productive or allocative efficiency. Under this concept a person 'produces' his or her own health, using for this various inputs (e.g. work, exercising, health services, and medication). Productive efficiency means that he or she is able to use the same components more effectively. Allocative efficiency means that education gives to a person more knowledge allowing them to change the mix of inputs that are used for producing health, and as a result of this relocation better state of health is achieved.

The relationship between education and health **may not be a causal one**, or at least the causality needs to be verified. In her recent study, Silles (2009) brings out several arguments that have been proposed in order to explain strong correlation between education and health (Silles, 2009, p. 123):

> *"The improvements in health observed as a result of schooling may simply reflect a third factor which causes more investment in both schooling and health. ... individuals with low discount rates are more likely to invest in education and more likely to invest in health. Cognitive ability is also a possible third variable. Smarter individuals are more likely to obtain more education and also live a healthier lifestyle. Another potential omitted variable is initial health endowment, which has been shown to be a clear protective against poor health later in life. The presence of third variables and any reverse causality would result in simple estimates of the effect of schooling on health to bias the effects of schooling. Finally, measurement error in the schooling variable could cause either an upward or downward bias in the estimated causal effect of schooling."*

The discussion of causality vs. correlation is important in the discussion of resource allocation at the government level. If the desire of policy makers is to have a healthier population, then, if education has a causal effect on health, maybe more resources should be put into education instead of health system. Despite relatively intense discussions, literature reviews (e.g. Grossman (2004)), suggest that there is a strong causal component between schooling and health.

## Method

In the current analysis, the basic concept behind assessing the effect of education on health cost is based on estimating the expected differences in health capital by education levels. In estimating the value of health returns of schooling we are going to follow in the footsteps of Cutler, Richardson, Keeler, & Staiger (1997) and Groot & Maassen van den Brink (2007).

The health capital is defined as "the utility resulting from the stock of current and future quality-adjusted life years" (Cutler, Richardson, Keeler, & Staiger, 1997, p. 226). It is possible to show that the level of health capital at specific age can be found according to following equations (Cutler, Richardson, Keeler, & Staiger, 1997, p. 232):

$$HC_{EL,g,a} = \left(\frac{U_H}{U_c}\right) \times E_t \left[\sum_{s=0}^{\infty} \frac{H_{EL,g,a+s}}{(1+r)^s}\right]$$

(3-7)

where $HC_{EL,g,a}$ is expected value of health capital at age *a* for gender *g*, at education level *EL*. $\frac{U_H}{U_c}$ is the marginal rate of substitution between health and consumption,[18] $H_{EL,g,a+s}$ is the person's health at age *a+s* (for the specific gender and education level) and *r* is the discount rate. To put it in a simplified manner – the first component of the equation ($\frac{U_H}{U_c}$) is the money value of consumption (say EUR 1,000) a person is willing to sacrifice for an additional unit of health and the second component is the sum of expected units of health over the life cycle.

In the current analysis, focus will be on the differences in health capital at a specific age in a specific year by education level. The health cost of school failure per one person will be calculated as follows:

$$Per\ capita\ HCSF_{EL,g,a} = HC_{EL,g,a} - HC_{EL-1,g,a}$$

(3-8)

where *per capita HCSF* denotes a per capita health capital loss from not having education level *EL*. This equation allows estimating differences in heath capital for different education levels. However, as school failure usually refers to the failure of not having obtained upper secondary education, *per capita HCSF* is measured as the difference between the health capitals of people who have obtained upper secondary education compared to those who have obtained lower secondary education.[19]

So far we have not addressed the issue of how $H_{EL,\ g,a}$ (units of health at specific age) is measured. $H_{EL,g,a}$ can be understood as the quality of health at a specific age. In order to simplify the calculations, we can normalize it to have values between *0* and *1,* where *1* denotes the units of health of a person with perfect health and 0 is the health of a persons who is in a near-death state.

[18] If health is measured in life years, $\frac{U_H}{U_c}$ is the money value of additional life year.

[19] Differences between other levels of education will also be estimated. However, these estimates will not be referred to as school failure costs.

The most basic approach would be to assume that $H_{EL,g,a}$ takes only two values – *1* if person is alive and *0* if otherwise. Let's call this the years of life approach (YOL). If $H_{EL,g,a}$ is a binary variable, then the health at age *a+s* is equal to:

$$H_{EL,g,a+s} = Pr(Alive)_{EL,g,a+s}$$

(3-9)

The equation (3-7) can then be rewritten in the following form:

$$HC_{EL,g,a} = \left(\frac{U_H}{U_c}\right) \times E_t \left[\sum_{s=0}^{\infty} \frac{Pr(Alive)_{EL,g,a+s}}{(1+r)^s} | Alive_a\right]$$

(3-10)

where $Pr(Alive)_{EL,g,a+s}$ is the probability of being alive at age*a+s* for gender *g* at education level *EL*. If discount rate is equal to zero, and we looked at for example 25 year old people who have upper secondary education, then the second term of the equation is simply life expectancy of 25 year olds with upper secondary education.

The probabilities of being alive at specific age *a+s* will be calculated based on the following equation:[20]

$$Pr(Alive)_{EL,g,a+s} = \prod_{j=0}^{s} \left(1 - \frac{D_{EL,g,a+j}}{P_{EL,g,a+j}}\right)$$

(3-11)

where $D_{EL,g,a+s}$ is the number of deaths at age a*+s* for specific gender *g* at education level *EL* and $P_{EL,g,a+s}$ is respective the total population for this socio-demographic group at age *a+s*.

Next, we will discuss how to obtain the value of $\frac{U_H}{U_c}$. Firstly, it is assumed that the marginal rate of substitution between health and consumption is constant over the life cycle. Secondly, we need an estimate for the value of statistical life that could be used for deriving the value of additional life year. There are several ways for calculating value of statistical life and it is difficult to provide conclusive evidence for supporting one specific methodology. Today there is no commonly accepted value of life that is used in health studies in Estonia. In the current analysis the value of statistical life is assumed to be the same as has been used in several cost-benefit analyses of large transport infrastructure projects in Estonia. The main justification of this approach is that both education as well as infrastructure can be considered as investments that in theory compete for same financial resources. Thus, the basic assumptions (including also the value of statistical life) should be the same. The detailed methodology of how the value of statistical life is calculated will not be described in this report. The reader can refer to Nellthorp, Sansom, Bickel, Doll, & Lindberg (2001) for more details. The value of an additional life year will be derived from the value of statistical life according to the following equation:

[20]Here we concentrate on the probabilities to be alive of these persons who were alive at age *a*.

$$Value\ of\ life\ year = \frac{r \times Value\ of\ statistical\ life}{1-(1+r)^{-v}}$$

(3-12)

where *r* is discount rate and *v* is life expectancy. It is important to keep in mind that if a single value of statistical life (for all age groups) is derived from willingness to pay studies, the life expectancy used for deriving the value of life year should reflect the life expectancy of the sample that was used for deriving the willingness to pay figures. If one used life expectancy at birth for making these calculations, then the value of life year would be underestimated.

The previously mentioned YOL approach treats the quality of health considering it a binary variable (person is either dead or alive). However, not all persons alive are in perfect health. A person who suffers from cancer could be considered to enjoy a life year less than a person who is at perfect health. Thus, instead of allowing $H_{EL,g,a}$ to have only two values we will modify the YOL approach by letting the quality of health have values also between 0 and 1, depending on the person's health. So in addition to previously listed probabilities of being alive, one must also take into account the probabilities of having a medical condition and the impact of this medical condition on person's quality of life. The following is a modified version of (e.g. Cutler & Richardson, 1998, p. 98)):

$$H_{EL,g,a+s} = \Pr(Alive)_{EL,g,a+s} \times \frac{\left[N + \sum_{I=1}^{N} Pr(I)_{EL,g,a+s} \times QALY_I\right]}{N}$$

(3-13)

where $Pr(I)_{EL,g,a+s}$ is the probability of having a medical condition *I* at age *a+s* (for a specific education level and gender). $QALY_I$ indicates the quality of health weight (between 0 and 1) for a year lived with condition *I* and *N* is the number of different medical conditions that are included in the analysis. The difference with original Cutler & Richardson (1998) is that the QALY weight is considered to be time-invariant. Also, the second term in the equation is corrected because without taking into account the number of diseases (*N*) under consideration it is technically possible to have negative health $H_{EL,g,a}$. To illustrate the former equation with a simple example, let's assume that people in a specific socio-demographic group will have a 10% probability of having high blood pressure and this probability does not change over time. If high blood pressure is the only medical condition that people can have and having this condition will reduce the quality of health by 15%, then each life year is not counted as 1 but instead as 0.985.[21]

There are, however, problems with this kind of approach. With small datasets the conditional probabilities of having certain medical conditions tend to have very large confidence intervals and variability, as there are too few observations. An alternative approach is needed. One way to get around this problem is to skip the information on health conditions from the equation and calculate the QALY weights directly for education levels. The equation (3-13) takes the following form:

$$H_{EL,g,a+s} = \Pr(Alive)_{EL,g,a+s} \times QALY_{EL,g}$$

(3-14)

[21] 1*(1+0.1*(-0.15))=0.985

where $QALY_{EL,g}$ is the quality of health for gender $g$, at education level $EL$.

The final step is to estimate the QALY weights. Again – there are several methods that can be used for assessing the impact of a medical condition on a person's health quality. In Estonia Vals (2005) has used weights for conditions that were constructed according to the methodology of Global Burden of Disease and were adjusted for local conditions. In short, these weights were constructed based on health professionals' expert opinions. In the current analysis, the distribution as well as nomenclature of medical conditions is derived from self-reported data in health survey (more specifically Estonian Health Survey). Thus, the best approach seems to be to derive also the QALY weights from this data. This approach has also been used by several other authors (e.g. Cutler *et al.*, 1997).

The QALY weights are found based on a slightly modified approach of Groot and Maassen van den Brink (2007). In empirical settings, three concepts of health quality are distinguished. The first is the true quality of health $h^*$ - this cannot be observed directly (persons with different characteristics can have different true quality of health while having the same diagnosis). However, we do observe the objective measure of the health status of the individual ($h_o$), and a self-reported quality of health ($h_s$) (The Estonian Health Survey asks people to assess their health in 5 level scale (excellent, very good, good, fair, or poor)). The objective health measure $h_o$ refers to the prevalence of diseases and handicaps among the respondents in our sample. The latent quality of the health variable is assumed to be determined by the prevalence of diseases and other individual characteristics (Groot & Maassen van den Brink, 2007, p. 193):

$$h^* = \beta_0 + \beta_1 S_r + \beta_2 S_f + \beta_3 S_m + \beta_4 h^0 + \beta_5 X + \epsilon$$

(3-15)

where $S_r$ is years of schooling of a person, $S_f$ and $S_m$ are the years of schooling respectively for father and mother, $h^0$ is the vector of medical conditions and $X$ denotes other socio-demographic characteristics like marital status and mother's and father's birth country. The self reported health status is a categorical ordered response variable. The observed health variable is assumed to be related to the latent variable in the following way: $h_s=i \leftrightarrow \alpha_{i-1} < h^* \leq \alpha_i,\ i=0,..,n.$ The number of response categories in the SRH scale is denoted by $n$, $\alpha_i$ are threshold levels that demarcate the different response categories. The model is estimated as an ordered probit model.

We will use a slightly modified version of this equation. Firstly, our focus in on the education level of a person (instead of years of schooling). Secondly, we are not going to include the medical conditions in equations. Groot & Maassen van den Brink (2007) also estimate two versions of the model (one with medical conditions included and one without them) and call the estimates from the version without medical conditions as the maximum estimate of QALY weights of education. As the probability of having medical conditions is also related to education, it seems unreasonable to control for the effect of medical conditions in advance.[22]

[22] Groot & Maassen van den Brink (2007) control for medical conditions mainly because they believe that this can distort the person's assessment of his or her health condition.

The problem with the previously mentioned probit model estimates is that the coefficients of different medical conditions ($\beta$) are not normalised to have value between 0 and 1 between (as is necessary for using it as a QALY weight). In order to overcome this obstacle the QALY weight is derived from $\beta$ in the following manner:

$$QALY_I = \frac{\beta_I}{\alpha_4 - \alpha_1}$$

(3-16)

where $\beta_I$ is the coefficient from probit estimation of modified version of (3-15). $\alpha_1$ and $\alpha_4$ are the cut points between categories. If one wishes to estimate also the statistical significance of QALY weights, the standard errors can be calculated in the following manner (Gunji & Hanaoka, 2004, p. 4):

$$SE_z = \left[\frac{\sigma_1}{\delta^2} + \frac{\beta^2\sigma_2}{\delta^4} - \frac{\beta^2(\sigma_2)^2}{\delta^6}\right]^{\frac{1}{2}}$$

(3-17)

where $\delta = \alpha_4 - \alpha_1$ and $z=\beta/\delta$ and $x_1 \sim N(\beta, \sigma_1)$, $x_2 \sim N(\delta, \sigma_2)$.

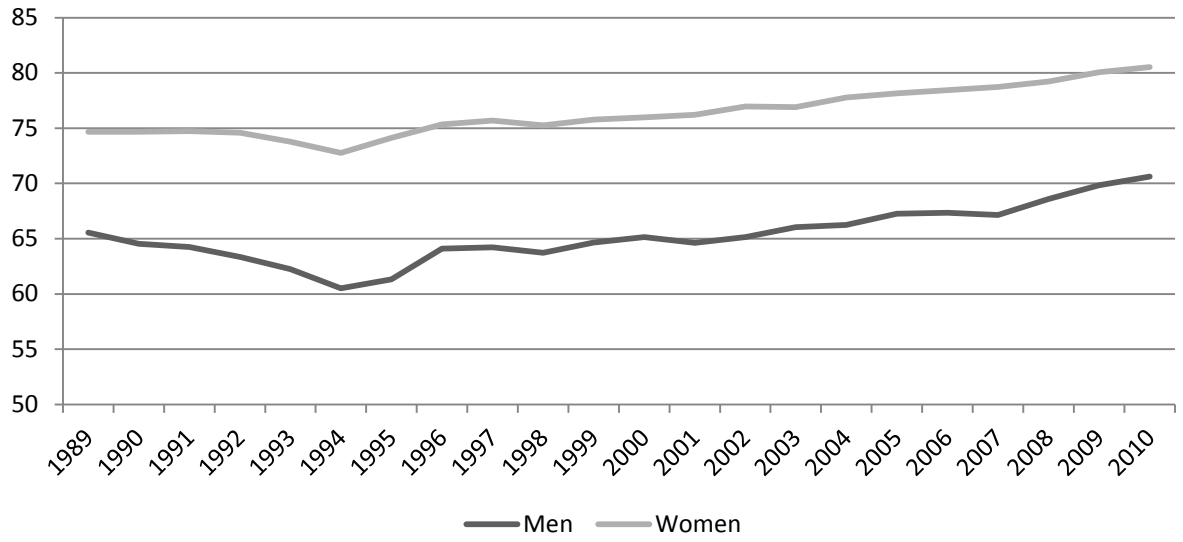
## Results

**Life expectancy**

During the years of independence, trends in Estonian life expectancy have gone through remarkable changes. Until 1994 life expectancy at birth (especially for men) decreased substantially (a phenomenon that could be observed also in other post-Soviet countries), being followed by quite steady growth from 1995 onwards. The differences between male and female life expectancy have slightly decreased since second half of the nineties, however even in 2009 women outlived men by more than 10 years.

Differences in life expectancy between education levels in Estonia have received somewhat lower attention. A few authors have shown that more educated people have also higher life expectancy (e.g. Leinsalu, Vågerö, & Kunst, 2003). These findings are mostly based on population census data from years 1989 or 2000. The main reason why population census data is necessary for estimating life expectancy by education level is the lack of good quality data on distribution of population by education levels. Unfortunately, the last population census was 10 years ago. The next population census in Estonia will take place in the beginning of 2012.

**Figure 8.** Life expectancy at birth, by gender



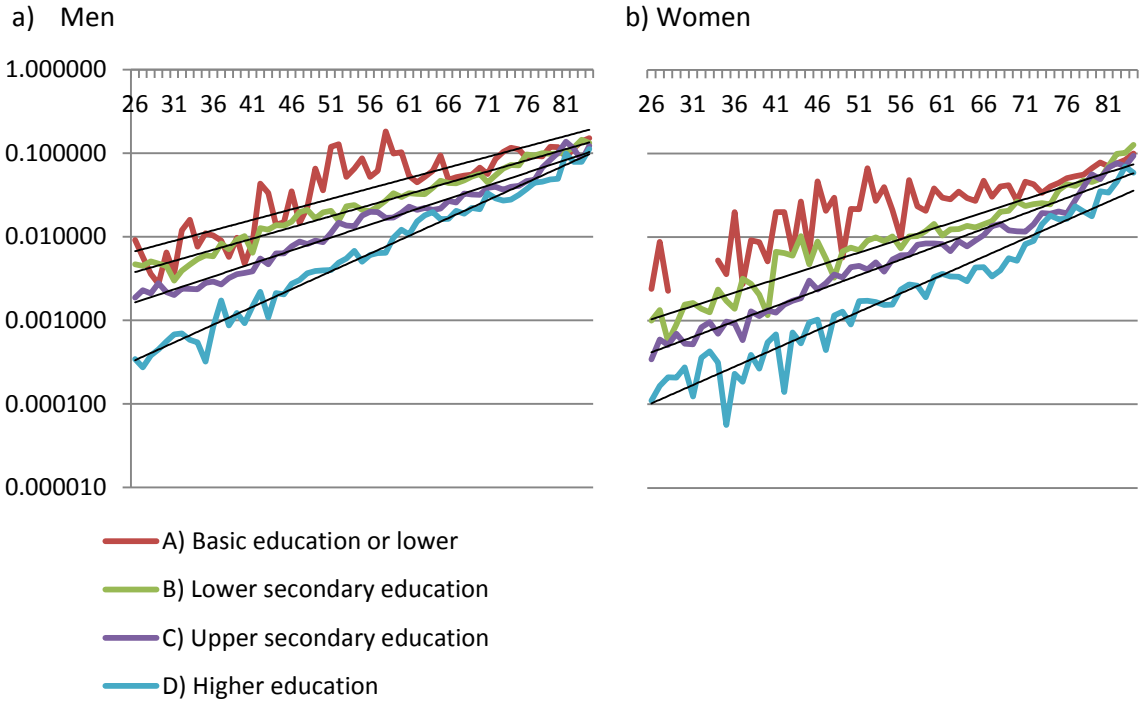

*Source: Statistics Estonia, online database*

The current analysis uses data from the Estonian Social Survey[23] (from years 2004-2008) for estimating the distribution of the population by education levels and, combining this data with number of deaths for specific socio-demographic group (obtained from Statistics Estonia), constructs mortality rates and expected life years. As it is reasonable to assume that the effect of education on health can kick in only after one has obtained the education and even then probably not immediately, the analysis focuses on those 25 years old and older. The choice of concentrating on expected health capital of 25 year olds[24] is somewhat arbitrary. However, as differences in health capital will be also calculated for other education levels (including higher education vs. upper secondary education) it cannot be significantly lower than 25 years. It is also important to keep in mind that the mortality rates are only observed up to age 84 – from there onwards the number of observations in the Estonian Social Survey becomes too small for using this data. This also affects the life expectancy figures of 25 year olds – they will be slightly shorter than those obtained from datasets that include also the population figures of older persons.

[23] The Estonian Social Survey is conducted on a yearly basis by Statistics Estonia with the aim to receive information on income and living conditions of Estonian residents, on inequality and poverty in the country. It includes approx. 11,000 observations for individuals.

[24] The same age is used for calculating differences in life expectancy for different levels of education by Leinsalu, Vågerö, & Kunst, 2003.

**Figure 9.** Mortality rates, by education level[25] and gender (2004-2008 average)




*Source: Statistics Estonia, authors' calculations*

Figure 9 lists mortality rates by education level. These are unsmoothed rates and are presented on a logarithmic scale. As one can see, there are clear differences in mortality by education levels. Also, for women mortality rates are systematically lower than for men. On the logarithmic scale, mortality rates for education levels B, C and D are more or less linear.[26] However, for men with basic education there is a clear "bump" between age 45 and 65 indicating significantly higher mortality rates. When looking at the causes of death, then injury and poisoning is peaking at age 50-54 and mental and behavioural disorders (including misuse of alcohol) at age 55-59, with injury and poisoning being probably the main reason for the "bump" in mortality rates. The main causes of death from 55 onwards are diseases of circulatory system and neoplasms. However, they seem to follow exponential growth over the life cycle and are probably not the main reason for the hike in mortality rates around 55-64.

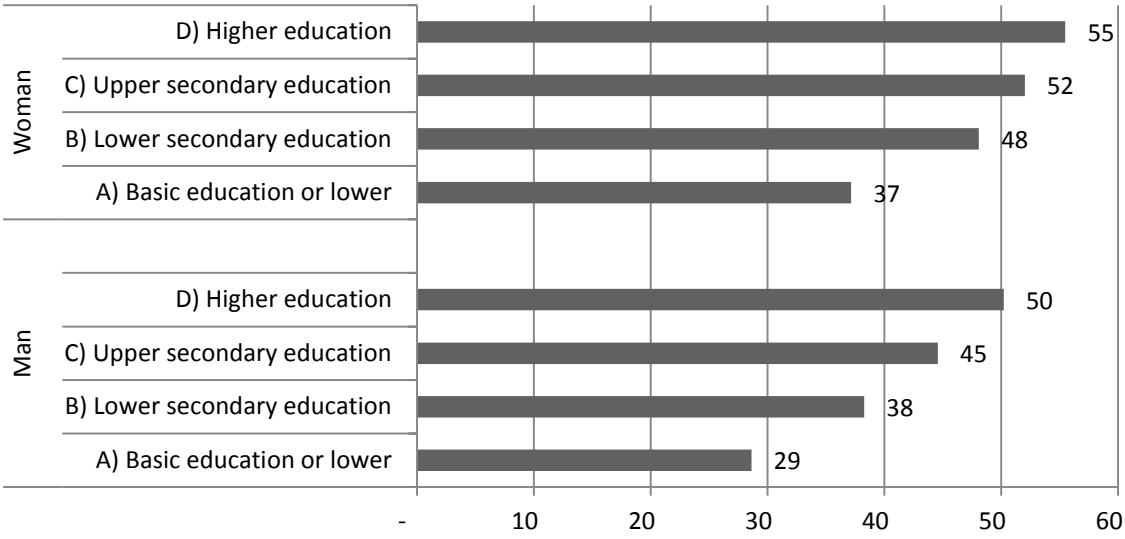
Life expectancies by education level are listed in Figure 10. Differences in life expectancy between upper secondary and lower secondary education are 4 years for women and 7 years for men. There are also significant differences in life expectancy between other levels of education. Life expectancy is lowest for people with basic education. It should, however, be kept in mind that the number of

[25] The mortality rates of post-secondary vocational education which in our analysis is classified as higher education shows for some reasons anomalously high mortality rates. As this is probably a result of technical problems in matching education classification between different data sources, the figures for higher education (when speaking of mortality rates and life expectancy) do not include post-secondary vocational education.

[26] Meaning that on a non-logarithmic scale the relationship between age and mortality rate is exponential.

observations of people with basic or lower education in Estonian Social Survey is very small and this influences the reliability of both mortality rates as well as life expectancy figures.

**Figure 10.** Life expectancy at age 25, by gender and education level[27]




*Source: Statistics Estonia, authors' calculations*

**Quality adjusted life years**

As already mentioned, a person's quality of life can be influenced by his or her health. There are several ways for taking this into account while estimating the levels of health capital. One can predict the probability to have a certain medical conditions and then calculate quality adjusted life year (QALY) weights for these conditions. The current analysis uses the Estonian Health Survey[28] for information on person's state of health. However, the list of potential medical conditions is quite long and number of observations in Estonia Health Survey is only slightly above 6,000 observations. For rarer medical conditions the number observations becomes too small and the results will be unreliable. Thus, the QALY weights are not linked with specific medical conditions, instead they are found for education levels. This method should bring together both differences in prevalence of diseases as well as the impact of these diseases on quality of health.

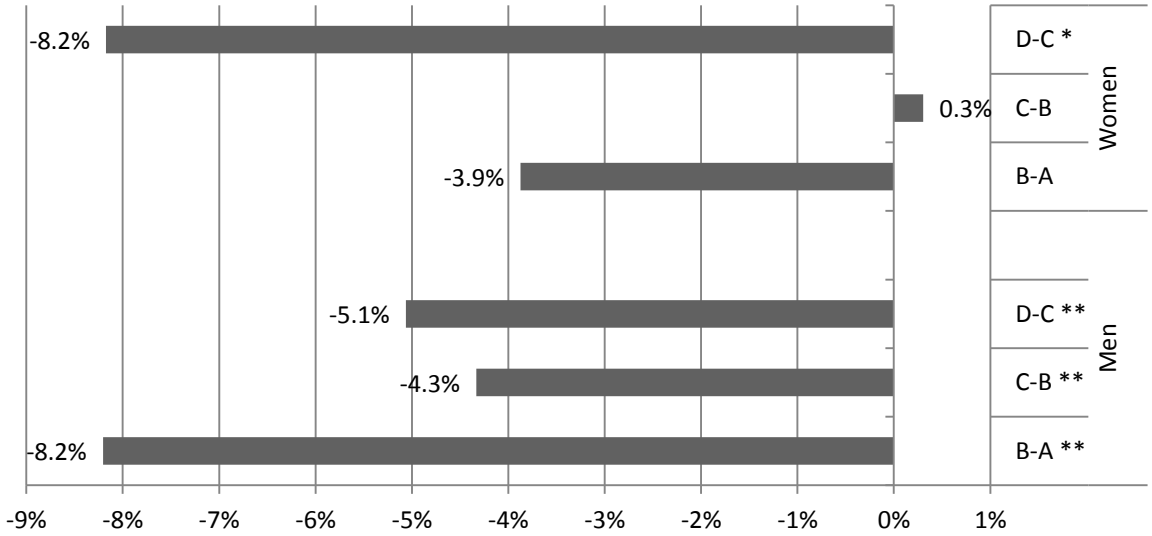
The results are listed in Figure 11 (more detailed estimation results can be found in the Appendix of this chapter). Horizontal bars on the figure depict the difference in quality of life between education levels. For example, for men with lower secondary education failing to obtain upper secondary education (denoted in the figure as C-B) brings about a 4.3% decline in QALY weight. This means that each year of life of a person with lower secondary education in comparison with upper secondary education is considered 4.3% shorter due to lower quality. The stars behind education levels denote the statistical significance of the effect. As one can see, at a 5% confidence level for men the

[27] In calculating life expectancy only people up to 84 years are includes. The reason for this is that in Estonian Social Survey number of observation of people more than 85 years old is low and mortality rates become unreliable.

[28] Estonian Health Survey was conducted in 2006, Estonian National Institute for Health Development. It includes ca 6400 observations. A detailed description of the data can be found in Matsi *et al.* (2009).

differences in quality of life are statistically significant for all education levels. However, for women at 5% confidence level the effects are insignificant.

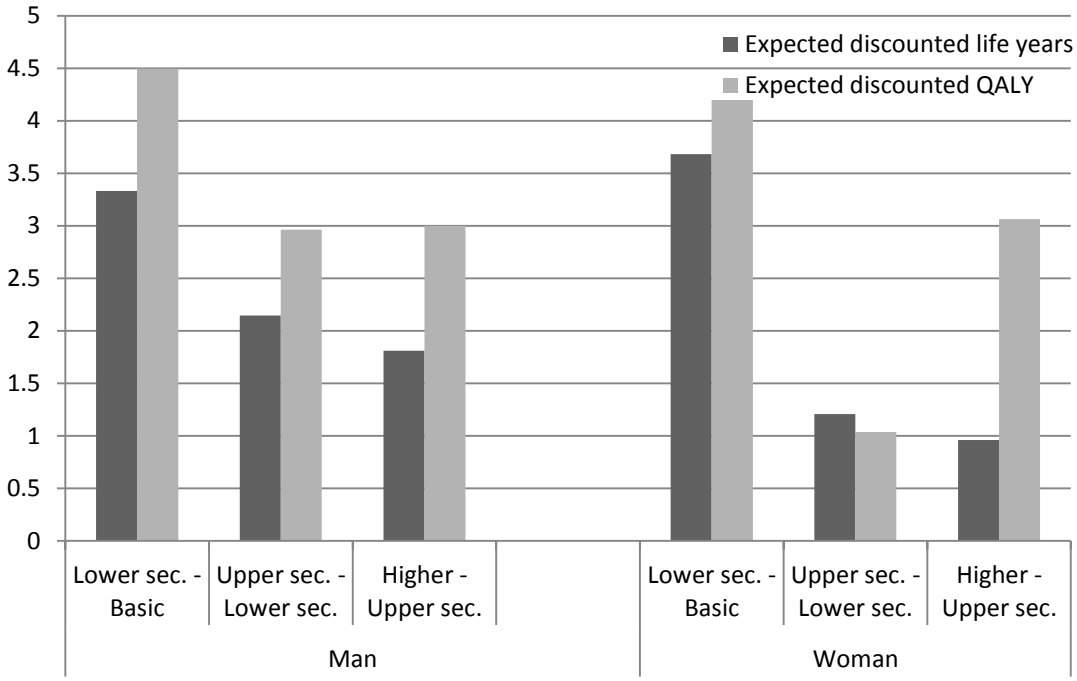
**Figure 11.** QALY weights, by gender and education level




* significant at 10% confidence level, ** significant at 5% confidence level, *** significant at 1% confidence level.

*Source: Estonian Health Survey, authors' calculations*

**Figure 12.** Differences in discounted life years and in discounted quality adjusted life years at age 25, by gender and education level, discount rate 3%




*Source: Estonian Health Survey, authors' calculations*

Figure 12 lists differences in discounted expected and quality adjusted life years for men and women by level of education. There is an approximately 3-year difference in quality adjusted life expectancy of 25 year old men who have obtained upper secondary education when compared to men who have obtained lower secondary education. For women, the difference between these education levels is slightly more than 1 year. With 6% discount rate, the respective figures would be 1.4 and 0.4.

The next step is to assign monetary values to QALY in order to obtain estimates for health capital. The monetary value of an additional life year is derived from the value of statistical life. In this project we use the same values as has been used in several cost benefit analyses of large transport infrastructure projects in Estonia. The methodology comes from the UNITE project.[29] The figures are the following:

- Value of statistical life:[30] approx. 815 thousand EUR in 2010 prices;
- Value of statistical life year: approx. 40,770 EUR in 2010 prices (3% discount rate).[31]

**Table 12.** Differences in health capital by education level

| | Education levels | Difference in quality adjusted life years at age 25 | | Difference in health capital per person, EUR (2010 prices) | |
|---|---|---|---|---|---|
| | | Discount rate 3% | Discount rate 6% | Discount rate 3% | Discount rate 6% |
| Man | B-A | 4.5 | 2.2 | 140,518 | 77,126 |
| | C-B | 3.0 | 1.4 | 92,542 | 49,740 |
| | D-C | 3.0 | 1.4 | 102,446 | 59,777 |
| Woman | B-A | 4.2 | 1.9 | 131,180 | 65,048 |
| | C-B | 1.0 | 0.4 | 32,364 | 12,563 |
| | D-C | 3.1 | 1.6 | 104,570 | 65,569 |

*Source: authors' calculations*

When using these values, the differences in health capital by education levels are the following (see Table 12). For a man, obtaining upper secondary education will increase the expected health capital by approx. EUR 92,500. For a woman, the figure is approx. EUR 32,400 (at a 3% discount rate). The respective figures for 6% discount rate are approx. EUR 50,000 and EUR 12,500.

If half of early school leavers in 2011 achieved upper secondary education, the health capital gains from this would be **approx. 53.4 mil EUR** (when using a 3% discount rate), or **27,6 mil EUR** when using a 6% discount rate.[32]

[29] Unification of accounts and marginal costs for transport efficiency.

[30] In order to provide some upper and lower bounds for the value of statistical life, we again use the values from the UNITE project where the upper bound is 167% and the lower bound is 50% of the value of statistical life used in this project.

[31] The value of life year is derived by applying equation (3-12) to the value of statistical life obtained from the UNITE project. As the value of statistical life in the UNITE project was originally designed for accounting for fatalities in road accidents, the life expectancy of a person of average age of road accident victims in Estonia was used. The average road accident victim in Estonia in 2010 was 47 years old and the average life expectancy at age 47 in year 2010 was 31 years.

**Table 13.** Yearly cost of school failure from lost health capital

| | Estimate of the number of early school leavers in 2011 | Value of gained health capital if half of the people with only lower secondary education obtained upper secondary education, EUR | |
|---|---|---|---|
| | | Discount rate 6% | Discount rate 3% |
| Man | 994 | 24,709,442 | 45,971,963 |
| Woman | 456 | 2,867,306 | 7,386,473 |
| TOTAL | 1,450 | 27,576,748 | 53,358,436 |

*Source: authors' calculations*

How do these estimates relate to the previous findings? Belfield (2008) estimates the impact of school failure on health and finds that high school graduation adds 1.7 quality-adjusted discounted life years (in these calculations a 3.5% discount rate is used). If we use the same discount rate, the discounted quality adjusted life years gained would be 2.6 for men and 0.9 for women. This averages roughly to 2.0[33] additional life years which is slightly higher than the estimates obtained by Belfield (2008).

### Constraints and limitations

This approach has its limitations. It is obvious that education can influence health, however, it is also quite conceivable that health influences education. If schooling is endogenous, we will get biased results. One way to take this into account is to use instrumental variable (IV) estimation. However, it should be kept in mind that the instrument used for this analysis should strongly influence educational attainment while not influencing the person's health. Such instruments are hard to find.[34]

In this study, the estimates of life expectancy and of the effect of medical conditions on life quality are retrospective. It is almost certain that the development in medicine will have significant influence on both of these issues. Unfortunately, there is no good way to take these developments into account.

Also, using the value of statistical life from UNITE project is questionable. Several willingness-to-pay studies have shown that the value of statistical life changes considerably over the life cycle (see Aldy *et al.* 2007, p 257). The willingness-to-pay value of statistical life tends also to change depending on the topic. Unfortunately, no willingness-to-pay study has been carried out in Estonia that could be used for deriving the health-investment-specific value of statistical life for different age groups.

This study does not address the costs related to consumption of health services. If one would like to get a complete picture of health related costs the educational differences in health services

[32] The upper and lower bound values (based on bounds on the value of statistical life) for these estimates are respectively EUR 89 mil and EUR 26.7 mil at a 3% discount rate, and EUR 46 mil and EUR 13.8 mil at a 6% discount rate.

[33] The average is weighted with the gender composition of early school leavers.

[34] A good instrument to use would be some kind of change in compulsory school attainment, e.g. changes in the minimum school-leaving age (Silles, 2009).

consumption should be taken into account. It is difficult to say in what direction the inclusion of these services swings the costs of school failure. On one hand low education is correlated with poor health and this should result in higher burden to health care system. On the other hand – more educated people are more aware of health related issues in general and should thus make more visits to the doctor.

Several concerns are also related to data quality – life expectancies have been calculated based on Estonian Social Survey. The number of observation in such surveys, even if the data from several years is pooled together, does not allow to get reliable information on the size of smaller socio-economic groups (e.g. non-ethnic Estonian woman with only basic education). This is the reason, why nationality has been dropped from the control variables. Therefore, the results should be recalculated based on new population census data (which will be organized in 2012). Small sample size also plagues the estimates of probabilities of having a certain medical condition by education levels. For this end, registry data would be handy, however, the data in the databases of Estonian Health Board must then be linked with other registers (or census data) that include information on each person's education. Today, the only register including reliable information on person's education is Estonian Education Information System, and even there the information is available only for younger cohorts.

Some difficulties arise from different classifications used for education. There is no unified classification of education levels that is used in all registers and as well as surveys. Using unified classification would allow for more reliable results not only in estimating health costs of school failure, but in other areas as well.

## APPENDIX: regression tables

**Table 14.** Probit estimation results of impact of education on self rated health, men

| | | | |
|---|---|---|---|
| **Ordered probit regression** | **Number of obs =** | **1,396** | |
| | **Wald chi2(8) =** | **338.10** | |
| | **Prob > chi2 =** | **0.0000** | |
| **Log pseudolikelihood = -1497.7236** | **Pseudo R2 =** | **0.1157** | |

| Variable | Coefficients | Robust Std. Error | z | P>z | [95% Conf. | Interval] |
|---|---|---|---|---|---|---|
| Lower secondary education | .3480331 | .1397768 | 2.49 | 0.013 | .0740757 | .6219906 |
| Upper secondary education | .5317781 | .1423958 | 3.73 | 0.000 | .2526875 | .8108688 |
| Higher education | .7465355 | .1485108 | 5.03 | 0.000 | .4554596 | 1.037611 |
| Mother's years of education | .013378 | .0146304 | 0.91 | 0.361 | -.0152971 | .042053 |
| Father's years of education | .0111973 | .0133301 | 0.84 | 0.401 | -.0149292 | .0373237 |
| Marital status | .1756473 | .0912386 | 1.93 | 0.054 | -.003177 | .3544716 |
| Age | -.0705503 | .0157458 | -4.48 | 0.000 | -.1014114 | -.0396891 |
| Age (squared) | .0003639 | .0001398 | 2.60 | 0.009 | .0000899 | .000638 |
| /cut1 | -4.212183 | .4835409 | | | -5.159906 | -3.264461 |
| /cut2 | -3.092284 | .463423 | | | -4.000576 | -2.183992 |
| /cut3 | -1.412704 | .4594034 | | | -2.313118 | -.5122895 |
| /cut4 | .0298363 | .4558203 | | | -.863555 | .9232277 |

**Table 15.** Probit estimation results of impact of education on self rated health, women

| | | | |
|---|---|---|---|
| **Ordered probit regression** | **Number of obs =** | **1,569** | |
| | **Wald chi2(8) =** | **504.22** | |
| | **Prob > chi2 =** | **0.0000** | |
| **Log pseudolikelihood = -1701.7584** | **Pseudo R2 =** | **0.1583** | |

| Variable | Coefficients | Robust Std. Error | z | P>z | [95% Conf. | Interval] |
|---|---|---|---|---|---|---|
| Lower secondary education | 0.1666604 | 0.1204516 | 1.38 | 0.166 | -0.0694204 | 0.4027411 |
| Upper secondary education | 0.1536098 | 0.1251997 | 1.23 | 0.220 | -0.0917771 | 0.3989966 |
| Higher education | 0.5051622 | 0.1271011 | 3.97 | 0.000 | 0.2560487 | 0.7542758 |
| Mother's years of education | 0.0651604 | 0.0135929 | 4.79 | 0.000 | 0.0385188 | 0.091802 |
| Father's years of education | -0.0092951 | 0.0132931 | -0.7 | 0.484 | -0.0353491 | 0.0167588 |
| Marital status | 0.1139267 | 0.0673235 | 1.69 | 0.091 | -0.0180249 | 0.2458784 |
| Age | -0.0474405 | 0.0152792 | -3.1 | 0.002 | -0.0773872 | -0.0174938 |
| Age (squared) | 0.0001331 | 0.0001339 | 0.99 | 0.320 | -0.0001294 | 0.0003957 |
| /cut1 | -3.738062 | 0.4540631 | | | -4.628009 | -2.848114 |
| /cut2 | -2.561961 | 0.4535503 | | | -3.450903 | -1.673018 |
| /cut3 | -0.9589462 | 0.4507766 | | | -1.842452 | -0.0754403 |
| /cut4 | 0.5635124 | 0.4422853 | | | -0.3033508 | 1.430376 |

**Table 16.** QALY weights for education level

**Men**

| Education level | Coefficients | Std. Error | z | P>z | [95% Conf. | Interval] |
|---|---|---|---|---|---|---|
| B-A | -0.0820442 | 0.0328955 | -2.49 | 0.0130 | -0.1465181 | -0.0175703 |
| C-B | -0.0433155 | 0.0213104 | -2.03 | 0.0420 | -0.0850831 | -0.0015478 |
| D-C | -0.0506262 | 0.0203815 | -2.48 | 0.0130 | -0.0905733 | -0.0106791 |

**Women**

| Education level | Coefficients | Std. Err. | z | P>z | [95% Conf. | Interval] |
|---|---|---|---|---|---|---|
| B-A | -0.03874 | 0.0279826 | -1.38 | 0.1660 | -0.0935889 | 0.0161008 |
| C-B | 0.003034 | 0.0192917 | 0.16 | 0.8750 | -0.0347771 | 0.0408449 |
| D-C | -0.08173 | 0.0170525 | -4.79 | 0.0000 | -0.1151488 | -0.0483041 |

## 3.3. Unemployment and social assistance benefits

### Introduction

The purpose of this section is to estimate the benefits associated with the reduction in spending on social and labour market benefits to early school-leavers in a counterfactual situation in which they had general secondary education.

There are different kinds of benefits. Concerning the theoretical framework for the relationship between education and the use of the social security network while unemployed, we will rely on the following argumentation of Sephen Nickell (Nickell, 1979, p. 118):

> *"Education leads directly to the accumulation of human capital. Furthermore, increases in the level of schooling significantly raise the rate of return to future training, which leads, presumably, to the accumulation of still higher levels of human capital during working life. Insofar as part of this human capital is firm specific, the more human capital an individual possesses, the less likely firms are to make him redundant, and the less likely he is to quit. There is thus an obvious link between the probability of an individual entering unemployment and the level of his education".*

If there is a clear link between probability of becoming unemployed and education, there is also one between education and receiving unemployment-related social benefits. In Estonia, these are the **unemployment allowance** and the **unemployment insurance benefit.**

With benefits related to the number of children in the family, one could use Mincer's argument. He proposed that if the "cost of children" is measured as the opportunity cost of forgone wages during the time the person is at home with children, then higher income means higher cost of children and women's wage rate is thus negatively related to the number of children (Mincer, 1963). As wages are positively affected by the level of education, then fertility rates should be negatively related to education. The consumption of child benefits is related to the number of children and thus should have a negative relationship with education. However – it is probably reasonable to consider as cost only the expenses associated with supporting the families that are not capable to guarantee to their children commonly accepted living standards. Other, not-means-tested benefits should not be treated as costs of school failure as they are directly linked with the birth of a child and a child per se should not be considered a negative outcome. Accordingly, we do not consider here child allowance and parental benefit. We do consider **subsistence benefit**, eligibility for which is affected by the number of family members.

The connection between **disability benefits** and education is also straightforward as long as we are discussing disabilities that have developed during adulthood due to behavioural factors – if a person's health is positively related to the level of education then this should apply also to the development of disabilities.

The last group of social costs is associated with **old-age pensions** and should also not be neglected, because if education increases life expectancy and wages, then it should also have a positive effect

on the size and duration of pension payments after retirement – this is the cost component that should actually increase with education.

## Method

**Old age pensions**

Estonia has a so-called three-pillar pension system, consisting of the following components:

a) State pension: a pay-as-you-go (PAYG) component;
b) Funded pension: a compulsory funded component;
c) Supplementary funded pension: a voluntary funded component.

We consider here only the first, the state pension, because the costs of the other two pillars are borne solely by the person herself and are not costs to the society.

The state pension in turn has three components:

a) The basic amount, which is EUR 114.7 as of 2011 and is the same for everyone;
b) The pensionable service period component, which depends on the length of employment (or activities deemed equal to employment such as raising children, compulsory military service). The value of one year of employment is EUR 4.3 as of 2011.
c) The insurance component, the amount of which depends on social tax paid on behalf of the person, relative to social tax on national average wage in the respective year. E.g. if a person works full-time in a given year, earning 80% of the average wage, then her insurance coefficient for that year will be 0.8. The total amount of the insurance component is obtained by multiplying the sum of these coefficients by EUR 4.3.

We do not consider differences in early retirement between persons with different education levels. It is possible to retire early (up to three years before the official retirement age, which is 65), in which case the amount pension is reduced by 0.4% for each month of the difference between actual and official retirement ages. The difference between the net present values of payouts under regular and early retirement is marginal.

We consider only pension costs at ages below 85.

The analysis proceeds in the following steps:

1. First we estimate the expected total work experience over the working age for persons with different levels of educational attainment. We do this by estimating the probability of being in employment at each age (using five-year age groups), conditional on ethnicity, sex, and educational attainment, and summing the predicted probabilities over the lifetime. We estimate a logit equation of the form

$$ln\left(\frac{\Pr(E)}{1-\Pr(E)}\right) = \beta_0 + \sum_i \beta_i AGE_i + \sum_j \beta_j EDUC_j + \gamma EST + \delta FEMALE + \varepsilon,$$

(3-18)

where *AGE* are the dummies for five-year age groups, *EDUC* are dummies for four levels of educational attainment, *EST* is the dummy taking the value of 1 if the person is ethnic

Estonian and 0 otherwise, *FEMALE* is self-explanatory and $\varepsilon$ is an error term. The equation is estimated using data from the Estonian Labour Force Survey 2004-2008. This equation gives us the predicted probability of being employed at each age group for each combination of ethnicity, sex and level of educational attainment.

2. Next we estimate the insurance coefficients (third component of the state pension) by multiplying the probability of being employed and wage relative to national average at each age and for each combination of educational attainment, sex, and ethnicity.
3. Based on the above and adjusting with the probability of being alive at each age, we calculate lifetime costs curves for each combination of educational attainment, sex, and ethnicity.
4. We calculate pension costs of school failure per person as differences in the net present values of total expected state pension receipt for persons with lower and upper secondary education. We use real discount rates of 3% and 6%.
5. Finally, we calculate total expected gains from reducing school failure by assuming that 50% of people without secondary education attain secondary education.

**Disability benefits**

Disability benefits include the *pension for incapacity for work* and the *disability allowance for a person not less than 16 years of age*. The monthly amount of the pension for incapacity for work is calculated as the degree of incapacity (percentage of full capacity) times the sum of the base benefit amount (EUR 114.6575) and the component calculated on the basis of years of pensionable service (EUR 4.343 per year). The amount of the disability allowance for a person not less than 16 years of age varies from EUR 16.62 to EUR 53.70, depending on the extent of additional costs to the person due to disability.

The methodology used in this study for estimating differences in disability benefit receipt due to school failure was the following:

1. First, the probability of disability benefit receipt, conditional on education level, age, ethnicity and sex was estimated using the following logit specification:

$$ln\left(\frac{\Pr(RDISABILITY)}{1-\Pr(RDISABILITY)}\right) = \beta_0 + \sum_i \beta_i \, AGE_i + \sum_j \beta_j \, EDUC_j + \gamma EST + \delta FEMALE + \varepsilon,$$

(3-19)

where *RDISABILITY* is a dummy variable indicating receipt of one or more of the disability benefits,[35] *AGE* are the dummies for five-year age groups, *EDUC* are dummies for four levels of educational attainment, *EST* is the dummy taking the value of 1 if the person is ethnic Estonian and 0 otherwise, *FEMALE* is the dummy for sex and $\varepsilon$ is an error term. We used data from the Estonian Social Survey 2005-2008.

[35] In the Estonian Social Survey, the costs of disability benefits include support to family members who care for a disabled family member. We considered only those persons who receive disability benefits who have not listed carer responsibilities as the reason for not being employed.

2. Next, for persons who received the disability benefits, the yearly amount of disability benefit received was estimated using the following specification:

$$DISABILITY = \beta_0 + \sum_i \beta_i \, AGE_i + \sum_j \beta_j \, EDUC_j + \gamma EST + \delta FEMALE + \varepsilon,$$

(3-20)

where *DISABILITY* is the total yearly amount of the disability benefits and the definitions of the other variables are the same as in the previous equation.

3. Combining the probabilities of benefit receipt and the benefit amount per recipient, we estimate the expected benefit receipt for each age group, sex, ethnicity and educational attainment combination.

4. Based on the above and adjusting with the probability of being alive at each age, we calculate lifetime costs curves for each combination of educational attainment, sex, and ethnicity.

5. We calculate disability benefit costs of school failure per person as differences in the net present values of total expected disability benefit receipt for persons with lower and upper secondary education. We use real discount rates of 3% and 6%.

6. Finally, we calculate total expected gains from reducing school failure by assuming that 50% of people without secondary education attain secondary education.

**Unemployment insurance benefits**

The unemployment insurance benefit (henceforth abbreviated as UIB) is available to those unemployed persons who meet certain eligibility criteria. These include grounds of dismissal (the person must be unemployed involuntarily, not having quit the job on her own accord), having paid unemployment insurance payments (this condition is equivalent to that of having been in paid work for at least 12 months during the 36 months prior to registration as unemployed), and actively looking for work (registering at Töötukassa and participating in services offered).

The amount of the benefit depends on the person's past earnings. In the first 100 days, it amounts to 50% of the average wage in the first nine of the past twelve months of the insurance period. Thereafter, the person receives 40% of the previous wage for a period of 80 to 260 additional days, depending on the length of the period during which she has been making insurance payments prior to registering as unemployed.

To model the effect of educational attainment on UIB receipt, it is thus necessary to consider differences in the probability of becoming unemployed, the duration of unemployment, the size of the unemployment insurance payments prior to unemployment, and the length of the period of being insured (i.e., of having made insurance payments). The available data are not sufficient to model each of these aspects explicitly, therefore it was necessary to simplify the approach.

The methodology adopted was as follows:

1. First we estimated the probability of entering registered unemployment, conditional on age, sex, ethnicity and educational attainment. We estimated a logit equation of the form

$$ln\left(\frac{\Pr(U)}{1-\Pr(U)}\right) = \beta_0 + \sum_i \beta_i AGE_i + \sum_j \beta_j EDUC_j + \gamma EST + \delta FEMALE + \varepsilon,$$

(3-21)

where *U* is the dummy that has the value of 1 when the person is registered unemployed and 0 otherwise, *AGE* are the dummies for five-year age groups (15-19 to 60-64), *EDUC* are dummies for the four levels of educational attainment, *EST* is the dummy for ethnic Estonian, *FEMALE* is the dummy for sex and $\varepsilon$ is an error term. The equation is estimated using data from the Estonian Labour Force Survey 2004-2008. This equation gives us the predicted probability of being employed at each age group for each combination of ethnicity, sex and level of educational attainment.

2. Then, using the same dataset, we estimated the expected duration of the unemployment spell, using a discrete-time duration model of the following form:

$$ln\left(\frac{\Pr(EXIT_t)}{1-\Pr(EXIT_t)}\right) = \sum_{k=1}^{12} \alpha_k D_k + \sum_i \beta_i AGE_i + \sum_j \beta_j EDUC_j + \gamma EST + \delta FEMALE + \varepsilon,$$

(3-22)

where *EXIT* is the dummy variable indicating whether the person has exited from unemployment to employment in the period considered, $D_1$-$D_{12}$ are dummies indicating the length, in months, of the unemployment spell (we do not consider separately spells longer than 12 months, since the UIB is not paid for more than that period of time), and other variables are as in the previous equation.

Using this equation, we obtain predictions of the expected duration of unemployment for each combination of age, ethnicity, sex and level of educational attainment. Some significant simplifying assumptions should be noted here. We are considering the duration of all employment, not only registered, since the data used is insufficient to restrict analysis only to registered unemployed (past registration status is unknown for those LFS respondents who have already exited unemployment at the time of survey). It is likely that expected unemployment duration differs systematically for registered and non-registered unemployed. The reason is that those who quit their jobs voluntarily do not qualify for UIB and have less incentive to stay in unemployment than UIB recipients

The estimated equation allows us to predict the expected number of months at 50% and 40% benefit levels. However, the data are not precise enough (in the LFS, unemployment duration is measured in months, not days), so we have assumed that the person receives 50% for three months, not 100 days.

3. It is not possible to estimate from the LFS or other survey datasets the pre-unemployment wages or insurance period in order to determine the expected amount of the benefit. Therefore, we have used as benefit amounts the Unemployment Insurance Fund's data on

average unemployment insurance benefit amounts in 2010 for each combination of age (five-year groups), education, and gender (the Fund's data does not distinguish ethnicity or primary language).

4. Based on steps b) and c), we calculate the expected total benefit amount per registered unemployed by each combination of age group, educational attainment, ethnicity and sex.
5. Combining the probabilities of registered unemployment estimated in step a) and expected benefit amounts from step d) and after adjusting for the probability of being alive at a given age, we obtain the expected lifetime curves for UIB costs per person.
6. We calculate costs of school failure per person as differences in the net present values of total expected UIB receipt for persons with lower and upper secondary education. We use real discount rates of 3% and 6%.
7. Finally, we calculate total expected gains from reducing school failure using the assumption that 50% of people without secondary education attain secondary education.

**Unemployment allowance**

The unemployment allowance (henceforth UA) is a flat-rate benefit received by people who either have exhausted their unemployment insurance benefit or do not meet UIB eligibility criteria (e.g. of involuntary unemployment). Eligibility criteria for the unemployment allowance include having been in employment or involved in certain types of activities that have been deemed equivalent to employment; the person's income being lower than the amount of allowance; and actively looking for work.

The maximum duration of the benefit is 270 days. The amount of the benefit, as of 2011, is EUR 65.41 per month.

The methodology adopted in estimating the effect of school failure on unemployment allowance receipt is the following:

1. First we estimated the probability of receiving the unemployment allowance, conditional on age, sex, ethnicity and educational attainment. We estimated a logit equation of the form

$$ln\left(\frac{\Pr(UA)}{1-\Pr(UA)}\right) = \beta_0 + \sum_i \beta_i AGE_i + \sum_j \beta_j EDUC_j + \gamma EST + \delta FEMALE + \varepsilon,$$

(3-23)

where *UA* is the dummy indicating receipt of unemployment allowance, *AGE* are the dummies for five-year age groups (15-19 to 60-64), *EDUC* are dummies for the four levels of educational attainment, *EST* is the dummy for ethnic Estonian, *FEMALE* is the dummy for sex and $\varepsilon$ is an error term. The equation is estimated using data from the Estonian Labour Force Survey 2004-2008. This equation gives us the predicted probability of receiving UA at each age group for each combination of ethnicity, sex and level of educational attainment.

2. Next we estimated the amount of unemployment allowance received. Since UA is a flat-rate benefit, the total amount depends only on the length of time it is received. We assumed that for each combination of age, educational attainment, ethnicity and sex, the duration of UA receipt is proportional to the overall duration of the unemployment spell. We used estimates

for the average duration of unemployment used in the analysis of the unemployment insurance benefit.

3. Combining the probabilities of receiving UA estimated in step 1 and expected benefit amounts from step 2 and after adjusting for the probability of being alive at a given age, we obtain the expected lifetime curves for UA costs per person.
4. We calculate costs of school failure per person as differences in the net present values of total expected UA receipt for persons with lower and upper secondary education. We use real discount rates of 3% and 6%.
5. Finally, we calculate total expected gains from reducing school failure using the assumption that 50% of people without secondary education attain secondary education.

**Subsistence allowance**

Unlike most other types of costs considered in this paper, the subsistence benefit is household-based. It is a means-tested benefit granted to households whose income per household member is below a certain threshold (EUR 76.70 a month for a single-member household or first member of household and EUR 61.36 for each additional household member).

The fact that this benefit is household-based poses significant problems in estimating school failure related costs. The benefit recipient is no longer an individual with easily determined level of educational attainment, but a household with a combination of individuals with possibly different levels of education and other characteristics. One possibility would be to focus on the educational attainment of the head of the household and combine benefit receipt for those households whose head has obtained lower and upper secondary education, respectively. However, there would be several problems with this approach. For example, it does not take into account the level of educational attainment of other members of the household, which could be expected to influence the likelihood of receiving subsistence benefit. Also, it is questionable whether the definition of the head of household (the member of the household with the highest income) would be meaningful in a household in which all the members are inactive. Another possibility would be to determine the level of educational attainment of the household as that of the household member with the highest educational attainment.

However, this would again ignore the possibility that e.g. a two-member household in which one member has an upper secondary education and another a lower secondary education could alter the probability of receiving subsistence allowance education if the lower-educated member acquired upper secondary education.

The approach taken in this study is to take into account separately the possible educational combinations of the two members of the household with highest educational attainment. In other words, we consider as possible „educational levels of the household“ the combinations B, BA, BB, BC, BD and so on (14 combinations in total), where the letters A to D indicate the four levels of education. This allows for the possibility that the effect of acquiring upper secondary education (i.e. upgrading from B to C) on the probability of receiving the subsistence benefit differs for each of these pre-existing combinations of educational attainment in the household.

The steps of the methodology were the following:

1. First, we estimated the probability that a household receives subsistence benefit, using the following logit specification:

$$ln\left(\frac{\Pr(RSUBSIST)}{1-\Pr(RSUBSIST)}\right) = \beta_0 + \sum_i \beta_i AGE_i + \sum_j \beta_j EDUC_j + \gamma EST + \delta FEMALE + \varepsilon,$$

(3-24)

where *RSUBSIST* is a dummy indicating receipt of subsistence benefit, *EDUC* are dummies for the educational combinations of the two highest educated members of each household; *AGE* are age group dummies, starting from 17-19 years and continuing with five-year age groups up to those 75 years old and older; *EST* is the dummy for ethnicity; *FEMALE* is the dummy for sex and $\varepsilon$ is an error term. We used data from the Estonian Social Survey 2005-2008. The variables *AGE, EST and FEMALE* refer to the characteristics of the highest educated household member.

2. Second, we estimated an equation for the amount of subsistence benefit received per household given that the household receives subsistence benefit, using the following specification:

$$SUBSIST = \beta_0 + \sum_i \beta_i AGE_i + \sum_j \beta_j EDUC_j + \gamma EST + \delta FEMALE + \varepsilon,$$

(3-25)

where *SUBSIST* is the amount of subsistence benefit received per household and the definitions of other variables are the same.

3. Combining the probabilities of benefit receipt and the benefit amount per recipient household, we estimate the expected benefit receipt per age group and educational attainment combination.

6. We calculate costs of subsistence benefit differences in the net present values of expected subsistence benefit receipt for households with lower secondary education (B) and upper secondary education (C). The education of the household was defined as described above: households with lower secondary education are those in which the two highest educated household members are B+A, B+B, B+C, B+D or B (the latter in single-member households); households with upper secondary education are defined as those in which the B's in these combinations are replaced with C's, i.e. C+A, C+B, C+C, C+D and C.

   To illustrate the procedure, Table 17 below describes male Estonians in age group 30-34 with educational level B and the educational composition of the C level households it is compared to. Among households defined as having the educational level B, 19.7 per cent are single-member households with level B, 2.5% are those in which the two highest levels of attainment are a combination of A and B, etc. The third column gives the expected annual amount of subsistence benefit of each of these combinations and the total figure for B households, which is the weighted average of all these educational combinations. The fourth column of the table gives the resulting educational combinations in case of upgrading the

educational attainment from B to C, i.e. the households with education B+A becoming C+A, B+B becoming C+B and so on. Thus, the difference between households with education levels B and C is a weighted average of the differences between households with the respective educational combinations.

In calculating net present values, we use real discount rates of 3% and 6%.

**Table 17.** Example of comparisons in expected subsistence benefit amounts between households with different education levels: 30-34 year old Estonian males

| Educational combination | Share of combination in all B level households | Expected annual amount of subsistence benefit, EUR | Corresponding C level household | Expected annual amount of subsistence benefit, EUR |
|---|---|---|---|---|
| B | 19.7% | 29.0 | C | 10.9 |
| B+A | 2.5% | 26.9 | C+A | 13.9 |
| B+B | 23.0% | 34.3 | C+B | 15.8 |
| B+C | 40.5% | 15.8 | C+C | 9.6 |
| B+D | 14.4% | 11.8 | C+D | 4.0 |
| All combinations with B | 100% | 23.8 | All combinations with C | 11.1 |

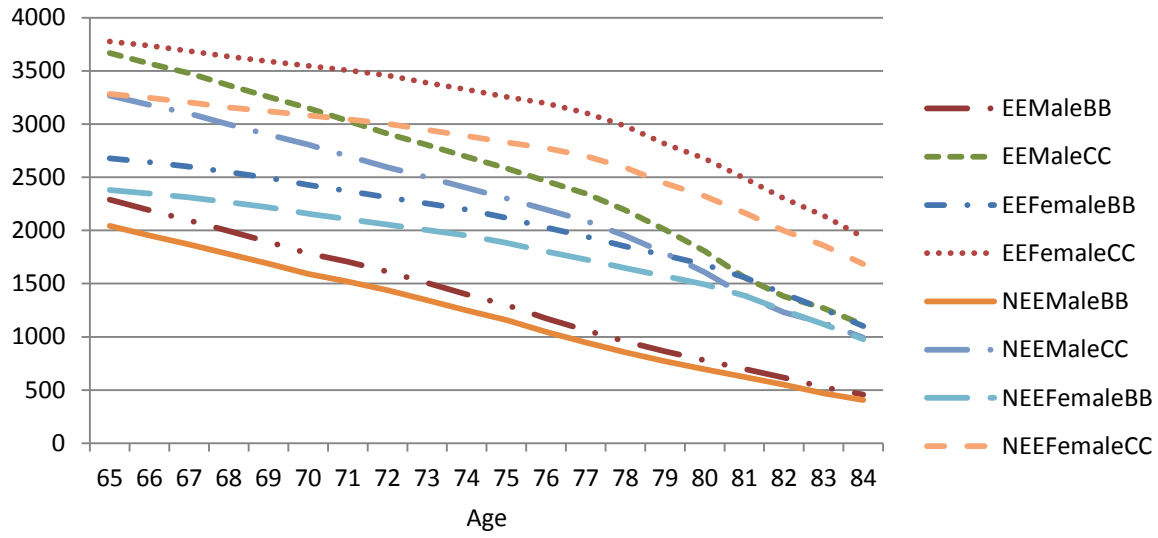
7. Finally, we calculate total expected gains from reducing school failure using the assumption that 50% of people without secondary education attain secondary education.

## Results

**Old age pensions**

The estimated pension costs per person over the lifetime for people with lower and upper secondary education are compared on Figure 13. Pension payments depend positively on total years worked (which influence both the pensionable service period component and the insurance component) as well as on the person's wage earnings (which influence the insurance component). Since both wages and the total length of employment over the lifetime are positively related to the level of educational attainment, the costs are higher for people with upper secondary education. In addition, the probability of being alive at each age is greater for persons with higher educational attainment. The pension costs of school failure are therefore negative for each combination of sex and ethnicity considered. That the lines are downward-sloping is due to the declining probability of being alive.

**Figure 13.** Expected yearly pension cost per person (EUR)[36]




*Source: Statistics Estonia, authors' calculations*

The following tables report the per capita pension costs associated with obtaining the next level of education.

**Table 18.** NPV of pension costs per person from attaining the next level of education (EUR), 3% discount rate

| Gender | Tertiary over upper sec | Upper sec over lower sec |
|---|---|---|
| Male | -4,370 | -3,887 |
| Female | -3,016 | -3,548 |

*Source: authors' calculations*

**Table 19.** NPV of pension costs per person from attaining the next level of education (EUR), 6% discount rate

| Gender | Tertiary over upper sec | Upper sec over lower sec |
|---|---|---|
| Male | -921 | -753 |
| Female | -621 | -676 |

*Source: authors' calculations*

Estimates for additional costs incurred if half of the people with lower secondary education obtained upper secondary education are reported in Table 20. The costs, from the point of view of the generation currently at school age, are far in the future and are thus discounted in calculations of the net present value, reaching only EUR 0.5 mil (with discount rate of 6%) or EUR 2.8 mil (with discount rate 3%).

[36] Prefix EE denotes ethnic Estonians, N EE non-ethnic Estonians. BB denotes lower secondary education, CC upper secondary education.

**Table 20.** Pension costs due to school failure

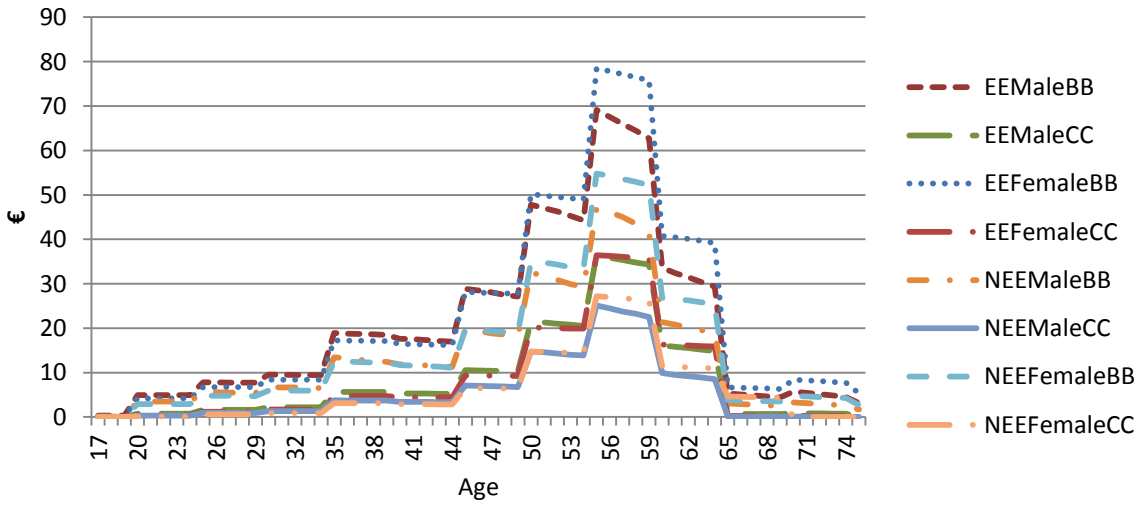
| | Estimate of the number of early school leavers in 2011 | Size of reduced pension costs if half of the people with only lower secondary education obtained upper secondary education, EUR | |
|---|---|---|---|
| | | Discount rate 6% | Discount rate 3% |
| Man | 994 | -373,850 | -1,930,851 |
| Woman | 456 | -157,182 | -824,864 |
| TOTAL | 1 450 | -531,032 | -2,755,715 |

*Source: authors' calculations*

**Disability benefits**

The expected costs of disability benefits per person over the lifetime are depicted on Figure 14. For all combinations of sex and ethnicity, the costs are higher for those with lower secondary education compared to those with higher secondary education. This is due both to the former's higher probability of receiving the disability benefit as well as the higher amount of the benefit per recipient (possibly indicating the higher degree of severity of disability). The curves increase with age, peaking before early retirement, age at which time these benefits are mostly substituted by old age pension.

**Figure 14.** Expected yearly disability benefit cost per person (EUR)[37]




*Source: Statistics Estonia, authors' calculations*

The following tables report the per capita disability benefit savings from attaining the next level of education.

[37] Prefix EE denotes ethnic Estonians N EE non-ethnic Estonians. BB denotes lower secondary education, CC upper secondary education.

**Table 21.** NPV of disability benefit savings per person from attaining the next level of education (EUR), 3% discount rate

| Gender | Tertiary over upper sec | Upper sec over lower sec |
|---|---|---|
| Male | 90 | 236 |
| Female | 88 | 266 |

*Source: authors' calculations*

**Table 22.** NPV of disability benefit savings per person from attaining the next level of education (EUR), 6% discount rate

| Gender | Tertiary over upper sec | Upper sec over lower sec |
|---|---|---|
| Male | 41 | 109 |
| Female | 38 | 117 |

*Source: authors' calculations*

Although the costs are higher for lower educated people, the overall amount of expected cost is small for all categories. Total disability benefit cost of school failure measured by the respective cost savings from half the people with lower secondary education obtaining upper secondary education remains fairly low at 178 thousand EUR (at discount rate of 3%). If 6% discount rate is used the return is 80 thousand EUR.

**Table 23.** Disability cost due to school failure

| | Estimate of the number of early school leavers in 2011 | Reduction in disability costs if half of the people with only lower secondary education obtained upper secondary education, EUR | |
|---|---|---|---|
| | | Discount rate 6% | Discount rate 3% |
| Man | 994 | 54,170 | 117,370 |
| Woman | 456 | 26,674 | 60,793 |
| TOTAL | 1,450 | 80,844 | 178,163 |

*Source: authors' calculations*

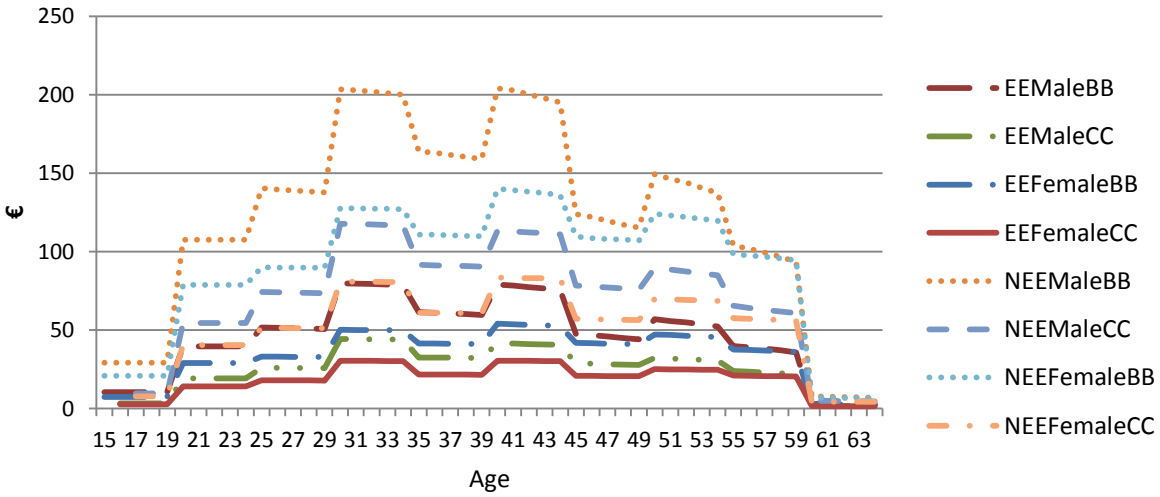
**Unemployment insurance benefits**

In 2010, unemployment insurance benefits were paid to 61,006 people, the average monthly amount being EUR 265.

Expected unemployment insurance benefit receipt per person over the lifetime is depicted Figure 15. For all combinations of sex and ethnicity, expected benefit receipt is higher for persons with lower educational attainment at all ages. This reflects their higher probability of becoming unemployed as well as the longer expected duration of unemployment. Although benefits are correlated with previous wages, which are on average higher for people with higher educational attainment, the effect of wage differences on expected benefit receipt is smaller than that of differences in unemployment probability and duration. Expected benefit receipt peaks at prime age approximately from 30 to 45 years of age. Although the probability of becoming unemployed is highest for young people, in prime age the expected duration of unemployment is higher. Also, the age-earnings

profiles reach their peak at this age, influencing the benefit amount which depends on wages prior to becoming unemployed.

**Figure 15.**Expected yearly unemployment insurance benefit cost per person (EUR)[38]




*Source: Statistics Estonia, authors' calculations*

The following tables report the per capita unemployment insurance benefit savings from attaining the next level of education.

**Table 24.** NPV of unemployment insurance benefit savings per person from attaining the next level of education (EUR), 3% discount rate

| Gender | Tertiary over upper sec | Upper sec over lower sec |
|---|---|---|
| Male | 288 | 1,158 |
| Female | 265 | 804 |

*Source: authors' calculations*

**Table 25.** NPV of unemployment insurance benefit savings per person from attaining the next level of education (EUR), 6% discount rate

| Gender | Tertiary over upper sec | Upper sec over lower sec |
|---|---|---|
| Male | 190 | 702 |
| Female | 167 | 463 |

*Source: authors' calculations*

Potential unemployment benefit cost savings due to half of the persons with lower secondary education obtaining upper secondary education are reported in Table 26. The total amount is 0.3 mil euro (at 6% discount rate) or 0.5 mil (at 3% discount rate).

[38] Prefix EE denotes ethnic Estonians N EE non-ethnic Estonians. BB denotes lower secondary education, CC upper secondary education.

**Table 26.** Unemployment insurance benefit costs due to school failure

| | Estimate of the number of early school leavers in 2011 | Size of the reduction in unemployment insurance benefit costs if half of the people with only lower secondary education obtained upper secondary education, EUR | |
|---|---|---|---|
| | | Discount rate 6% | Discount rate 3% |
| Man | 994 | 256,676 | 425,960 |
| Woman | 456 | 69,116 | 119,958 |
| TOTAL | 1,450 | 325,792 | 545,918 |

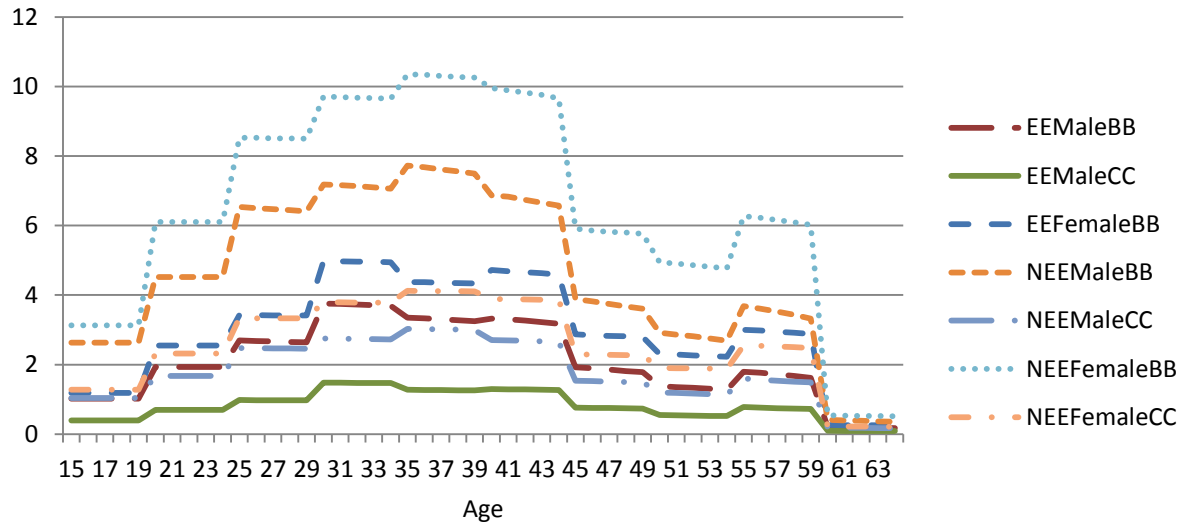
*Source: authors' calculations*

**Unemployment allowance**

In 2010, unemployment allowance was paid to 45,401 people or 39% of the total number of the unemployed.

The unemployment allowance costs per person over the lifetime are depicted on Figure 16. The overall expected cost is small due to the low amount of the benefit. For all combinations of sex and ethnicity and at each age, the cost is higher for persons with lower educational attainment. This reflects both their higher probability of being unemployed as well as their longer expected unemployment spells, while the daily amount of the benefit is the same for everyone. The curves peak approximately at prime age (30-45). While the probability of unemployment is highest for the young, those at prime age spend longer time in unemployment.

**Figure 16.** Expected annual unemployment allowance costs per person over the lifetime (EUR)[39]




*Source: Statistics Estonia, authors' calculations*

The following tables report the per capita unemployment allowance savings from attaining the next level of education.

[39] Prefix EE denotes ethnic Estonians N EE non-ethnic Estonians. BB denotes lower secondary education, CC upper secondary education.

**Table 27.** NPV of unemployment allowance savings per person from attaining the next level of education (EUR), 3% discount rate

| Gender | Tertiary over upper sec | Upper sec over lower sec |
|---|---|---|
| Male | 58 | 50 |
| Female | 85 | 61 |

*Source: authors' calculations*

**Table 28.** NPV of unemployment allowance savings per person from attaining the next level of education (EUR), 6% discount rate

| Gender | Tertiary over upper sec | Upper sec over lower sec |
|---|---|---|
| Male | 38 | 31 |
| Female | 54 | 36 |

*Source: authors' calculations*

Table 29 reports the estimated amount of potential unemployment allowance cost savings if half the people with lower secondary education attained upper secondary education. Since the amount of the allowance is small, the overall cost of school failure is also low at EUR 24 thousand (at 6% discount rate) or 39 thousand (3% discount rate).

**Table 29.** Unemployment allowance costs due to school failure

| | Estimate of the number of early school leavers in 2011 | Size of the reduction in unemployment allowance costs if half of the people with only lower secondary education obtained upper secondary education, EUR | |
|---|---|---|---|
| | | Discount rate 6% | Discount rate 3% |
| Man | 994 | 15,243 | 24,658 |
| Woman | 456 | 8,306 | 13,826 |
| TOTAL | 1,450 | 23,549 | 38,484 |

*Source: authors' calculations*

**Subsistence benefit**

In 2009, the benefit was paid to 106,819 households, the average monthly amount being EUR 108. The overall amount of subsistence benefit paid was 11.6 mil EUR.

The following tables report the per capita subsistence benefit savings from attaining the next level of education.

**Table 30.** NPV of subsistence benefit savings per person from attaining the next level of education (EUR), 3% discount rate

| Gender | Tertiary over upper sec | Upper sec over lower sec |
|---|---|---|
| Male | 121 | 307 |
| Female | 119 | 337 |

*Source: authors' calculations*

**Table 31.** NPV of subsistence benefit savings per person from attaining the next level of education (EUR), 6% discount rate

| Gender | Tertiary over upper sec | Upper sec over lower sec |
|---|---|---|
| Male | 79 | 211 |
| Female | 71 | 224 |

*Source: authors' calculations*

The estimate of the total net present value of subsistence benefit saving from reaching upper secondary education for half of the people who have obtained lower secondary education would be between EUR 155 thousand (at 6% discount rate) and EUR 228 thousand (at 3% discount rate).

**Table 32.** Subsistence benefit costs due to school failure

| | Estimate of the number of early school leavers in 2011 | Size of the reduction in subsistence benefit costs if half of the people with only lower secondary education obtained upper secondary education, EUR | |
|---|---|---|---|
| | | Discount rate 6% | Discount rate 3% |
| Man | 994 | 104,627 | 152,151 |
| Woman | 456 | 50,908 | 76,249 |
| TOTAL | 1,450 | 155,535 | 228,400 |

*Source: authors' calculations*

**Total effects of school failure on unemployment and social assistance benefits**

The total effect of school failure on unemployment and social assistance is quite surprising and depends to large extent on whether pension costs are taken into account or not. If pension costs are excluded then addressing school failure would allow saving costs of unemployment and social assistance benefits.

**Table 33.** Effect of education on cost of unemployment and social assistance benefits ( EUR)

| | 6% | 3% |
|---|---|---|
| Subsistence benefit costs due to school failure | 155,535 | 228,400 |
| Unemployment allowance costs due to school failure | 23,549 | 38,484 |
| Unemployment insurance benefit costs due to school failure | 325,792 | 545,918 |
| Disability benefit cost due to school failure | 80,844 | 178,163 |
| Pension costs due to school failure | -531,032 | -2,755,715 |
| TOTAL | 54,688 | -1,764,750 |

*Source: authors' calculations*

However, if pension costs are included then the picture is different and increasing life expectancy as well as increasing employment rates and higher wages can, depending on the discount rate, bring about even higher pension related costs. All this results in ca 1.8 mil EUR of **additional costs** (if a 3% discount rate is used). With a 6% discount rate, a small reduction on social costs can be achieved in the amount of EUR 55 mil.

## Constraints and limitations

The main limitations are connected with accuracy of the approach. The Estonian Social Survey does a lot of aggregation in asking people about the source of support received from government institutions. Registry-based data would allow estimating separately the impact of education of different types of benefits and pensions. However, the main shortcoming of registry data is that the registers of the Social Insurance Board are biased – they include only people that have already received some kind of benefits and will thus overestimate the receipt of benefits. This problem could be solved by linking their databases with Population Register data; however, the quality of education information in Population Register is too poor to be used in the analysis. Another way to overcome this obstacle is to estimate the probabilities of receiving a certain kind of benefit from sample based surveys (like the Estonian Social Survey) and then get the cost estimates from registry data. This approach has also its limits, as the Estonian Social Survey data aggregates several benefits into one group. It should also be noted that the quality of the data in the registry is unclear, while surveys conducted by Statistics Estonia are well documented and reliable.

More accurate measures of costs related to unemployment (insurance) benefits could be obtained if it were possible to combine data from the Unemployment Insurance Fund (the data on yearly payments of unemployment benefits and unemployment insurance benefits) with probabilities of receiving unemployment insurance benefit or unemployment benefit from either Estonian Labour Force Survey or Estonian Social Survey.

The current analysis overlooks the cost of social services. Again – there are problems with the selection bias in the registries of both the Social Insurance Board as well as the Unemployment insurance fund. Neither the Estonian Labour Force Survey nor the Estonian Social Survey is sufficiently detailed to allow estimation of the probability of the receipt of services.

## APPENDIX: regression tables

**Table 34.** Probability of receiving the subsistence benefit

| Variable | Coefficient | t-statistic | P>t |
|---|---|---|---|
| *Age group (reference: 20-24 years)* | | | |
| 17-19 years | 0.59 | 2.03 | 0.04 |
| 25-29 years | -1.12 | -2.93 | 0.00 |
| 30-34 years | -0.06 | -0.18 | 0.86 |
| 35-39 years | -0.13 | -0.33 | 0.74 |
| 40-44 years | -0.22 | -0.69 | 0.49 |
| 45-49 years | 0.47 | 1.74 | 0.08 |
| 50-54 years | 0.28 | 0.91 | 0.37 |
| 55-59 years | 0.06 | 0.19 | 0.85 |
| 60-64 years | -1.01 | -2.67 | 0.01 |
| 65-69 years | -1.31 | -3.31 | 0.00 |
| 70-74 years | -1.74 | -4.33 | 0.00 |
| 75+ years | -1.00 | -2.98 | 0.00 |
| Female | -0.01 | -0.07 | 0.95 |
| Ethnic Estonian | -0.01 | -0.04 | 0.97 |
| *Education of two highest educated household members (reference group: single-member household with education level B):* | | | |
| A (Single-member household) | 0.03 | 0.08 | 0.94 |
| C (Single-member household) | -0.63 | -2.4 | 0.02 |
| D (Single-member household) | -1.69 | -3.91 | 0.00 |
| A+A | -0.41 | -0.7 | 0.49 |
| B+B | -0.26 | -1 | 0.32 |
| B+A | 0.10 | 0.27 | 0.79 |
| C+B | -0.73 | -3.14 | 0.00 |
| C+A | -1.58 | -2.76 | 0.01 |
| C+C | -1.45 | -6.13 | 0.00 |
| D+A | -0.20 | -0.3 | 0.76 |
| D+B | -1.01 | -2.81 | 0.01 |
| D+C | -2.24 | -7.9 | 0.00 |
| D+D | -3.72 | -5.4 | 0.00 |
| Constant | -2.48 | -8.23 | 0.00 |

**Table 35.** Yearly amount of subsistence benefit received per recipient

| Variable | Coefficient | t-statistic | P>t |
|---|---|---|---|
| *Age group (reference: 20-24 years)* | | | |
| 17-19 years | 1757.74 | 1.41 | 0.16 |
| 25-29 years | -101.73 | -0.05 | 0.96 |
| 30-34 years | -47.15 | -0.03 | 0.97 |
| 35-39 years | -1551.45 | -1.25 | 0.21 |
| 40-44 years | -26.41 | -0.02 | 0.98 |
| 45-49 years | 1038.56 | 0.95 | 0.34 |
| 50-54 years | 1392.83 | 1.10 | 0.27 |
| 55-59 years | -379.82 | -0.34 | 0.74 |
| 60-64 years | -1571.20 | -1.39 | 0.17 |
| 65-69 years | -4807.30 | -4.40 | 0.00 |
| 70-74 years | -4046.86 | -3.20 | 0.00 |
| 75+ years | -3165.78 | -2.41 | 0.02 |
| Female | 317.81 | 0.50 | 0.62 |
| Ethnic Estonian | -329.89 | -0.44 | 0.66 |
| *Education of two highest educated household members (reference group: single-member household with education level B):* | | | |
| A (Single-member household) | -860.31 | -0.96 | 0.34 |
| C (Single-member household) | -1745.90 | -2.29 | 0.02 |
| D (Single-member household) | -897.19 | -1.12 | 0.26 |
| B+B | 3074.28 | 2.29 | 0.02 |
| B+A | -361.83 | -0.24 | 0.81 |
| C+B | 986.23 | 0.74 | 0.46 |
| C+A | 6373.09 | 2.80 | 0.01 |
| C+C | 1385.76 | 1.29 | 0.20 |
| D+A | -1771.38 | -1.07 | 0.29 |
| D+B | 1214.66 | 1.09 | 0.28 |
| D+C | 2311.13 | 2.00 | 0.05 |
| D+D | 1118.58 | 0.19 | 0.85 |
| Constant | 6692.81 | 5.25 | 0.00 |

**Table 36.** Probability of receiving disability benefit

| Variable | Coefficient | t-statistic | P>t |
|---|---|---|---|
| *Age group (reference: 20-24 years)* | | | |
| 17-19 years | -1.15 | -5.54 | 0.00 |
| 25-29 years | 0.30 | 1.44 | 0.15 |
| 30-34 years | 0.47 | 2.35 | 0.02 |
| 35-39 years | 1.00 | 5.23 | 0.00 |
| 40-44 years | 0.98 | 5.01 | 0.00 |
| 45-49 years | 1.39 | 8.23 | 0.00 |
| 50-54 years | 1.80 | 10.80 | 0.00 |
| 55-59 years | 2.11 | 12.88 | 0.00 |
| 60-64 years | 1.71 | 10.07 | 0.00 |
| 65-69 years | 0.84 | 4.61 | 0.00 |
| 70-74 years | 1.21 | 6.52 | 0.00 |
| 75+ years | 1.21 | 6.74 | 0.00 |
| Female | -0.05 | -0.77 | 0.44 |
| Ethnic Estonian | 0.23 | 3.34 | 0.00 |
| *Level of education (reference group: B)* | | | |
| A | 0.20 | 1.60 | 0.11 |
| C | -0.65 | -8.70 | 0.00 |
| D | -1.20 | -12.22 | 0.00 |
| Constant | -3.38 | -19.99 | 0.00 |

**Table 37.** Annual amount of disability benefit per recipient

| Variable | Coefficient | t-statistic | P>t |
|---|---|---|---|
| *Age group (reference: 20-24 years)* | | | |
| 17-19 years | -1513.79 | -9.28 | 0.00 |
| 25-29 years | 338.61 | 1.93 | 0.05 |
| 30-34 years | 475.16 | 2.88 | 0.00 |
| 35-39 years | 1053.35 | 4.97 | 0.00 |
| 40-44 years | 992.86 | 4.87 | 0.00 |
| 45-49 years | 1566.32 | 8.78 | 0.00 |
| 50-54 years | 2531.69 | 10.20 | 0.00 |
| 55-59 years | 3703.11 | 12.97 | 0.00 |
| 60-64 years | 2297.65 | 7.91 | 0.00 |
| 65-69 years | -210.53 | -1.77 | 0.08 |
| 70-74 years | -234.19 | -1.72 | 0.09 |
| 75+ years | -651.37 | -4.33 | 0.00 |
| Female | -214.12 | -2.16 | 0.03 |
| Ethnic Estonian | 235.80 | 2.27 | 0.02 |
| *Level of education (reference group: B)* | | | |
| A | 967.10 | 3.39 | 0.00 |
| C | -1367.96 | -7.89 | 0.00 |
| D | -2038.05 | -11.53 | 0.00 |
| Constant | 1659.39 | 8.70 | 0.00 |

**Table 38.** Probability of being in registered unemployment

| Variable | Coefficient | z-statistic | P>z |
|---|---|---|---|
| *Age group (reference: 20-24 years)* | | | |
| 15-19 years | -1.24 | -3.77 | 0.00 |
| 25-29 years | 0.17 | 0.58 | 0.56 |
| 30-34 years | 0.40 | 1.52 | 0.13 |
| 35-39 years | 0.35 | 1.32 | 0.19 |
| 40-44 years | 0.60 | 2.46 | 0.01 |
| 45-49 years | 0.26 | 1.02 | 0.31 |
| 50-54 years | 0.59 | 2.43 | 0.02 |
| 55-59 years | 0.34 | 1.30 | 0.19 |
| 60-64 years | -2.28 | -3.10 | 0.00 |
| Female | 0.02 | 0.14 | 0.89 |
| Ethnic Estonian | -0.93 | -7.58 | 0.00 |
| *Level of education (reference group: B)* | | | |
| A | -1.00 | -1.91 | 0.06 |
| C | -0.67 | -4.69 | 0.00 |
| D | -1.30 | -6.74 | 0.00 |
| Constant | -2.94 | -12.65 | 0.00 |

**Table 39.** Probability of receiving unemployment allowance for registered unemployed

| Variable | Coefficient | z-statistic | P>z |
|---|---|---|---|
| *Age group (reference: 20-24 years)* | | | |
| 15-19 years | 1.16 | 2.20 | 0.03 |
| 25-29 years | 0.31 | 0.76 | 0.45 |
| 30-34 years | 0.15 | 0.39 | 0.69 |
| 35-39 years | 0.37 | 0.95 | 0.34 |
| 40-44 years | -0.08 | -0.19 | 0.85 |
| 45-49 years | -0.35 | -0.94 | 0.35 |
| 50-54 years | -0.96 | -2.41 | 0.02 |
| 55-59 years | -0.25 | -0.65 | 0.51 |
| 60-64 years | -0.01 | 0.00 | 1.00 |
| Female | 0.45 | 2.14 | 0.03 |
| Ethnic Estonian | 0.21 | 1.08 | 0.28 |
| *Level of education (reference group: B)* | | | |
| A | -0.08 | -0.10 | 0.92 |
| C | -0.31 | -1.30 | 0.19 |
| D | -0.50 | -1.52 | 0.13 |
| Constant | -0.86 | -2.43 | 0.02 |

**Table 40.** Duration of unemployment

| Variable | Coefficient | z-statistic | P>z |
|---|---|---|---|
| *Age group (reference: 20-24 years)* | | | |
| 15-19 years | 0.05 | 0.20 | 0.84 |
| 25-29 years | 0.08 | 0.50 | 0.62 |
| 30-34 years | -0.80 | -3.78 | 0.00 |
| 35-39 years | -0.06 | -0.34 | 0.73 |
| 40-44 years | -0.33 | -1.80 | 0.07 |
| 45-49 years | -0.44 | -2.44 | 0.02 |
| 50-54 years | -0.14 | -0.80 | 0.42 |
| 55-59 years | -0.39 | -1.95 | 0.05 |
| 60-64 years | -0.70 | -1.36 | 0.18 |
| Female | 0.03 | 0.35 | 0.72 |
| Ethnic Estonian | 0.37 | 3.71 | 0.00 |
| *Level of education (reference group: B)* | | | |
| A | 0.38 | 1.48 | 0.14 |
| C | 0.38 | 2.98 | 0.00 |
| D | 0.34 | 2.11 | 0.04 |
| *Time since beginning of unemployment spell* | | | |
| 1 month | -3.09 | 0.22 | -14.19 |
| 2 months | -2.97 | 0.23 | -12.76 |
| 3 months | -2.78 | 0.22 | -12.67 |
| 4 months | -2.88 | 0.24 | -11.93 |
| 5 months | -2.81 | 0.25 | -11.05 |
| 6 months | -2.86 | 0.25 | -11.42 |
| 7 months | -3.02 | 0.28 | -10.75 |
| 8 months | -3.69 | 0.32 | -11.46 |
| 9 months | -2.75 | 0.30 | -9.11 |
| 10 months | -3.41 | 0.32 | -10.83 |
| 11 months | -3.01 | 0.29 | -10.32 |
| 12 or more months | -4.97 | 0.27 | -18.55 |

**Table 41.** Probability of being employed

| Variable | Coefficient | z-statistic | P>z |
|---|---|---|---|
| *Age group (reference: 20-24 years)* | | | |
| 15-19 years | -1.22 | -15.67 | 0.00 |
| 25-29 years | 1.73 | 25.09 | 0.00 |
| 30-34 years | 2.00 | 28.79 | 0.00 |
| 35-39 years | 2.01 | 27.69 | 0.00 |
| 40-44 years | 2.22 | 29.36 | 0.00 |
| 45-49 years | 2.21 | 30.85 | 0.00 |
| 50-54 years | 1.95 | 28.24 | 0.00 |
| 55-59 years | 1.52 | 22.96 | 0.00 |
| 60-64 years | 0.33 | 4.80 | 0.00 |
| Female | -0.61 | -16.18 | 0.00 |
| Ethnic Estonian | 0.36 | 8.79 | 0.00 |
| *Level of education (reference group: B)* | | | |
| A | -1.01 | -7.77 | 0.00 |
| C | 0.79 | 17.21 | 0.00 |
| D | 1.28 | 23.88 | 0.00 |
| Constant | -1.22 | -20.83 | 0.00 |

## 3.4. Effect of education on cost of crime

### Introduction

Broadly speaking, there are two different explanations why people with different education levels differ also in criminal behaviour – differences in **opportunity costs** and **differences in preference**. Higher education is strongly linked with higher earnings and a higher probability of employment. The opportunity costs approach is based on the rational choice of people who consider their costs and benefits from criminal behaviour and without it. The decision is made considering the income from criminal behaviour, the probability of being caught, the punishment and the income from legal activity. If a person commits a crime, then there is a fairly good chance that he or she has to withdraw from the labour market (either because he is incarcerated or because the criminal sentence is a restriction for working in certain jobs). For persons with higher wages, the cost of imprisonment is higher than for people who earn less because, while being away from labour market, they could have earned more than their low-paid colleagues (Lochner 2004). People with higher earnings thus have weaker incentives for criminal behaviour since for them the opportunity cost of crime is higher. As the earnings and educational level are quite strongly correlated, people with higher education have a lower probability of committing a crime because of the higher opportunity costs associated with it.

Differences in preferences can also work through several mechanisms. If persons' time preferences differ by education level, this can lead to less criminal behaviour among the more educated as they can postpone their consumption needs more effectively to the future. The reason for this is that schooling can give a person tools that allow him to understand and perceive better the link between choices in the near future and outcomes in the more distant one (Becker and Mulligan 1997). If schooling in itself transforms the person's perception of e.g. diligence, conformity and cooperation, then more educated persons can also prefer activities that are less associated with criminal behaviour (Arrow 1997). Thus, if moral values are influenced by education, then higher education lowers the probability of crime.

The discussion of causality vs. correlation between criminal behaviour and education is also important, especially for the resource allocation decisions at the government level. If the desire of policy makers is to have less crime, then if education has a causal effect on crime, it is prudent to put money into education instead of policing and sentencing. However, in case criminal behaviour impacts investment in education, there is not much use in developing education. Lochner (2004) argues that education has a causal effect on crime (Lochner 2004, p. 183), a similar conclusion is made by Groot *et al*. (2010, p. 285). Here the causal effect is not tested but is assumed to be present.

We use a rather simple approach, which is heavily constrained by the available data and crimes' cost estimates. In Estonia an analysis on the relationships between socio-demographic data and criminal activity on aggregated level (county level) has been carried out by Raus, T. and Timmus, L. (2005). However, for our purposes, there is a need for individual level data and as far as it is known to the authors, this is the first attempt in Estonia to analyse the relationship between education and criminal activity at micro level.

## Method

**Data processing**

Usually this kind of exercise is done based on survey data that collects self-reported information on criminal behaviour (e.g. Groot e*t al.* 2010) as they give relatively rich background information about a person. In case of Estonia, no such survey has been done so far (Estonia only has a regular crime victim survey).

We use an extract of data from the *Database concerning prisoners, persons in detention after service of the sentence, detained persons and persons in custody; Database concerning probation supervision* for deriving the probability of committing a crime.[40] The data includes incidents of the beginnings of incarceration or probation supervision. This means that only crimes that have ended with punishment of incarceration or probation supervision are taken into account in the analysis. The total number of crimes is underestimated, as punishment might in some cases be restricted only to e.g. pecuniary punishment or not registered at all because of underreporting of crimes. We use the data to derive the number of different types of crimes that have been committed by specific demographic groups of people.

The registry excerpt included the following fields of data:

1. Date of birth;
2. Code of prisoner;
3. Date of the beginning of probation supervision or detention in prison;
4. Coded name of the person (the date of birth and coded name give a unique identification to each person, which is used for referring to the number of incarcerated.);
5. Gender;
6. Education;
7. End of detention;
8. Type of crime.

The data does not enable us to differentiate clearly between the transfer from one prison to another and from prison to probation supervision for the same sentence from the punishments for different crimes. Thus the data that are treated here are only rough estimates for more severe crimes. Even though we apply some correction mechanisms to reduce double counting (which are explained below), in some cases the number of crimes might be overestimated. The registry data included all persons who commenced their sentence in the prison or whose probation supervision started in 2007-2011 (March). In the analysis, we used only observations from years for which data for both incarcerations and probation supervision for the whole year was available, i.e. 2008-2010.

The database included repeating observations for persons for whom the different levels of educations were recorded. This indicates that the person might have completed the level of education while being in the prison or between serving different sentences. However, the specific level of education and specific imprisonment cannot be explicitly connected to each other. To reduce the double counting of crimes, repeated observations with lower levels of education were deleted.

[40]We thank Andri Ahven, Mari-Liis Sööt and Kaire Tamm from the Ministry of Justice for granting access to the data and giving insightful comments on the report.

Thus, we assume that the highest level of education that is recorded was obtained by the incarceration start date recorded in the database. As a result, we might overestimate the education level of incarcerated persons and thus underestimate the propensity for lower educated people to commit crimes punishable by incarceration. However, it is probably not a significant source of bias because we are studying a very short and recent period (2008-2010). This problem concerned only the incarceration register and not probation supervision.

Additionally, in order to reduce double counting of people for the same crime, movements between prisons are eliminated. If the time span between the end of incarceration and the beginning of a new incarceration is ten days or less, we considered it to be a movement between prisons and not the start of a new incarceration for a new crime. Unfortunately, there is no good rule for applying the same technique for eliminating double counting for movements from prison to probation supervision and thus in this respect some double counting might remain. As there is a tendency for a person who has committed a crime, to do it again, we preferred to risk with some double counting rather than eliminating all but one observation for each person.

In total, the data after the corrections mentioned above includes 26,238 incidents (beginning of detention in prison or starting of probation supervision), of 19,348 persons.

**Table 42.** Distribution of persons starting probation supervision or detention in prison

| Starting year of the detention in prison or probation supervision | Number of persons* | Number of incidents** | Number of incarcerated persons | Number of incarceration incidents |
|---|---|---|---|---|
| 2008 | 5929 | 9579 | 1451 | 2935 |
| 2009 | 6528 | 8978 | 1886 | 2929 |
| 2010 | 6891 | 7681 | 1778 | 2096 |
| Total | 19348 | 26238 | 5115 | 7960 |

*Source: Ministry of Justice: database concerning prisoners, persons in detention after service of the sentence, detained persons and persons in custody; database concerning probation supervision.*

** Number of persons who started incarceration or probation supervision. Each person is counted once, even if there are several records in the database for the person for different crimes*
*** The number of incidents or observations in the database reflects all beginnings of detentions in prison or probation supervision, irrespective of the person. Thus several incidents involving one person are considered separately.*

Education in the database is self-reported and it is therefore difficult to ensure correspondence to the classification used in the current study. In general, the following assumptions were made for classifying education:

1. Self reported education 'basic education' or 'with no education' (in Estonian *alghariduse, hariduseta*) – A;

2. Primary education and unspecified vocational education[41] (in Estonian *põhiharidus, kutseharidus*) – B;
3. General secondary education and secondary vocational education (in Estonian *keskharidus, keskeriharidus*) – C;
4. Higher education and professional higher education (in Estonian *kõrgharidus, rakenduslik kõrgharidus*) – D;
5. Education not known or reported as 'other' (in Estonian *teadmata, muu*):
    a. If there were for several observations one person in the database and for some observations education was reported and for some not, then education not known or category 'other' was replaced with the level of education that was reported during other incidents;
    b. The rest of the observations are left out from the analysis (in the cleaned database there were 114 incidents in this category).

For each observation in the database, the type of crime is determined based on the sections of legal acts. As the data in the database is not filed in coherently (all the sections, subsections and paragraphs were given in the same cell without a predefined rule), several data transformations made were in order to clean and present data so as to make it possible to determine automatically the type of crime that was committed. The sections that were the bases for convictions were reported without the abbreviation of the title of the legal act, but those that followed the sections that were reported with the name of the legal act were assumed to be from the same act as the previous sections. Some observations were provided without any reference to the basis of the conviction. 155 incidents in the corrected database are therefore left out from the following analysis.

**Calculations of costs of crime**

The steps for calculating the costs of crime by education levels are following:

- The probability of committing a specific type of crime (over the life cycle) is multiplied with the cost of the respective crime;
- The figures are adjusted for **life expectancy**;
- **the NPV** is calculated for each combination of education and gender;
- The costs of crime due to school failure are the weighted differences of NPV between education levels;
- **Total gains** from reducing school failure are calculated by assuming that 50% of people without secondary education obtain secondary education.

From the point of view of a 16 year old person, the costs of each crime were calculated by multiplying the probability of committing the crime at each age with the probability of being alive at that age and the cost of the specific crime. The cost of each crime was expected to remain the same and the calculations were made in constant prices. Yearly expected costs of crimes are discounted with real interest rates 6% and 3% to find the NPV of the costs of crimes for a person belonging to a specific group of people. Costs occurring up to age 82 are considered.

[41]This assumption means that some persons who have secondary vocational education, but have not specified it, are accounted for as persons with education level B.

## Results

In the current study we are only looking at crimes that have resulted in incarceration or probation supervision. At present it is assumed that all cases of incarceration and probation supervision are isolated events. This might not necessarily be the case; however, it is difficult to distinguish from the dataset whether incarceration and probation supervision address the same criminal episode or not.

The distribution of incidents in the cleaned dataset (which covers years 2008-2010) is the following (see Table 43). As can be seen, the most dominant crimes are theft and drunk driving.

**Table 43.** Number of incidents related to the type of crime*

| Type of crime | Number of registered incidents | Number of incidents | Number of incidents/population (18-82) |
|---|---|---|---|
| Manslaughter and homicide § 113-11442; | 283 | 191 | 0.0058% |
| Sexual offences § 141-146; | 365 | 191 | 0.0058% |
| Other offences against persons §115-120, §122-140 and §147-150; | 2933 | 739 | |
| Physical violence § 121; | 14012 | 2870 | |
| Theft § 199; | 71625 | 7838 | 0.2310% |
| Robbery § 200; | 2234 | 1286 | 0.0371% |
| Drug crimes § 183-189; | 3501 | 1772 | 0.0538% |
| Tax offences § 386-393; | ... | 347 | 0.0106% |
| Economic criminal offence § 372-385; 394-402; | 2903 | 124 | 0.0038% |
| Corruption offences § 289, § 293-300; | ... | 68 | 0.0021% |
| Computer crimes § 206-208; 213; 216-2; 217; 222-225; 284; | ... | 305 | 0.0089% |
| Drunk driving § 424 | 10559 | 6273 | 0.1921% |

*One incarcerated person may have committed several types of crimes so that one incarceration or probation supervision might refer to several paragraphs of the law. One crime might have been committed by several persons, therefore, we cannot speak about number of crimes.

*Source: Statistics Estonia; Ministry of Justice: database concerning prisoners, persons in detention after service of the sentence, detained persons and persons in custody; database concerning probation supervision, authors' calculations*

The probability of committing a crime is measured as the yearly average number of incarcerated persons and persons committing probation supervision with the respective level of education in 2008-2010 as a proportion of the average yearly number of persons with the respective education level in 2004-2008 (calculations based on the Estonian Social Survey as in previous chapters).

**Probability of committing a crime**

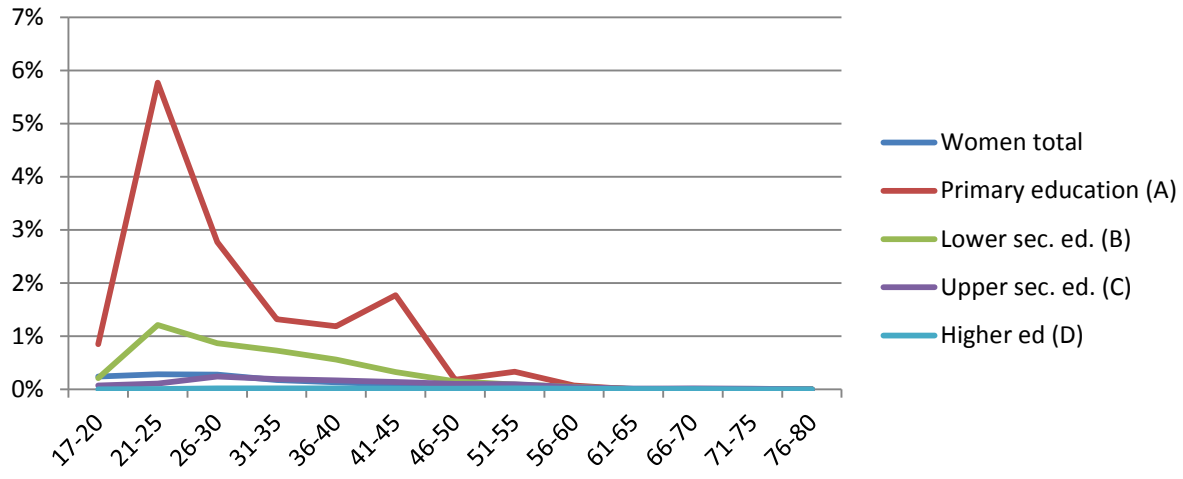
The probabilities of committing a crime are higher among persons (see Figure 17 for female and Figure 18 for male):

- with lower levels of education,
- among younger persons, and
- among males.

A similar pattern is also found in other studies (e.g. Groot *et al*. 2010). The impact of education is visible for younger people and it disappears in old age (since sixties). One of the reasons behind this might be that belonging to younger age groups is an important precondition for engaging at least in certain types of criminal activities (e.g. crimes requiring physical fitness or strength). That might partly explain why education has more visible effect for these age groups.

A further technical note is that one person might be incarcerated several times in a year. Here these cases are counted separately. One person might also be incarcerated for several reasons simultaneously (e.g. robbery and injury). These cases are counted in Figure 17 and Figure 18 as one case, but in the following calculations as separate cases.

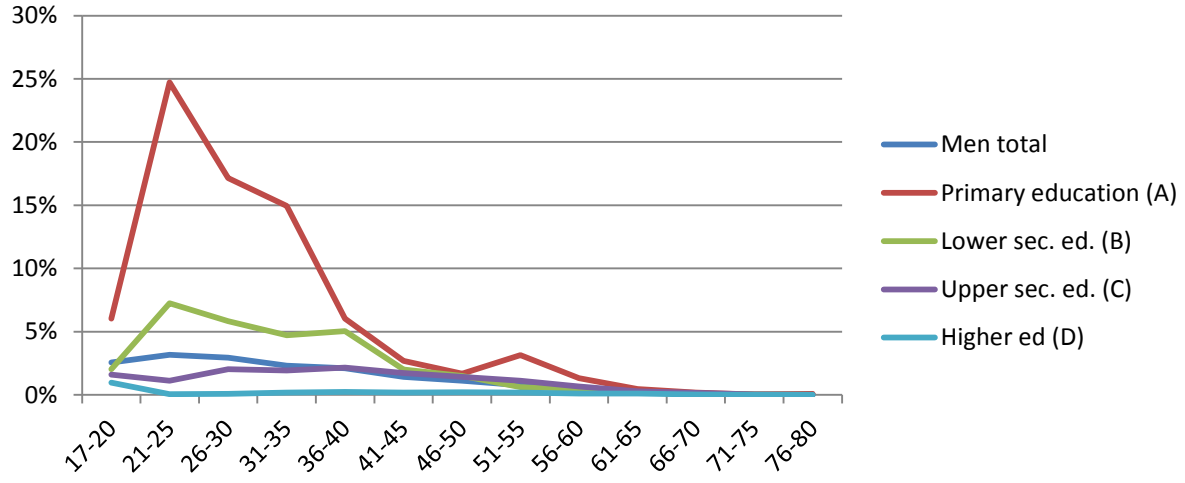
**Figure 17.** The average probability of being incarcerated or under probation supervision for committing a crime for women in 2008-2010, by age and education level (%)




*Source: Ministry of Justice: database concerning prisoners, persons in detention after service of the sentence, detained persons and persons in custody; database concerning probation supervision, authors' calculations*

Looking separately at the types of crimes for which persons were incarcerated, it is evident that while for most types of crimes there is a higher probability of committing a crime among lower educated persons, there are also some crimes that are more prevalent among persons with higher education. For example, corruption among men is solely committed by people with higher education.

**Figure 18.** The average probability of being incarcerated or under probation supervision for committing a crime for men in 2008-2010, by age and education level (%)




*Source: Ministry of Justice, authors' calculations*

**Cost of crime**

The costs associated with specific crime that are used in the current study were provided by Ministry of Justice.[43] The costs are indicated in the following table. The costs that were calculated by MoJ (2010) include costs of crime prevention, insurance, pre-trial and trial costs, costs of punishment (staying in the penal institutions, pecuniary punishment, coercive treatment), and direct costs of damage (lost lives, lost property). It is not quite clear from the report how exactly the costs are distributed and which costs have been included and which omitted. However, these are the best and only estimates available in Estonia and therefore we will use them as input.

From the previous table the offences against persons in total are left out of calculations, as there is no indication for the cost of these crimes if manslaughter and homicide, sexual offences and physical abuse are excluded. MoJ (2010) measures the lost lives based on average expected wage, which is assumed to be Estonian average wage. This is not in correspondence with the approach which is used for measuring the value of life in other sections of the current study. Therefore a correction was made to costs of manslaughter and homicide. The value of life according to the current study was (see section of health) 815 thousand EUR in 2010. This is assumed to be the minimum cost of homicide and manslaughter. There is no clear indication in the report by MoJ (2010), how much of their estimate is control costs and how much the value of life; therefore it is not possible to add control costs to this value of life. Thus as the conservative estimate we rather underestimate the costs of homicide and murder.

[43] The data are from an unpublished working report, provided by the Ministry of Justice. The data and accompanying short report will be referred to as MoJ (2010).

**Table 44.** Costs of crime according to the type of crime

| Type of crime | Sections from the Penal code | Cost per crime in EUR 2008 |
|---|---|---|
| Offences against persons in total | § 113-150 | 9,397 |
| Manslaughter and homicide | § 113-114 | 191,777 |
| Sexual offences | § 141-146 | 46,376 |
| Physical violence | § 121 | 8,179 |
| Theft | § 199 | 9,152 |
| Robbery | § 200 | 8,412 |
| Drug crimes | § 183-189 | 4,545 |
| Tax offences | § 386-393 | 15,217 |
| Other economic offences | § 372-385; 394-402 | 190,093 |
| Corruption | § 289, § 293-300 | 9,826 |
| Computer crimes | § 206-208; 213; 216-2; 217; 222-225; 284 | 1,498 |
| Drunk driving | § 424 | 1,212 |

*Source: MoJ (2010)*

From the point of view of a 16 year old person, the costs for each crime are calculated by multiplying the probability of committing the crime at each age with the probability of being alive at that age and the cost of the specific crime. The cost of each crime is expected to remain the same and the calculations are made in constant prices. Yearly expected costs of crimes are discounted by real interest rates 6% and 3% to find the NPV of the costs of crimes for a person from a specific group of people. The costs occurring up to age 82 are considered. The differences between the cost estimates for a person with lower secondary education (B) from the estimate for a person with upper secondary education (C) are presented in the following table.

**Table 45.** Differences in NPVs for a person with lower secondary education (B) and with upper secondary education (C), EUR per person

| | Discount rate 6% | | Discount rate 3% | |
|---|---|---|---|---|
| | Women | Men | Women | Men |
| Manslaughter and homicide | 441 | 1,080 | 649 | 1,352 |
| Sexual offences | 0 | 97 | 0 | 128 |
| Physical abuse | 50 | 277 | 78 | 454 |
| Theft | 284 | 970 | 402 | 1,461 |
| Robbery | 23 | 98 | 31 | 157 |
| Drug crimes | 46 | -60 | 65 | -37 |
| Tax offences | 5 | 15 | 11 | 16 |
| Other economic offences | -42 | -139 | -77 | -237 |
| Corruption | -0 | -4 | -0 | -6 |
| Drunk driving | 2 | 63 | 2 | 103 |
| Computer crimes | 2 | 8 | 4 | 11 |
| TOTAL (per person) | 812 | 2,406 | 1,164 | 3,402 |

*Source: Ministry of Justice, authors' calculations*

**Table 46.** Differences in NPVs for a person with upper secondary education (C) and with tertiary education (D), EUR per person

| | Discount rate 6% | | Discount rate 3% | |
|---|---|---|---|---|
| | Women | Men | Women | Men |
| Manslaughter and homicide | 99 | 1,226 | 185 | 2,112 |
| Sexual offences | 0 | 69 | 0 | 125 |
| Physical abuse | 11 | 147 | 18 | 242 |
| Theft | 93 | 517 | 137 | 780 |
| Robbery | 5 | 85 | 7 | 115 |
| Drug crimes | 15 | 99 | 21 | 134 |
| Tax offences | 8 | 48 | 13 | 73 |
| Other economic offences | 43 | 256 | 77 | 408 |
| Corruption | -1 | 3 | -1 | 2 |
| Drunk driving | 2 | 76 | 3 | 121 |
| Computer crimes | 0 | 3 | 1 | 4 |
| TOTAL (per person) | 275 | 2,530 | 460 | 4,116 |

*Source: Ministry of Justice, authors' calculations*

Adding all the costs of all crimes together, we are able to estimate the minimum possible reduction of costs of crimes if half of the people with lower secondary education obtained upper secondary education. The yearly reduction of crime costs would range from EUR 1.4 mil to EUR 2 mil, depending on the discount rate used.

**Table 47.** Yearly cost of school failure from criminal behaviour

| | Estimates of the number of early school leavers in 2011 | Value of reduced costs of crime if half of the people with only lower secondary education obtained upper secondary education, EUR | |
|---|---|---|---|
| | | Discount rate 6% | Discount rate 3% |
| Man | 994 | 1,195,211 | 1,689,855 |
| Woman | 456 | 185,333 | 265,744 |
| TOTAL | 1,450 | 1,380,544 | 1,955,598 |

*Source: Ministry of Justice, authors' calculations*

As explained before, there are some aspects due to which our estimates overestimate the costs of crime (e.g. double counting some crimes as it is not possible to separate movements without committing a new crime between prisons and movement from prison to probation supervision or vice versa in the database; also as it is not clear how the costs estimates of the crimes are derived, these are associated currently with each person who is starting incarceration or probation supervision, even if two persons have committed the same crime, both persons are related to the whole cost of the respective crime). Also, the calculation assumes that education is the sole explanatory variable besides education, sex and age. It might, though, be that there are some other variables that influence the inclination to commit a crime besides education (e.g. parents' education). Therefore there might be some overestimation of the impact of education on committing a crime. At the same time, if we compare the probabilities of committing a crime found in other studies (e.g. Groot *et al.* 2010 for the year 1995 in the Netherlands), the probabilities that we find are rather small (e.g. average probability of drunk driving based on self-reported data in the Netherlands

in 1995 was 5.8%, in Estonia the yearly average in 2007-2010 was 0.59%). Additionally, as only a very limited list of crimes was looked at and the costs of crime types are rather underestimated, in general the costs are also probably underestimated and the total gain from the education because of reduction of crime costs may be higher.

### Constraints and limitations

The data used in this study does not allow for controlling for the causality between crime and education. It might well be that people who are more inclined to commit a crime are also less inclined to participate in education due to a "taste for crime" or unobserved discount rates (Belfield *et al.* 2007, p. 148). Instrumental variable approach can be used in order to test for causality – a change in obligatory schooling years, for example, would be a good instrument to use. However, in the Estonian case, there is no recent reform that could be used for that kind of assessment. There is also not much data on the social background of criminals that would allow to construct other (although lower quality) instruments.

There is also very limited data on actual costs associated with both administrative procedures (like policing and sentencing) as well as on the cost of consequences. This obviously limits our possibilities.

In this report we used registry data that has several limitations. Firstly, it is biased towards more severe crimes and secondly, even if the register would include crimes that do not involve incarceration, any registry data would probably suffer from underreporting. In order to take into account also less severe crimes one could use survey on criminal behaviour (e.g. something similar to 'The Netherlands Survey on Criminality and Law Enforcement' that was conducted in 1996).

Concerning the registers used, a further problem arises – Database concerning prisoners, persons in detention after service of the sentence, detained persons and persons in custody and Database concerning probation supervision use relatively simple education level classification which does not match with other surveys or classification used in Estonian Education Information System. This affects the reliability of our calculations as upper secondary education in this section and in section dealing with, say, private earnings, might not necessarily denote the same thing.

## 3.5. Total costs of school failure

The total costs of school failure are listed in Table 48 and Figure 19. The most important component is by far private earnings, followed by tax revenues. From social assistance costs pensions stand out as an important source of additional cost from better education. The main reason behind this is longer life expectancy of better educated. Also, it should be kept in mind, that better educated contribute also more to tax revenues and the combined effect of tax revenues and pensions is in favour of better education.

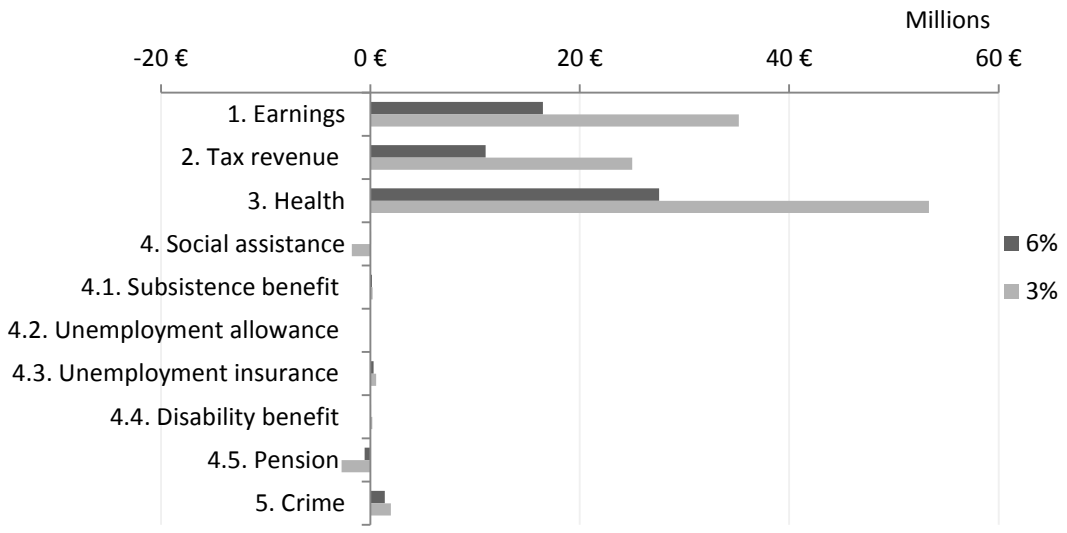
All together, the potential benefit from higher education ranges from EUR 113.8 mil (at a 3% discount rate) to EUR 56.6 mil (at a 6% discount rate). As a percentage of the Estonian 2011 (forecasted) GDP, the respective figures would be 0.71% and 0.35%.

**Table 48.** Total costs of school failure (rounded to 100 thousand precision), EUR

| | 6% | 3% |
|---|---|---|
| 1. Earnings | 16,500,000 | 35,200,000 |
| 2. Tax revenue | 11,000,000 | 25,000,000 |
| 3. Health capital | 27,600,000 | 53,400,000 |
| 4. Social assistance | 100,000 | -1,800,000 |
| 4.1. Subsistence benefit | 200,000 | 200,000 |
| 4.2. Unemployment allowance | 0 | 0 |
| 4.3. Unemployment insurance | 300,000 | 500,000 |
| 4.4. Disability benefit | 100,000 | 200,000 |
| 4.5. Pension | -500,000 | -2,800,000 |
| 5. Crime | 1,400,000 | 2,000,000 |
| TOTAL | 56,600,000 | 113,800,000 |

*Source: authors' calculations*

**Figure 19.** Total costs of school failure, EUR

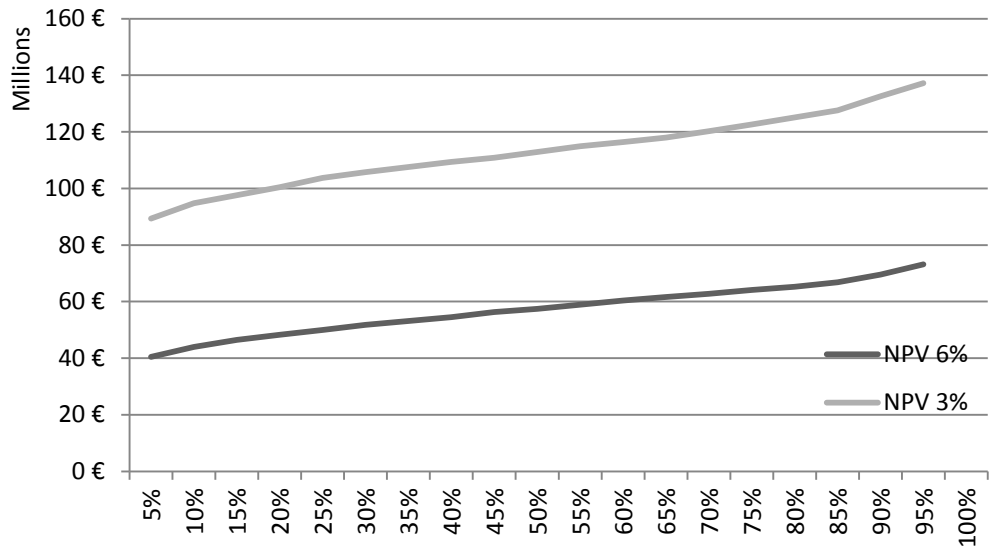



*Source: authors' calculations*

The following figure illustrates the variation of the total costs of school failure obtained from Monte Carlo simulations. When conducting the simulations, the parameters of regression coefficients are drawn randomly from normal distribution with respective mean and standard deviation. In cases where nonparametric methods are used (e.g. when calculating mortality rates and probabilities of being alive), in order to conduct Monte Carlo simulations, estimates of e.g. the size of the population in specific socio-demographic groups (e.g. 20 years old Estonian men with upper secondary education) are assumed to be normally distributed.[44] Again, the values are randomly drawn from normal distribution with specific parameters for each group. In order to give some structure to the latter process, although randomly generated quintiles are used in order to draw random values from the respective distribution, we will use the same quintile for all groups.[45] The process is iterated 500 times.

The results from Monte Carlo simulation show that, using a 6% discount rate, the cost of school failure remains in the range of **40-73 mil EUR** with 90% probability. In case of 3% discount rate the respective range would be **89-137 mil EUR**.

**Figure 20.** Empirical cumulative distribution function of total cost of school failure, EUR




*Source: authors' calculations*

[44] The mean and standard deviation are calculated based on yearly observations form years 2004-2008.

[45] Otherwise the random process could simultaneously draw the number of people in the group of 20 year old men with upper secondary education from the 95$^{th}$ percentile and the number of people in the group of 21 year old men with upper secondary education from the 5$^{th}$ percentile. The idea of using Monte Carlo estimates is to introduce some 'probable' variation into the calculations. However, so large fluctuations in the number of people between two cohorts are usually highly improbable. Thus, if the random process generates the 95$^{th}$ percentile, this percentile would be used for calculating the number of people in all socio-demographic groups.

# 4. Additional topics

## 4.1. The civic costs of school failure

### Introduction

In addition to direct costs of school failure, such as lower tax incomes and higher cost of social benefits, it also creates more general losses for the civil society. In the following chapter we will introduce the theoretical framework for linking education to civic costs and social capital. This is followed by an overview of recent empirical work abroad and some indication of the link between Estonian educational attainment and its impact on social capital.

As it is quite difficult to put a price tag on the civic costs of school failure (as well as inequality issues described in the next chapter), we will report only differences between education levels on some indicators of social capital (e.g. participation in voluntary work).

### Theoretical framework

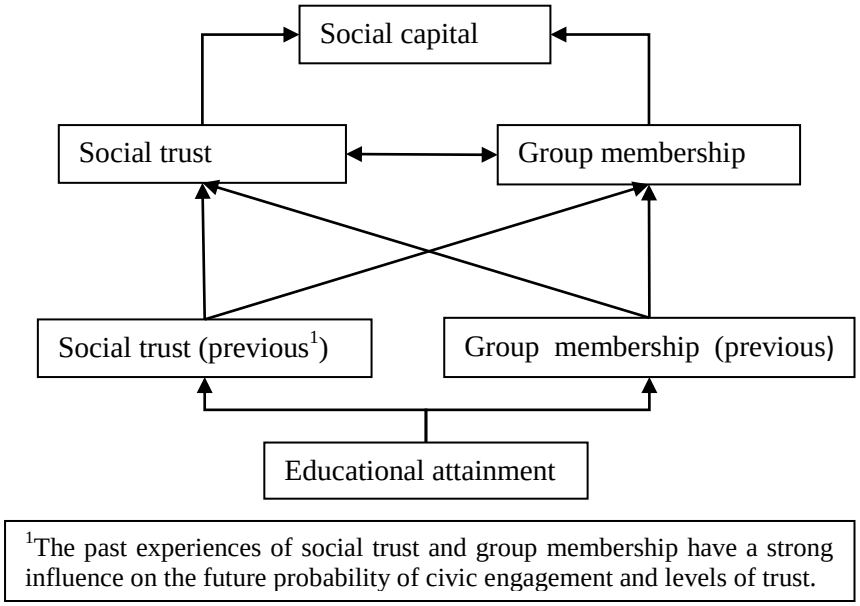
**Defining social capital: trust and civic participation**

Civic costs of school failure can be measured as loss in social capital. Before turning to the causal relationship between education and social capital, an elaboration of the meaning of the term "social capital" is in order. First of all, it has to be made clear that the term "social capital" has been used in very different contexts and there's a multitude of definitions. Becker defines it as *"a particular type of human capital. Human capital [...] usually looks at a person [...] Social capital looks at a person's link to other individuals"* (Clement, 2002). One of the more general definitions is proposed by Putnam (1993), where social capital is defined as the *"aggregate concept that encompasses the association networks, norms and trust that facilitate collective interactions for mutual economic and social benefits"*. It is also possible to distinguish social capital on micro, meso and macro levels (Huang *et al.*, 2009, p. 2). As most of the analysis done in the previous chapters of this report concentrates on the individual level, we will stick with the individual level also in analysing the civic costs.

Fukuyama defines social capital as *"...an instantiated informal norm that promotes co-operation between two or more individuals"* (Fukuyama, 2001, p. 7). This coincides with the view of Huang *et al.* (2009), who state that social capital on the individual level is expressed by social trust and engagement in social activities.

Figure 21 describes the components of social capital. In general terms, social capital is composed of two major components – social trust and group membership. These terms need also additional clarification. We start with **social trust**. Yamigishi and Yamigishi (1994) distinguish between "generalized trust" and "particularized trust." Generalized trust can also be viewed as social trust, for it describes person's confidence in strangers. Particularized trust shows confidents in friends and acquaintances. Particularized trusters avoid strangers and are therefore also less likely to participate in civic engagement (Uslaner, 1997, p. 4). Trust described in Figure 21 is therefore generalized trust, since particularized trust has a very limited positive influence on social capital.

**Figure 21.** Creating Social Capital




*Source: composed by author*

**Civic participation** is usually seen as probability of joining groups or community activities, active citizens have been described as *"informed about and discuss politics, vote, get involved in political parties, trade unions, NGOs and civic associations, and use all 'forms of contention'"*(Magnette, 2003, p. 5).

As one can see, social trust and civic participation are clearly interrelated, however there are quite dissenting opinions regarding the causality of social trust and individual engagement. It has been argued that trust and personal engagement are "mutually reinforcing" (Putnam, 1993) and there is no one-way causal effect between the two. Others have argued that the relationship is in fact asymmetric and one is the outcome of the other.[46] On the one hand, trusting people are believed to be more eager to join different groups, because of their high trust in others. On the other hand, people who belong to groups are thought to have more positive experiences which should have a positive influence on their overall trust. Nevertheless it is clear that the two are strongly correlated and combined make up most of social capital.

Social participation and trust are essential for a fully functioning democratic society. More trust and involvement in social activities could be beneficial in various ways: higher voting counts, more volunteer hours, more blood donations, but also more citizen input into policy making. "A high level of social participation is supposed to raise civic norms among people and fortify the foundation of a

[46]The literature is quite undecided in these matters. For example Brehm and Rahn (1997) have found that civic engagement increases trust. Uslaner (1997) on the other hand states that social participation grows through trust. Claibourn and Martin (2000) researched the matter further comparing two age-cohorts from The Michigan Socialization Study. The data consist of three waves of a survey administered to high school students and their parents beginning in 1965. Since personal engagement is strongly correlated to different group activities Claibourn and Martin (2000) tested the causality of trust and the probability of belonging to groups. They found that trust doesn't encourage group membership.

democratic society" (Huang *et al*., 2009, p. 454). Thus a quest for policies that encourage trust and social participation is understandable and desirable.

**School failure and social capital**

Supporters of the social capital theory generally agree that schooling is the best way to increase the amount of social capital generated (e.g. Fukuyama, 2001; Putnam, 2000). It is widely believed that education creates social capital through "impart[ing] good standards of behaviour, help[ing] to socialize young people and also enable[ing] them to engage in society by virtue of being better informed" (Denny, 2003, p. 2). Hence education creates social trust trough socialisation and improves the opportunities of civic engagement – the two main components of social capital as described in previous paragraphs.

According to Nie, Junn, & Stehlik-Bany (1996), the impact of education on social capital can be divided into relative and absolute effects. The **absolute effect** refers to the accumulation of civic values and knowledge. The **relative effect** measures relative educational status, this takes into account the devaluation of lower educational levels over time. Therefore an individual's social capital is indirectly linked to others' educational attainment (Huang *et al.*, 2008).

The exact mechanism of how education influences social capital has been explained in various ways. Firstly schooling is thought to reduce costs of lower civic participation through increased cognitive abilities, making information processing easier. Secondly education raises awareness about the benefits of social involvement, making it more desirable. However education may also shape civic preferences through shared social norms and specific peer groups (Dee, 2003).

## Previous empirical research

**General effect of education on social capital**

Civic returns are complicated to calculate since you can't put a price on e.g. percentage of voter participation. The various empirical studies on the matter mostly combine three sorts of data: actual participation in voluntary, political or community activities; laws regarding child labour and compulsory education; and different social surveys measuring political awareness and attitudes on trust and civic participation. Economic value is rarely estimated.

The most up to date and comprehensive source of the effects of education on social capital is a meta-analysis by Huang *et al.* (2009) based on 65 different studies. Two criteria were used to find studies: they should focus on the determinants of at least one dimension of social capital at the individual level with formal education in the model; and they should have reported statistical data to allow for estimation by the fixed effects and random effects models. They found that one standard deviation of years of schooling accounts for 12-16 percent change of standard deviation in different dimensions of social capital. Their analysis confirms that education is a strong and robust positive correlate of individual social capital. The existence of a relative effect of education was also affirmed in this meta-analysis. Gender plays a role in the mechanism by which education affects social capital, as women exhibit a statistically negative impact on the effect sizes of both dimensions of individual social capital. The endogeneity problem in schooling achievement and social capital outcome is a

critical source of variation of study estimates of civic participation, but it does not influence estimates on social trust (Huang *et al.*, 2009, p.460).

There are several studies that have proposed remedies for tackling estimation problems. In both the United States and the United Kingdom Milligan *et al.* (2004) found strong evidence of the schooling impact on civic participation. They used probability of voting, awareness of candidates and campaigns, attending political meeting and working on community issues as measures of social participation. The effects of schooling were controlled through changes in compulsory school laws (Milligan, 2004).

Similarly Dee assessed whether educational attainment in the United States had causal effects on civic outcomes by using other sources of variation in schooling (i.e., the geographic availability of two-year colleges as a teen and exposure to child labour laws as a teen). These should have no effect on civic outcome unless educational attainment has a causal relationship with accumulation of social capital. He used data from 1972-2000 General Social Surveys and High School and Beyond longitudinal study. The results suggested that educational attainment, both at the post-secondary and the secondary levels, has large and independent effects on civic engagement and attitudes (Dee, 2003).

A somewhat similar approach was taken by Hoskins *et al.* (2008) who used the 2006/2007 European Social Survey to evaluate 19 different European countries. The composite indicator was comprised of three distinct forms of participation: Representative Democracy, Protest and Social Change, Community Participation, and a fourth dimension on Democratic Values combining attitudes regarding democracy, human rights and intercultural understanding. The results showed that education was positively and significantly correlated with active social behaviour. Estonia was also included in this survey, but the results were not presented separately from other eastern European countries. It ranked in the same range as other eastern European countries which had the lowest level of active citizenship in comparison to other parts of Europe. This difference is thought to come from the young democratic governing, civic participation has not yet grown to the extents it has in northern Europe (Hoskins *et al.*, 2008).

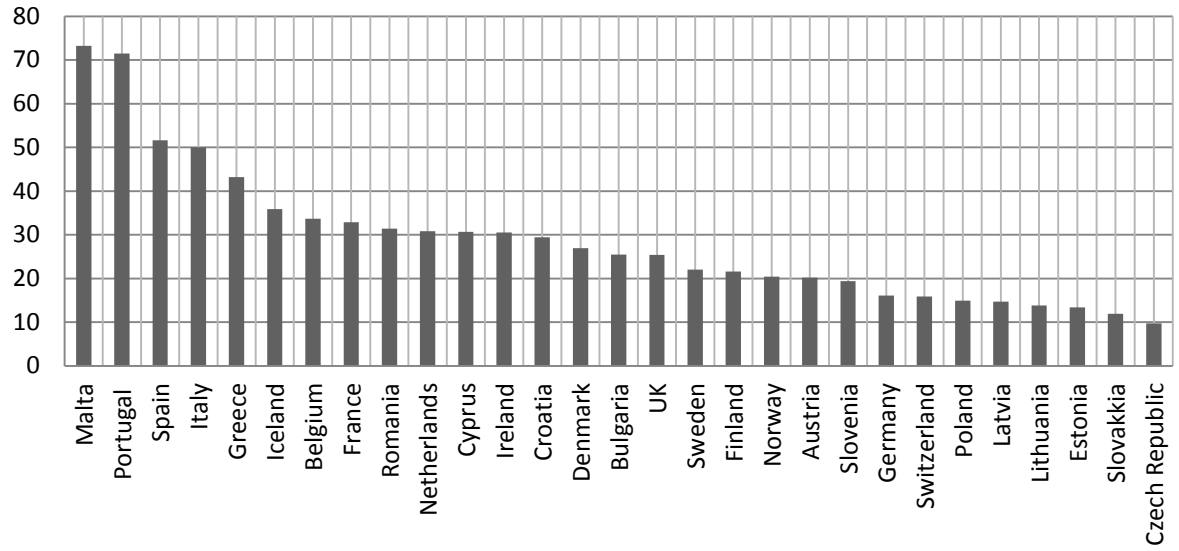
A similar analysis was conducted by McCloughan *et al.* (2011) who found that southern European countries were those with least voluntary activity. In fact Estonia ranks 6$^{th}$ right after Scandinavian countries (McCloughan *et al.,* 2011). Figure 22 shows the comparison of European countries by proportion of people with basic or lower educational attainment. On the one hand, this coincides more with the findings of McCloughan *et al.* (2011) since the Baltic States have an even smaller proportion of people with lower education than Sweden or Finland. At the same time, educational attainment seems to predict the amount of voluntary work fairly well.

Social trust has been studied comparatively through international surveys like European Social Survey and World Value Survey. Using various evidence Helliwell and Putnam (1999) report that one extra year of schooling increases an individual's belief about whether other people can be trusted by 10%.

Despite the large number of studies referring to strong relationships between education and social capital, not all researchers agree to call this link a causal one. For example, Cassel and Lo (1997) found evidence of self-selection when using panel data to measure political literacy before and after

higher education. Results showed that much of political literacy is created before leaving high school and comes from the same variables that lead to higher education. Latent variable model estimates refer to self-selection (Cassel & Lo, 1997).

**Figure 22.** 25-74-year-olds with basic or lower educational attainment in Europe, % of population



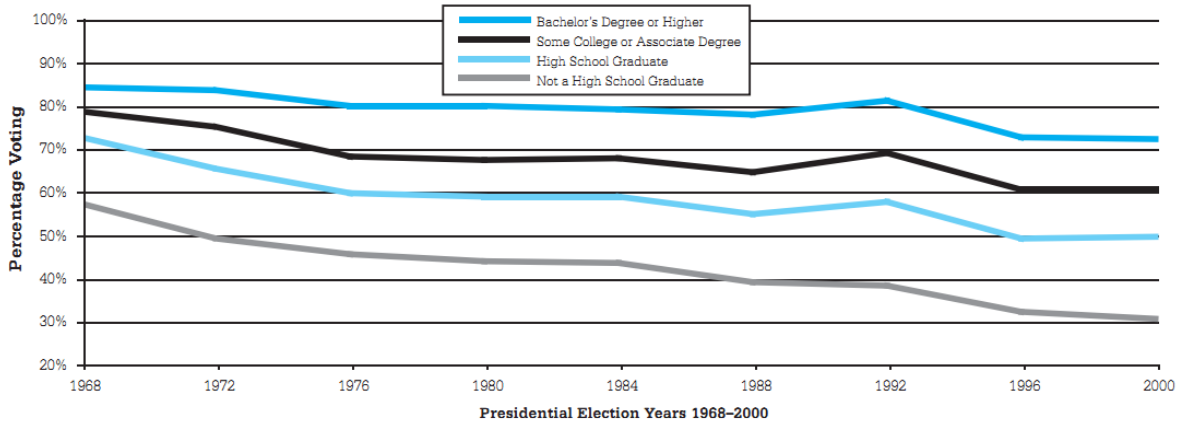

*Source: Eurostat*

**The influence of school failure on voting**

Next, we will look at more specific aspects of the effects of education on civic behaviour. One of the most researched civic returns on education is political activity and voting turnout in particular. Researchers generally agree that there is a strong causal relationship between the two, but there are still unanswered questions regarding the dropping voter turnout over the past decades.

In the United States and United Kingdom, Milligan *et al.* (2004) empirically tested schooling impact on the probability of voting, political awareness, attending community meetings and working on community issues. They found that both in the US and the UK, better educated adults participate more often and are better informed on political issues. There was a strong and robust relationship between education and voting turnout in the US, but not in the UK. In the United Kingdom, only registered voters were included in the sample and therefore there might be a barrier for lower educated people to be in the sample (Milligan *et al*., 2004). Tenn (2005) claims that stronger evidence for the causality can be found when using relative educational attainment. This means that an individual's educational level is compared to his age group's mean.

**Figure 23.** Voter turnout by level of education




**Note:** Based on self-reporting.
**Source:** U.S. Census Bureau, 2002b, Table A-2.

*Source: Baum (2007)*

Figure 23 represents self-reported turn-out for the United States president elections in years 1968-2000. Participation in elections has declined in all educational groups, but the difference between educational levels can be clearly seen. One must also remember that self reporting systematically overestimates the percentage of voters due to social norms which disapprove of not voting (Granberg & Holmberg, 1991). Baum also provides an overview of voter participation over the last years, which shows that among 25-44-year-olds high school graduates are nearly twice as likely to vote as the less-educated, 50 and 25 percent accordingly (Baum & Payea, 2004; Baum & Ma, 2007; Baum *et al.* 2010).

This has been explained in two different ways. First, better-educated people are believed to have higher appreciation for democratic values and have better cognitive skills which help them to process complicated information faster. Second, a better-educated person is thought to be more likely closer to the political stage than a less-educated individual. The latter might feel that his opinions are not heard and have less motivation to vote. In the past upper secondary education was considered as elite as higher education is today. This change might explain the low participation levels by high school graduates today (Uslaner, 1997).

However, it doesn't explain the overall drop in voter turnout over the years, since rising education should mean more civic participation. This phenomenon has been called the "paradox of participation" and it is especially concentrated in the most educated – usually also the youngest – cohorts (Campbell, 2006). This phenomenon has not been well explained by political scientists.

**The influence of school failure on volunteerism**

Another well-researched civic return is the participation in voluntary activities and charitable donations. Researchers generally agree that higher educational level motivates people to do more voluntary work through higher appreciation of democratic values. However, higher education also

raises the cost of time and should therefore lower the motivation for better-educated citizens to engage in voluntary work.

Baum *et al.* (2010) have found that educational attainment and volunteerism are highly correlated. They observed the time of voluntary work done during 12 months (September 2008- September 2009) in the United States. Among 25-year-olds and older, high school graduates were twice as likely to do voluntary work as people with lower educational level, 19% and 9% respectively. Comparison to years 2003 and 2006 shows that overall there are very little changes over time (Baum & Payea, 2004; Baum & Ma 2007).

Denny supports this argument with his study, stating that one year of extra schooling increases the impact of education by 3-4%. He used Eurobarometer data to distinguish altruistic and non-altruistic organisations and education positively affected voluntary activities in both (Denny, 2003).

Not all researchers agree: Gibson's study used twins to explore the relationship between education and volunteering, controlling for unobservable family effects. His results showed that education significantly reduces the probability of volunteering and the amount of volunteer hours. This was explained by the higher opportunity cost of time for highly educated people (Gibson, 2001).

International studies show that the estimated effect sizes vary depending on the method used. Dee (2003) found that college entrance by itself increases the probability of volunteering 20%. Baum *et al* have found that there is a linear correlation between educational attainment and voluntary work. Their probability of volunteering for people with some college education and those with a bachelor's degree is accordingly around 30 and 40 percent (Baum & Payea, 2004; Baum & Ma, 2007).

These trends could be observed as long as 24 years ago when Hodgkinson and Weitzman (1988) found that college graduates volunteered twice as much and donated 50 percent more of their income than high-school students. This has also been proven by Denny (2003) who found that acquiring a 4-year university degree is associated with a 10 percent higher probability of an individual engaging in voluntary works.

**Other influences: blood donations and ethical behaviour**

There is more or less consensual evidence that voting and volunteering have a causal relationship with education. There are, however, other civic returns for which it is debatable whether they are caused by educational attainment. Blood donations and ethical behaviour are just two examples of this.

Baum (2004) has found some correlation between educational attainment and regular blood donations in the United States. In 1994, 11% of high school graduates donated blood in comparison with only 6% of those with lower education. Again there is no proof of causality but it is assumed that blood donation is found more important by those who have higher trust for others and are more capable of planning for the future. Based on 2005 National Health Interview Survey, Baum states that only 4.0% of high school graduates donated blood in the last year and the probability for less-educated was 1.6% (Baum, 2007). The large differences in the result may be caused by different survey methods. Nevertheless there is strong evidence that better educated citizens donate twice as much blood.

Adults with higher levels of education are also more likely to be open to differing opinions according to the General Social Survey 2004 (Baum 2007). 64% of high school graduates find "Trying to Understand Opinions of Others" important, for lower educated respondents the number was 59%. The belief that others opinions are "not important" was also more widely spread among the lower educated respondents. It is possible that education increases social cohesion through raising tolerance and spreading common moral norms.

The perception of ethics has also been examined by researcher, although with fuzzy results. The following studies address the benefits of higher education, but are still worth mentioning. According to Lau (2011), people in Malaysia with an undergraduate degree or higher seem to be more ethical than those with secondary school education. He explained the correlation through informal belief systems that are obtained in formal education. However, Gundersen *et al.* (2008) found contrary evidence when studying different groups of students. Different groups perceived ethical dilemmas differently with no correlation to levels of academic achievement.

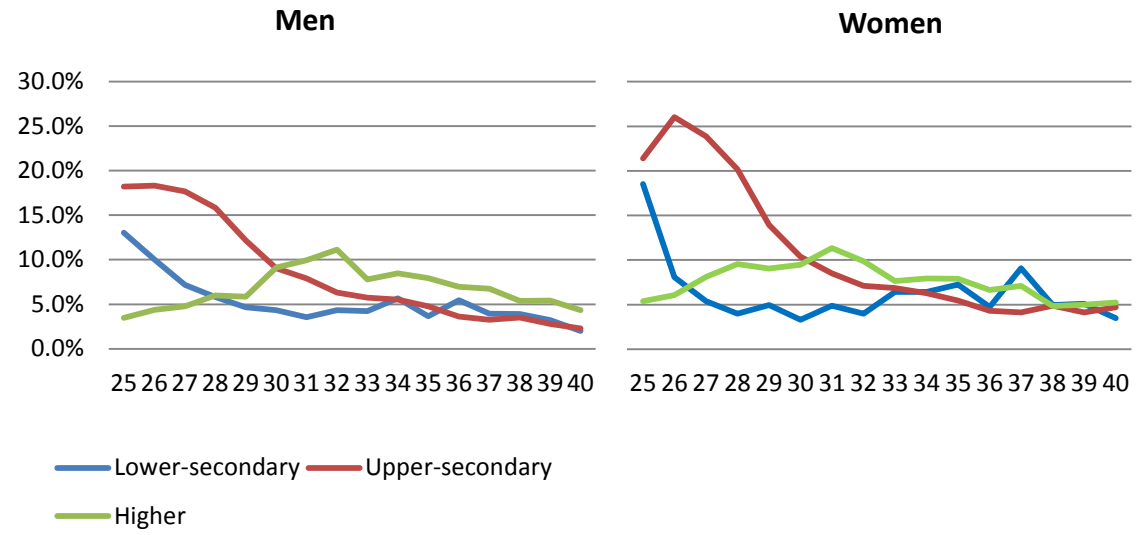
### Civic costs of school failure in Estonia

For civic costs of voter participation, similar tendencies are dominant in Estonia as elsewhere. Toomla (2011) has compared the last three parliament elections. The 18-30-year-olds are the most passive cohort, with 1/3 not-voters. The participation level is strongly related to educational attainment: about 1/3 with basic education don't vote in comparison to 20-25 percent of those with secondary education. Among the less-educated elderly and young people are more or less evenly distributed. The 2011 survey shows that 43% of young people with basic education don't vote. The data collected is based on self-reporting and there are usually more active citizens in the sample than would be proportional. The actual voter turnout for the last three elections is around 60 percent, but 75-80 percent of respondents claim to have voted (Toomla, 2011).

The data from Northern-Estonian Regional Hospital for the year 2005-2010 also suggest that people with lower secondary education are less likely to donate blood than those with upper secondary education (see Figure **24**). Oddly, the trend does not seem to continue through higher levels of education. In fact, people with higher education have a lower probability of donating blood when comparing the national averages for educational attainment. Interestingly, there seems to be a significant ageing effect. By the age 33, the differences between educational levels are very small and the participation of all educational levels drops gradually. This can be explained through individuals forgetting to update their personal information when graduating from university. Therefore by the age of 30, most of these people have updated their information from upper-secondary to higher education. From that point onward, we can observe the expected effect of educational attainment.

There are two restrictions with this data. Firstly, all the respondents who claimed to have vocational education in the questionnaire for blood donators were discarded. There was no reliable way of saying whether they had had lower- or upper-secondary vocational schooling. Secondly, the information about population's educational levels may differ from the specific regional situation. On the other hand, there is no reason to assume that the average for northern Estonia varies significantly from the national average since about 1/3 of the population is concentrated in this area.

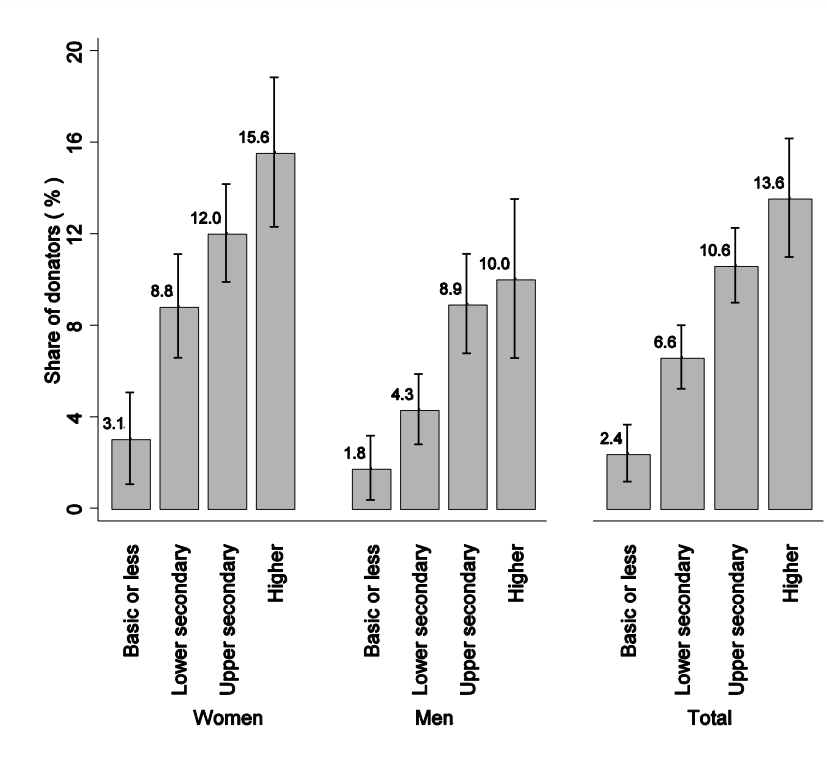
**Figure 24.** Share of population donating blood by age and gender, 2005-2010, (25-40-year-olds)




*Source: Statistics Estonia and SA Põhja-Eesti Regionaalhaigla Verekeskus, authors' calculations*

The participation in other voluntary activities such as volunteer work, membership of NGOs and donations made can be analysed based on the time-use survey by Statistics Estonia. The data for 2009-2010 reveals that there is positive correlation between education level and probability of making donations (see Figure 25).When looking more specifically at the differences between lower secondary and upper secondary education, then school failure seems to affect also the probability to donate. There are also gender differences - in general, women are more inclined to donate than men. Women with upper secondary education do not behave statistically significant differently than women with lower secondary education. For men, however, the differences between upper secondary and lower secondary education are statistically significant.

**Figure 25.** Donations in past 3 months, share by gender and educational attainment (2009)

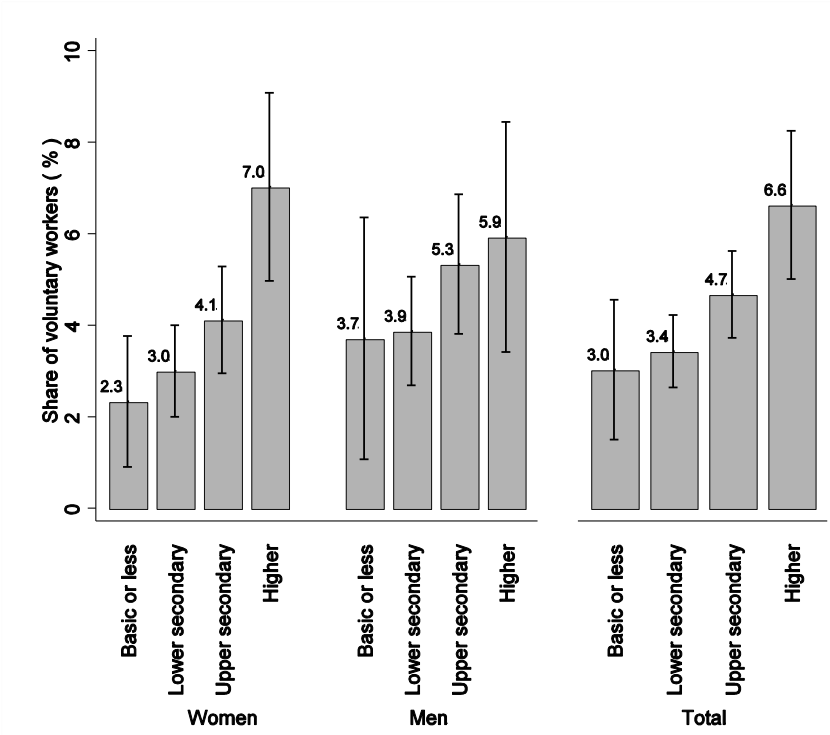



*Source: Time-use survey 2009/2010, authors' calculations*

Volunteer work here is defined as any unpaid work done for people outside the household, including relatives. There are rather small differences when comparing men and women. Differences between uppers secondary and lower secondary education are statistically insignificant (see Figure 26). The same is true for membership in NGOs (see Figure 27).

Unfortunately, there are not enough observations to analyse neither the effect of ageing nor the influence of gender by nationality.

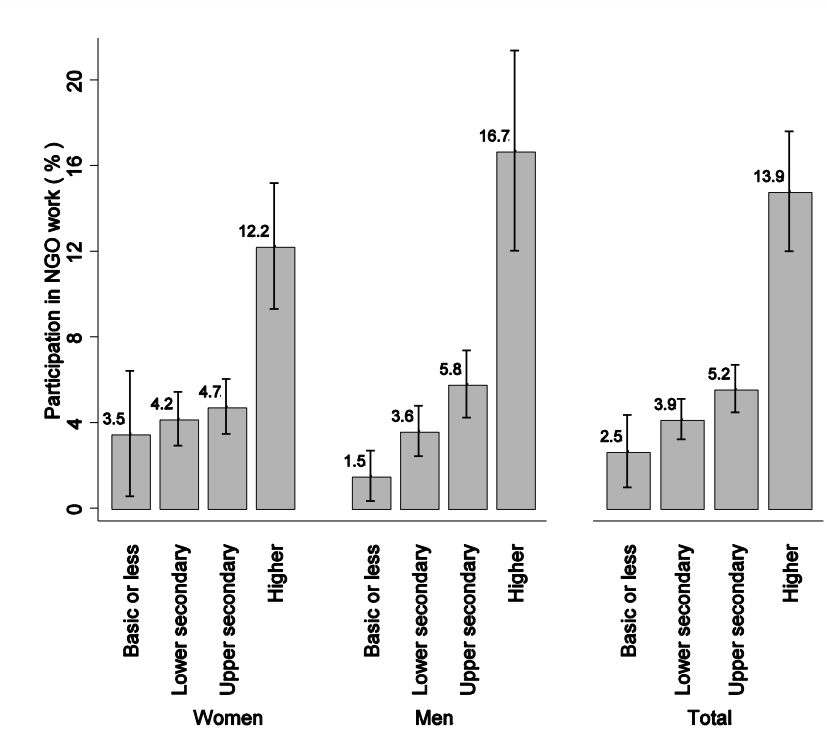
**Figure 26.** Voluntary work by genderand educational attainment (2009)




*Source: Time-use survey 2009/2010, authors' calculations*

For Estonia, also the impact of obtaining tertiary education on civic engagement has been analysed. A study by Möller et al states that people with tertiary education in Estonia participate in voluntary activities 31% more often (Möller *et al.*, 2008).

**Figure 27.** NGO membership by gender and educational attainment (2009)




*Source: Time-use survey 2009/2010, authors' calculations*

## Conclusion

Civic returns on education are measured by general social trust and civic participation as two main components of social capital. Social capital has been considered one of the fundamental parts of a well functioning democratic society.

The mechanism of how education influences social capital has been explained in various ways. Schooling is thought to reduce costs of civic participation through increased cognitive abilities, making information processing easier. But education also raises awareness about the benefits of social involvement, making it more desirable. However, education may also shape civic preferences through shared social norms and specific peer groups. Many researchers do not take into account the problems of (self-)selection or endogeneity. Nevertheless there are others that do and the qualitative results of these researches generally point to positive causal influence of education.

Numerous analyses have found a strong causal relationship between civic participation, social trust and educational attainment. Therefore it is fair to say that school failure reduces social capital. This is expressed for example by lower voter turnout, less political and community activity in conjunction with low numbers of volunteer work and blood donations. This is all supported by the empirical evidence discussed earlier.

The results from previous research show that the propensity for civic participation in Estonia in comparison to other regions of Europe is rather low. The results also showed that education was positively correlated with active social behaviour, but statistically significant differences between

upper and lower secondary education emerged only for donation activity of men. Also it has been found that educational attainment and voter turnout are in Estonia highly correlated.

There was some evidence that volunteerism, NGO participation and educational level are positively correlated, but differences between upper and lower secondary education are statistically insignificant. It also seems that better educated citizens donate more blood (especially when looking at differences between uppers secondary and lower secondary education). Interestingly, the same logic does not apply to upper-secondary and higher education. It is probable that his puzzle is a result of inaccuracy in updating the data on education levels.

## 4.2. School failure and inequality

### Introduction

Education has considerable effect on wages and differences in level of education in the population are one of the sources of income inequality. School failure affects by definition the least-educated people who tend to be least compensated in the workplace. Raising the minimum level of education thus has potential to lower income inequality, but the impact is minimal constrained as most of the income inequality comes usually from a small number of top-earners, not from the bottom deciles.

The distributional aspects are still important, as the policies minimizing school failure will be targeted towards people in the lower end of income distribution, alleviating the need of other social interventions and the risk of relative poverty.

In the next sections we will first give an overview of wage dispersion among 25-45 year olds in Estonia and estimate the contribution of education towards wage income inequality.

### Wage dispersion by education groups

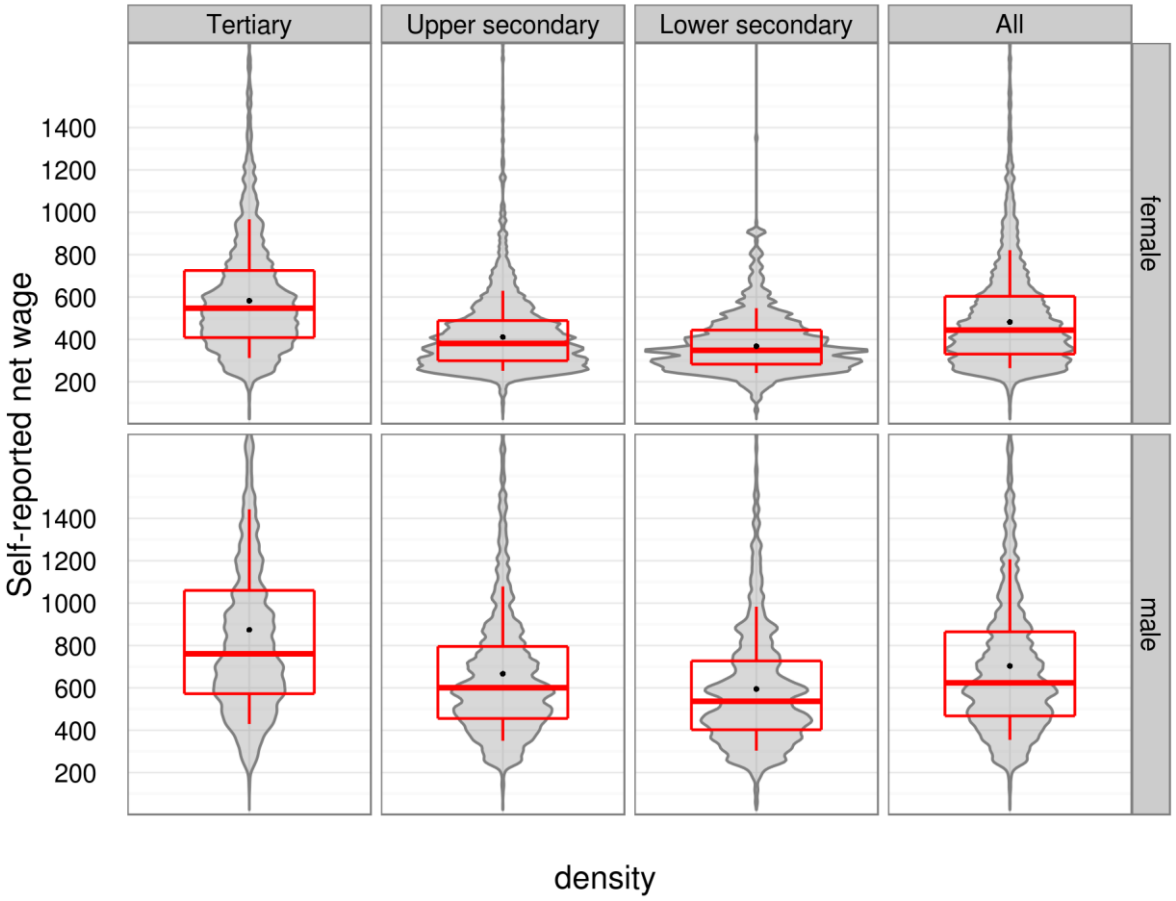
Figure 28 depicts the dispersion of monthly self-reported salary levels of 25-45 year old full time workers in the Estonian Labour Force Survey.[47] The data is divided by gender due to the large gender wage gap and differences in educational attainment.

The figure shows median (line inside the box), 25$^{th}$and 75$^{th}$percentiles (lower and upper bounds of the box) of wage income. The 10$^{th}$and 90$^{th}$percentiles are marked by the end of the lines coming out of the box, the violin plot in the background shows the distribution of the wages with more detail (plot is cut at 1,800 euro). 50% of the earners are inside the box, 25% below and 25% over it. The black dot shows the average wage for our sample.[48]

[47] Aggregated data from 2004-2009, wage levels adjusted to be comparable with levels in 4-th quarter of 2009. We use a subsample of people aged 25-45 as the educational composition of them is closer to the current cohorts. Small percentage of people with education below lower secondary level have been removed, sample size is 25605, 19160 of them are both employed and reporting wages.

[48] 1.5 % of the top and bottom earners are removed from the sample. While this will not affect median and quantiles, it does lower the average wage.

**Figure 28.** Wage dispersion of 25-45 year old full-time workers by education and gender, aggregated data from 2004-2009, wages adjusted to the level of 4-th quarter in 2009




*Source: Estonian Labour Force Survey, authors' calculations.*

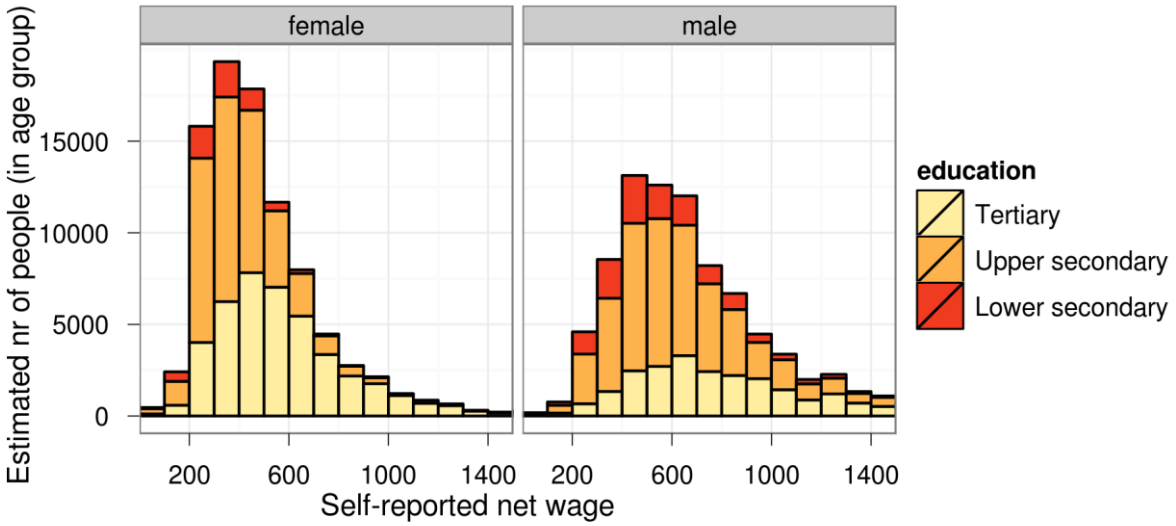
People with tertiary education are around 25% higher in the society than people with upper secondary education – the median wage of someone with upper secondary education roughly corresponds to the 25$^{th}$percentile of people with tertiary education, a quarter of people with upper secondary education earn more than the median wage of tertiary education and three quarters earn less. The graph only contains people who are working, thus the real difference is larger due to higher unemployment and inactivity levels of lower-educated people.

The differences between lower and higher secondary education are also visible but not so profound: median and quintile earners earn 10-15% more in monetary terms in higher secondary education group and having a higher education level would raise people in lower secondary group by 10-15 percentiles within their group (60-65% of lower educated people earn less than the median wage of upper secondary education). Wages of men are more unequal than those of women and wage dispersion appears highest for people having tertiary education.

School failure can be attributed to be the cause of at least some of the inequality between upper and lower secondary education groups. The number of people it affects is small compared to the whole

society and the overall impact on inequality in society will thus be modest. The histogram in Figure 29 shows the share of each education group in different income levels.

**Figure 29.** Histogram of net wages by education level for 25-45 year olds, aggregated data from ELFS 2004-2009, wages adjusted to the level of 4th quarter of 2009



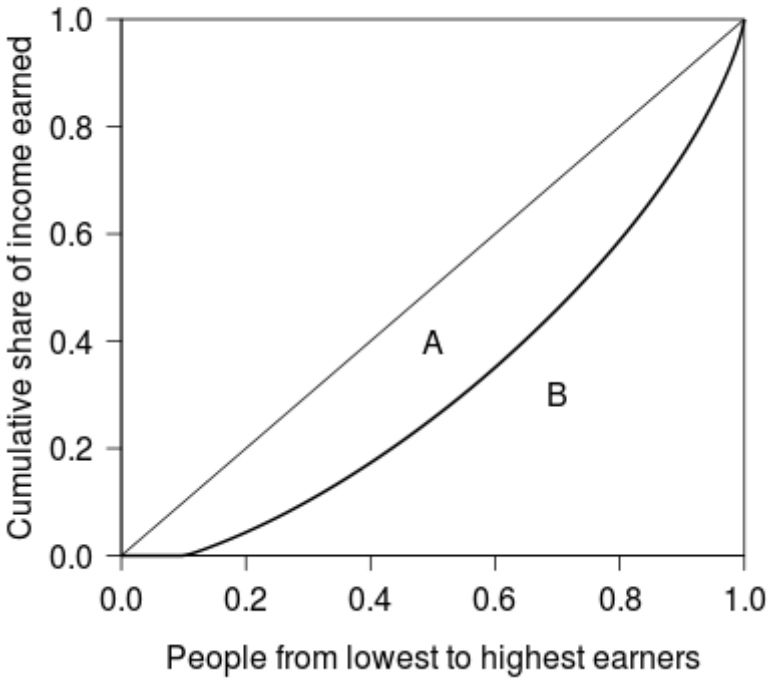

*Source: Estonian Labour Force Survey, authors' calculations.*

People with lower secondary education (stacked at the top) impact the histogram skewing it to the left, but not by very much, as 90% of the population in this age group have either upper secondary or tertiary education.

### Inequality measures and effect of school failure

There are several methods to describe the level of inequality mathematically; the most commonly used being the Gini coefficient and the Theil index. The Gini coefficient can lie between 0 (absolute equality) to 1 (absolute inequality) and it has an intuitive graphical interpretation. Figure 30 depicts the Lorenz curve of employed and unemployed people (the latter with zero wages). In case of perfect equality, the cumulative share of earnings earned should equal the cumulative share of people and Lorenz curve should follow the diagonal line. As the sample contains unemployed people, the percentage of the unemployed will earn cumulatively zero at first, after which the cumulative share starts to rise slowly. The Gini coefficient is equal to the share of area A to the sum of areas A and B.

**Figure 30**. Lorenz curve for earnings of employed + unemployed persons




The Theil index is harder to interpret intuitively. It has its roots in information theory and is easiest to understand by considering the case of two groups: in case of perfect equality (50% of people get 50% of income), the Theil index is 0, it is 0.5 if 26% of people get 74% of income, 1 if 18% of people get 82% of income, 2 if 8% get 92% of income and so on[49] (Mandal, 2009). The Theil index (unlike the Gini coefficient) has a useful property of decomposability – we can divide the overall inequality to between-groups and within-group inequality. On the other hand it is not defined with wages which are exactly zero, so we treat the unemployed persons as having wage of 1 euro.

Table 49 provides our estimates for gains in wage-income inequality from decreasing school failure by 50%.[50] Three types of inequality is measured – inequality among wage earners, which describes the diversity of jobs, inequality among active labour force (employed and unemployed people) – the earnings inequality of people who either work or are actively searching for work (for whom the wage is set to 1). The third one is the inequality of wage earnings for the entire sample, where everyone not working is considered to have a wage of 1 EUR. Changes in this value are most important as it contains the movements out of inactivity and unemployment associated by the increase in the education level.

[49](Conceicao, et al., 2000) provide some further intuition and motivation for its use.

[50] Note that the unit of analysis here is the person, not the household, as is usual in inequality measures for the society. Thus the coefficients found here are not directly comparable with coefficients published at the national level, but are used for evaluating the relative effect size of the measure.

**Table 49.** Inequality measures of wage income distribution

| | Before intervention (11% of population with lower secondary education) | After intervention (school failure halved) |
|---|---|---|
| Gini coefficient of employed | 29.5% | 29.3% |
| Gini coefficient of employed + unemployed | 36.2% | 35.9% |
| Gini coefficient of employed + unemployed + inactives | 46.0% | 45.3% |
| Theil index of employed | 0.15 | 0.15 |
| Theil index of employed + unemployed | 0.25 | 0.24 |
| Theil index of unemployed + inactives | 0.42 | 0.40 |

There are indeed some changes towards more equal society from halving early school leaving, but the effect is very small.

The Theil index can further be decomposed to inequality due to education and inequality due to income variability inside education groups. Table 50 reports the results for employed people.

**Table 50.** Share of within-group inequality and between-group inequality in overall inequality for employed people

| | Theil index within-group | Weight of group (share of group in total income) | Share of group contribution in overall inequality | Theil index between-group | Total (within + between-group) |
|---|---|---|---|---|---|
| Tertiary | 0.146 | 0.439 | 0.064 | | |
| Upper secondary | 0.138 | 0.464 | 0.064 | | |
| Lower secondary | 0.142 | 0.097 | 0.014 | | |
| Total | | 1 | 0.142 | 0.007 | 0.149 |

Differences between groups contribute much less than differences within groups. Theil index is largest for people with Tertiary education showing the highest within-group inequality, but the differences with other groups are moderate.

The picture changes considerably when we take into account the effect of unemployment and inactivity (see Table **51**).

**Table 51.** Share of within-group inequality and between-group inequality in overall inequality for the whole cohort

| | Theil index within-group | Weight of group (share of group in total income) | Share of group in overall inequality | Theil index between-group | Total (within + between-group) |
|---|---|---|---|---|---|
| Tertiary | 0.340 | 0.439 | 0.149 | | |
| Upper secondary | 0.411 | 0.464 | 0.190 | | |
| Lower secondary | 0.602 | 0.097 | 0.058 | | |
| Total | | 1 | 0.397 | 0.017 | 0.414 |

The largest within-group inequality is now in the lower secondary group, and the smallest in tertiary educated group as lower educated people have much smaller probability to be in employment. This is also the reason why between-groups contribution to inequality rises to the level of total inequality in wage-earners – the differences between the groups grow considerably.

We assume that early school-leavers would have the same characteristics as current high-school graduates if they graduated. This is a strong assumption that is only true if there are no selection effects due to innate abilities. In reality there may be some, and the early school-leavers may end up in the lower end of the distribution of high-school graduates.

## Conclusion

While the early school leaving has an impact to overall inequality in the society, its magnitude is small. This does not mean that there are no distributional considerations in combating school failure. On the contrary – people with lowest educational attainment are the group with lowest earnings. The gap becomes especially visible if we consider unemployment and inactivity, indicating that a large share of them are pushed out of the employment, be it for the effect of minimum wage or deficiencies in cognitive skills.

The level of education does not explain a large share of inequality, within-group variability tends to be much higher.

Our analysis is purely observational and lacks any means to identify the causal effects of education. The reader should thus exercise caution in interpreting the exact numbers computed.

# 5. Estonian measures for combating school failure

## 5.1. Currently used measures aimed at reducing school failure in Estonia

### Introduction

Most of the measures addressing school failure in Estonia are applied at levels of primary and basic education. They are introduced with the aim to ensure that every child attains compulsory education (which is lower secondary education), only a few state as their aim completing upper secondary education. It has to be kept in mind that the new Basic Schools and Upper Secondary Schools Act that was introduced in 2010 brought about considerable changes in the legal frame regulating the measures against school failure; audits and studies that have been referred to in this report address the time period before this new initiative.

In Estonia, most of the existing research on the issue of dropping out of (basic) school has been concentrating on the reasons and underlying risk factors of why students leave school early. Concentrating on aggressive behaviour, Kõiv (2007) connects dropout risk factors and outcomes, for example dysfunctional family and the student's lack of motivation. Based on surveys of dropouts, their parents and class teachers, Sakk (2004) analysed causes of basic school dropout, dividing them into home and school related factors. The topic has been dealt with also by Mündi (2006), who conducted a large scale survey addressing the issue of causes before and after the event of dropping out. Knowledge about causes is certainly a prerequisite for discussing support measures to reduce school failure.[51] However, in Estonia it is unclear if the support measures implemented today are linked to previously conducted research and take these risk factors as prominent input.

We are going to give a brief overview of the measures taken in Estonia to support students fulfilling their educational goals up to acquiring upper secondary education. While speaking of general education, the focus will be on the new system introduced in 2010. To get the picture of the situation in Estonia, we try to list the measures set by the regulations and implemented by schools/other relevant bodies using the few sources available. The main sources of this overview include relevant laws and regulations (incl. national curricula).Background information is also gathered from audits of the National Audit Office of Estonia (NAOE) and state supervision reports by the Estonian Ministry of Education and Research (MofER).

The overview of intervention measures to prevent school failure is structured following the institutional structure of Estonian education system:

- Basic education, lower secondary education (incl. compulsory schooling until age 17) and upper secondary general education (USGE);
- Upper secondary vocational education (USVE).

[51] It should be kept in mind that there have also been findings that common risk factors are ineffective predictors of who would actually drop out (Dynarski and Gleason (1998) via Tyler and Lofstrom (2009)).

## Basic school, lower secondary education (compulsory schooling) and upper secondary general education

### Measures for combating school failure

*Introduction*

The laws and regulations list a large variety of measures schools can use for keeping their students on track, but the use of those measures allows for considerable flexibility and instructions on how to detect or notice early signs of students who might be in need for such measures taken, seems to be relatively scarce.

In the following chapter, we will give an overview of the system introduced with the new Basic Schools and Upper Secondary Schools Act for combating early school leaving. As already mentioned, legal acts also list large number of measures that can be used either inside or outside the school. The main text of this chapter will touch upon them briefly; however, in order to get a more detailed picture, the reader is kindly asked to refer to Appendix 3, where most of the measures are listed with references to legal Acts.

Following the logic of support measures in the Basic Schools and Upper Secondary Schools Act and the OCED working paper on the policies to prevent dropout and early school leaving (Lyche 2010), we categorised the measures by the body who applies these measures (inside school, outside school) and by the intensiveness of the intervention. The list is not final –for example, schools have a right to establish other classes or groups for students with special educational needs with the school owner's permission. The measures listed in the appendix are mostly meant for both levels of general education.

The measures are classified as follows:

- Measures taken by the school/school practices
    - Support for all students
    - Support for certain students of certain need
- Measures decided by bodies outside of school (owner of the school/local government, county counselling committee)

*Differences between old system and new Basic Schools and Upper Secondary Schools Act*

The system described below entered into force in the beginning on 2011, so a description of differences between old and new system is in order. The distinction between the old and new system is relevant mainly because all the numerical data that is available reflects the performance of the old system, while the description of measures listed in this report has been constructed so that it would be as up to date as possible. The following relies on two main sources – a memo composed for the Cabinet of Ministers in order to explain main changes brought about by new Basic Schools and Upper Secondary Schools Act, and an interview with Kristin Hollo, adviser at the Ministry of Education and Research.

Concerning school failure the most important changes are related to clarifying the meaning of compulsory school attendance and stating that immediate action has to be taken if a child is missing classes. Although school attendance was obligatory also before these changes, it was somewhat less clear what exactly was meant by school attendance. Under the new Act compulsory school attendance is not fulfilled is person is not listed as pupil in schools register or is not attending classes. If a child has not attended classes the school must inform the parent not later than the next day after the child has not showed up at school. The parent, on the other hand, must also inform the school if the child cannot attend classes and also explain the reasons for this. So the law encourages constant exchange of information between school and home. If a child has missed more than 20% of lessons during one academic quarter without proper justification, this information is entered into the Estonian Education Information System (EHIS) and passed on to local government officials, who can take up additional measures (one of the "last resort" measures being fining the parent). Also the roles of the different actors (school, local government, parent) contributing to the child's development as well as pedagogical practices (e.g. choice of teaching methods, additional pedagogical counselling after normal classes etc) have been clarified.

The measures used for addressing special educational needs (SEN) as well as the actual definition of SEN are listed in a more coherent way (for example overachievement is listed as a SEN that must be addressed). The procedure for assessing SEN is also laid down in the law, as is the in-house infrastructure of SEN management. A new instrument – individual development card – is proposed that should help to map pupil's problems and measures that have been implemented for solving these problems as well as make it possible to evaluate the effectiveness of these measures.

The list of measures that can be used for addressing SEN are divided into two broader categories – the ones that can be implemented by the decision of the school's headmaster and further intervening measures that can be used if they are decreed by the counselling committee (a body at country level administration). In either case, measures can be applied only with the consent of the parent. Concerning differences between the old and the new system, the new Act brings these measures together in a coherent way. Before that, they were scattered in different Acts and Regulations.

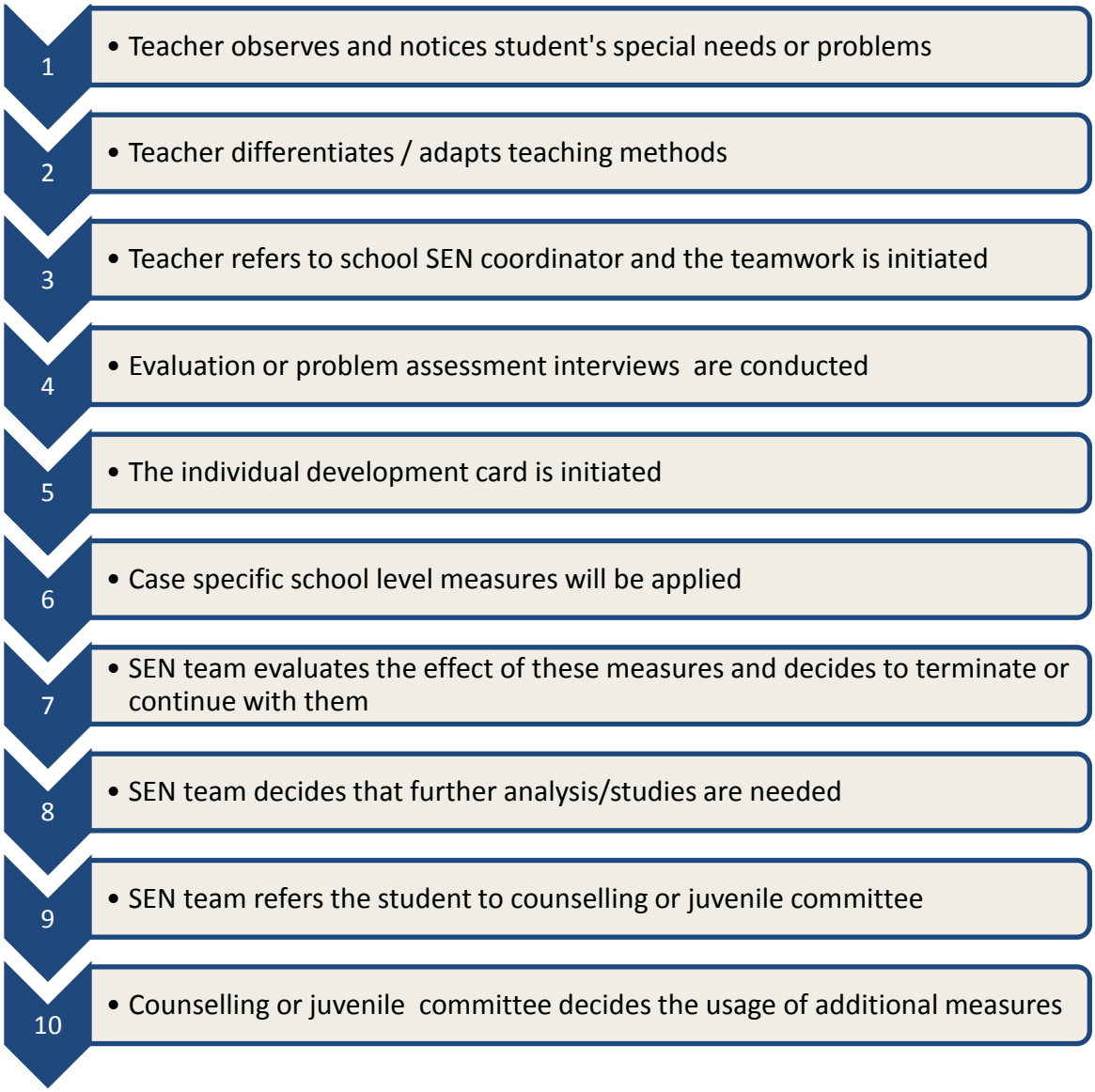
It is difficult to say today how this new system (or, perhaps, slightly modified and clarified old system) has been applied. An interview with a school's headmaster showed that there is considerable room left for the school find their own system. On the one hand, a reasonable degree of flexibility is most certainly desirable, but on the other, this means that schools that had a system can carry on with it (and this is good) while others that do not have any can still continue doing less than necessary. On the other hand, the system has been applied for less than a year and some implementation details still need to be clarified. A proper evaluation of this system should probably wait at least several years.

*General framework and measures*[52]

Support for all students

Before turning to the measures, a sketch of the process that should be applied in case the teacher notices problems or students' special educational needs is in order. In case of smaller problems, usually no formal procedure is applied and the teacher finds ways of solving these issues inside the classroom without any additional help. However, if the issues are more difficult to solve, the teacher can refer for help to SEN coordination inside the school and, in case of even more problematic situations, to counselling or the juvenile committee.

**Figure 31.**The process of combating school failure at individual level




[52] See this list of measures with more detailed references to sources in Appendix 1.

The assessment of possible special educational needs is done through pedagogical and psychological evaluation, medical tests, monitoring of the pupil's behaviour in different situations and through gathering additional background information about the child and his/her living environment. It should be mentioned that a student's extraordinary talent (overachievement) is also classified as a SEN and is assessed through standardized tests or good scores in national or international Olympiads and competitions.

The following measures are for general support of every student, so they essentially help them acquire basic or USG education, but most aren't directly used as tools aiming for overcoming problem situations or prevent dropout. The general support of every student involves measures that are used for monitoring the progress and development of every student (like annual student evaluation interviews), financial support not related to economic situation of the household (like state subsidy for covering lunch costs or reimbursing everyday travel expenses (up to 100%) from home to school) as well as services that are available for everybody (e.g. long day group and health services at school).

Support for certain students of certain need

If problems appear with students' study outcomes or attainment behaviour, teachers (either class teacher or subject teachers) or the headmaster can support their studies using measures either in order to improve grades in certain subject(s) or as general educational support to cope in school. Some students need help in only one or few subjects and/or their studies can be supported with a general measure whilst (still) attending regular classes. Others' problems or health reasons call for more intensive intervention like special classes or curricula. There are also students who need the kind of help the schools aren't able to provide or measures already taken by the school appear to be insufficient. In those cases, schools should refer the students to other relevant bodies. All in all, the list of possible interventions at this level is quite extensive.

Measures decided by bodies outside of school

There are problems and causes behind students being at risk of dropping out which are outside schools reach to deal with. Also if the measures implemented by schools are not successful or it's not possible to implement them because it's not possible to get in touch with the student or his/her parents, the school is obligated to turn to local government in order to implement other support measures. For some (SEN) cases there are instructions set in legislation that the school is obligated to implement certain support measures to the student before referring him/her to other relevant institutions.

*Additional comments*

None of those listed above are measures specifically declared to be preventive of school failure (in the sense of helping a person to achieve upper secondary education); a lot of them are meant to be used as interventions in the context of fulfilling the obligation of compulsory schooling (basic education or reaching the age of 17). But there is no doubt that the goal of support is to help students acquire both basic and upper secondary general education (USGE). Although it seems reasonable to assume that at different education levels different sets of measures should be applied,

there is barely any clear distinction in the Basic Schools and Upper Secondary Schools Act as to which of the measures are meant for supporting students at basic school level and which at USGE level (other than the ones concerning compulsory education and classes for SEN students for whom the support needed is not available while attending regular classes).

Kanep (2008) analyses data of special educational needs (SENs) from 2006/2007 in Estonia and points out the fact that at different stages of education different SENs tend to dominate – the structure of SENs differentiates by stage of education. At the first stage of basic education (grades 1-3) SEN students mostly have difficulties with writing, reading and arithmetic, at the second stage (grades 4-6) there're two equally dominating SENs: learning difficulties and difficulties with writing, reading and arithmetic. At the highest stage of basic education (grades 7-9) however, SEN students mostly have learning difficulties. Kanep (2008) also emphasizes that the number and structure of SENs is completely different at the USGE level comparing to lower stages just described above. Most frequent are health problems, followed by being abroad and physical disabilities. Therefore it seems reasonable to vary the intervention measures by stage of education the students are acquiring.

In addition to the list of classes for SEN students the Basic Schools and Upper Secondary Schools Act where it is stated that some of those are classes listed are only applicable at basic school level, there is also a hint of possible variation in measures in the data input manual for EHIS. For EHIS, there are instructions that some SENs are only possible to assign (and file in EHIS) to students studying at basic education level (for example temporary and permanent learning difficulties, autistic disorders etc). Although there are no further explanations or guidelines in the manual, it logically follows that some measures meant for these types of SEN are at the same time not meant to be used to support students at USGE level. (Õppuri....)

Unfortunately, it also happens that in some cases the goal of implementing a measure is to keep a student in school until he/she reaches the age of compulsory schooling – 17 years. Despite some recent improvements in early school leaving figures, a lot of 17-year olds who haven't graduated grade 9, leave school.

In addition to the previously listed measures there are some additional measures available from different sources. For non-ethnic Estonians some topics of the curricula are taught in Russian and there are also Estonian language lessons for students for whom Estonian is not the mother tongue. There are other intervention measures the schools (and local governments) provide by themselves which are not listed in regulations – their own solutions to support students; some examples from the survey conducted by Kanep (2008)can be seen in Appendix4.There are some additional projects in Estonia to support students in general education and to prevent them from dropping out. There are two ongoing European Social Fund programmes which have a goal to prevent dropping out of school: "Developing an Educational Counselling System" (2008-2011) and "Preparation of Study Materials for Students with Special Educational Needs" (2008-2013).

The objective of "Developing an Educational Counselling System" programme is to improve the quality of the educational counselling system and create regional counselling centres on the county level to prevent students from dropping out of school, and to improve coping strategies and competitiveness for young people in their everyday life and in the labour market. The programme activities are aimed at ensuring that study counselling service is available in all regions of Estonia

since the shortage of support specialists (special education teachers, speech therapists, psychologists, social workers) in schools and kindergartens is a serious problem. The programme target group comprises SEN students, parents, teachers and specialists at educational institutions, and local government officials responsible for the educational sphere. (Developing...)

The purpose of Preparation of Study Materials for SEN Students programme is to improve the quality of education and access to education for students with special educational needs. The programme activities will help prevent school dropout and ensure equal educational opportunities. In the course of the programme, a model will be developed for the system of preparation of study material, also textbooks conforming to the simplified national curriculum and the national curriculum for students with moderate and severe learning disabilities will be prepared. (Preparation...)

There is also a project directly meant to develop and test a measure to prevent school failure in basic school (2009-2011). The measure consists in appointing support persons for students with learning difficulties who are at risk of dropping out. The support person's duty is to improve and expand student's social coping skills. The aim is to develop social skills of those 150 students selected to participate as much as possible during 2.5 years in order for them to graduate basic school (grade 9). The project started at 2009 and is due to report the results in 2011. The project results are planned to indicate if those students have moved past their previous status of being at risk of dropping out. Therefore this project could be the first study in Estonia having scientific proof of intervention measure being effective or not as in preventing school failure. (Dropping... 2010)

**Data availability**

The Estonian Education Information System (*Eesti Hariduse Infosüsteem or EHIS*) collects information about SEN categories (in total 23) assigned to students, support measures (11) assigned to SEN students and information about which SEN students study in specialised classes (18) or SEN schools. There's also information on whether the students have been assigned a support person or whether they are using state financed boarding school facilities. However, at the moment the existing list of support measures in EHIS is insufficient in order to analyse school failure intervention measures, because it does not include information on third party measures provided by the decision of the school. This is also the reason why it is difficult to use the data to analyse the effect of these measures on acquiring basic or upper secondary education.

Regarding the usage of measures, in the following we present a short list of the existing information sources we rely on in order to give a brief overview of measures implemented in Estonia. It is important to keep in mind that these studies were conducted before the new Basic Schools and Upper Secondary Schools Act. Thus, we do not know how the new system is going to influence both data availability as well as usages of SEN measures.

The sources of this overview were following:

- Kanep (2008) analysed EHIS data about access to support measures for SEN students and distribution of SEN categories in 2006/2007. Kanep also carried out a survey in general education schools (the response rate was 59% of all schools) about their readiness to provide different support measures for 2 types of SEN students (with temporary learning difficulties

and/or difficulties with writing, reading and/or arithmetic) and channels of information of noticing students' special needs. In addition to that questions were asked about providing physical access and study opportunities for SEN students.

- The National Audit Office of Estonia (NAOE) has carried out two audits (in 2002 and 2007) on the activities of the Ministry of Education and Research in ensuring compulsory school attendance in order to assess what has been done to improve compulsory school attendance and whether the measures taken in schools to ensure compulsory school attendance are effective. They used EHIS where possible and carried out a survey in general education schools about the measures taken to improve attendance. Also interviews with students at risk and local government (school owners) officials were implemented and schools visited.(Compulsory... 2002, Compulsory... 2007)
- State supervision reports (*järelevalve temaatilised ülevaated*) carried out by the Estonian Ministry of Education and Research (MofER) have prioritized the issue of students dropping out of school since 2005. The focus was on basic school level and compulsory education attendance. The ministry visited a sample of schools every year in order to gather information on how the support measures prescribed in regulations were being implemented in order to prevent dropout and improve study results. (Overview... 2008-2010)
- NAOE audits on specialised schools and juvenile committees (2004, 2010), educational opportunities of SEN students (2004) and redirecting basic school drop-outs back to the educational system (2003), problems of general education (2003).

**Table 52.** Level of education and students addressed in different sources

| Source | Subject | |
|---|---|---|
| | Level of education | Students |
| Kanepi (2008) | Basic, LSGE[53] and USGE | only SEN |
| NAOE audit 2002, 2007 | compulsory education (basic and LSGE until age 17) | all students |
| MofER supervision reports general education (06/07-09/10) | basic and LSGE education | students at risk |

The above indicates that most of the information available deals with issues concerning dropping out of basic and LSGE school, the USGE level is examined only in Kanep (2008). All of the sources address the issue of support measures according to the aims of the analyses, none of the sources approach the issue directly from the perspective that is of interest in this study, i.e. in context of helping more students to complete upper secondary education. The financial issues are addressed only in the NAOE audits – the audit of compulsory school attendance addresses costs of school failure as a rationale for the audit and provides some information of the costs of measures where possible.

[53]LSGE - Lower secondary general education, UGSE – upper general secondary education.

As the 2007 audit of NAOE points out, at that time the existing data in EHIS about intervention measures concerning compulsory education was unreliable and largely nonexistent. According to NAOE, nobody gathered information about absenteeism and non-satisfactory annual grades regularly before the NAOE 2007 audit; schools did not meet their obligation to transmit this data to EHIS. There was data about which students have repeated a year, but since the principles of repetition were changed in regulations in 2005, the data was not comparable over years. Data about which students have dropped out is present over the years in EHIS, but there is again the issue of comparability over time – the principles of declaring a student being a dropout had changed, therefore different sources have different data and for the academic year 2004/2005 no official statistics exist. Data concerning absenteeism and unsatisfactory grades has only recently been added to EHIS (Compulsory... 2007).

Concerns about data quality are also shared by Kanep (2008) – as a result of structural changes in the EHIS database since its existence (like refining classification or adding categories), it was not possible to compare data over several years in order to analyze changes in assigning SENs and implementing measures over time. Kanep points out another important shortcoming – there is a list of different SEN categories in EHIS, but no information of their priority compared to other SEN categories the student has. This situation leads to confusion of whether a certain SEN is the main or accompanying characteristic of a student. Based on existing data, Kanep concludes that most likely a substantial part of today's SEN students with learning difficulties and/or difficulties with writing, reading and/or calculating are actually accompanying categories to (or even the result of) other SEN categories (like problems with health or behavioural problems) rather than being the main SEN category for a certain student. Kanep suggests developing the EHIS database in a way that students' different SEN categories are prioritized at data entry.

Kanep (2008) also notes that comparing different but connected fields in EHIS revealed several inconsistencies (for example SEN categories and measures taken didn't match) and major shortages of data entry leading to the conclusion of the database being unreliable for analysing a lot of important issues (but also to understanding that students with the same SEN category (can) have different needs for intervention measures). Comparing survey results to the EHIS database also revealed inconsistencies in support measures by schools (like in EHIS there are students marked as having received support measures that the same schools responded about the same measures as not being implemented etc). This leads Kanep to conclude that the schools' understanding of the classifications of EHIS is not uniform.

A telephone interview with Kadri Peterson who is working in the MofER as head of Supervision Department indicated that in recent years the picture has improved and schools are paying more attention to both assessing the SEN, assigning measures to persons who have SEN as well as filing this information in EHIS.

Nevertheless – it still remains questionable how uniformly the schools manage to address the issues of assessing SEN and applying appropriate measures. At present, it seems that it is still largely in schools' own discretion how the SENs are assessed and if there is no uniformity in assessing SEN there can be no consistency in the data listed in EHIS.

**Implementation of measures**

As already said, the usage and availability of preventive measures varies a lot by schools and by local governments/counties. The distribution on intervention measures often depend on schools' possibilities to actually use measures listed above/in regulations, the reasons being either financial or systemic. In order to give an overview of the support measures used in Estonia we use the above-mentioned sources which cover the topic of whole Estonia. The issues with availability and reliability of intervention measures data in Estonia addressed in previous section are the underlying reasons for giving just a limited overview of how are the measures implemented. Therefore in this section the indicators and statistics from the available sources are presented only if they are considered to be based on fairly reliable data.

*NAOE audit of compulsory school attendance and the efficiency of enforcement (2007)*[54]

Based on EHIS data, the NAOE audit (2007) shows that since 2003/2004 the implementation of support measures has been growing rapidly, although it's not known how much of this growth is due to more schools entering data to EHIS and doing it more correctly than before. The schools' opinion is that the reason behind the increased implementation of support measures is the fact that the number of problematic students have increased – it's caused by growing absenteeism and reasons not present before – like basic school students start working, their parents are more negligent etc(Compulsory... 2007).

According to data from EHIS and survey responses, NAOE found that the most common support measures implemented by schools has been long day groups, study support groups with special education teachers or speech therapists and assistance from speech therapists. But according to NAOE survey in schools, the measure used most often is daily help (additional work) by subject teachers (in 81% of the schools in 2007). According to the survey, measures least used by schools were opportunity classes for teaching children with learning difficulties, classes for students who have behavioural problems and boarding school facilities for children who have social-economic problems. Schools' own solutions for helping their students also include educational committees, support networks and serenity classes (Compulsory... 2007).

The NAOE audit (2007) also notes that although there's been growth in using support measures by schools, the measures have not been available for all students in basic school who need support. Analysis of EHIS data reveals that less than half of the students who repeated an academic year have received support during the year preceding retention. The proportion of students who received support before repeating a year had increased during those 5 years under observation. The measures used to support these students were mainly study support groups with special education teachers or speech therapists, long day groups and assistance from speech therapists. Since repeating an academic year is in itself a measure for students already having problems keeping up with the study programme, the fact that more than 50% of those students did not get support beforehand is an indication of malfunction of the support system. The picture is even worse when looking at drop-outs – on the average, only 30-53% of those students got some kind of support during the year of dropping out, 39-52% a year earlier. This grim image is partly the result of EHIS database not having

[54]The first audit on that topic was carried out in 2004, the one from 2007 is a followup with more recent data.

data on all the support measures schools (or other relevant bodies) can implement to help students. It might be that some of the measures to support the students at risk of repeating a year or dropping out are measures not included in EHIS. Although an indication that this reasoning might also be just wishful thinking is the information the NAOE audit gathered from in-depth interviews with 14 students at risk (ages 13-18): for five of them the only measures taken where discussion with the class teacher and notifying parents.(Compulsory... 2007)

*Annual state supervision reports by Ministry of Education and Research (2008-2010)*

MofER has been conducting state supervision reports of basic education following the state priority of reducing dropout rates by prevention and improving students' educational performance. Since academic year 2007/2008[55] the supervision reports have been focusing on three groups of basic education students already having problems keeping up with their curriculum: 1) students who are repeating an academic year; 2) students who have been transferred to next grade with one or some non-satisfactory (*mitterahuldav*) grades from the previous academic year; 3) students who have non-satisfactory grades at the first quarter of academic year (Overview... 2008-2010).

MofER reports suggests that behavioural problems and not attending compulsory schooling can be caused by learning difficulties, social problems and study load growing year by year. The relatively large share of non-satisfactory semester grades in subjects like history and (natural) science may be caused by shortages in acquiring basics in core subjects like Estonian and maths during the first stage of basic school (Overview... 2008-). In all 3 student groups the reports show that the reasons for not keeping up with curriculum[56] vary by different stages of study which suggest that the measures to support students should also be varied by stages of study. Unfortunately most of the statistics and conclusions about support measures in supervision reports cannot be differentiated by stages of study.

For following short overview of the MofER supervision results one has to keep in mind that the schools under supervision were different each year. One cannot be sure if changes in indicators over time reflect actual changes in the phenomenon which is measured by the indicator or whether the change in the numbers is only the indication of subjects of inspection (schools) being different each year. Therefore hereby we mostly refer to the most relevant results handling total indicators of the whole period under supervision (academic years 2005/2006-2009/2010) by 3 student groups listed above in order to get a glimpse of the implementation of different intervention measures.

Only 60% of the **students who were repeating a year** had had support by their school during the previous academic year (on average per academic year). Students could have more than one support measures implemented to help them

[55] The reports deal with the issues of previous academic year, the exception is report of 2007/2008 when 2 previous academic years were under supervision. So all together the academic years under supervision of the topic were 2005/2006-2009/2010.

[56] The results are mostly affected by learning difficulties; the second most common reason is social problems. Starting from the second stage behavioural problems and not attending school (compulsory education). The latter is most common among students repeating a year.

**Table 53.** Access to support measures

| % of students who got support before retention | Support measures implemented before students repeated an academic year |
|---|---|
| 31% | had had counselling from social pedagogy teachers or social workers |
| 20% | psychological counselling |
| 11% | had taken part in study support group with special education teachers or speech therapists |
| 11% | had individual curriculum |
| 9% | took part in long day groups |
| 60% | Received at least one service |

The support measures taken to improve the performance of on average 52% of the retention students were classified as "other":

- support lessons or consultations from subject teachers or assistant teachers after lessons;
- additional lessons;
- meetings with class teacher;
- group study;
- referring the student to a doctor's or specialist's consultation;
- cooperation with parents.

The school also turned to the relevant local government for help in order to ensure attendance and coping with studies in case of approximately 1/3 of the students repeating a year.

Of the **students who were transferred to the next grade with non-satisfactory grades** on average 75% (per academic year) received support during the preceding year. The measures taken were the following:

- 61% - support lessons or subject consultations and interviews with teachers,
- 22% received psychological counselling,
- 25% received counselling from social pedagogy teachers and
- 11% had an individual curriculum.

63% of the **students with non-satisfactory results at the first quarter** of the academic year received some support. Comparing different academic years[57] under observation, the supervisors notice a decrease in support measures stated in regulations and increase in other measures taken by schools (see Table 54).

[57] It is important to keep in mind, that the selection of schools into yearly samples for making this comparison is not random, thus it is unclear what the year-over-year changes in the indicator actually shows.

**Table 54.** Changes in the structure of support measures

| Decrease in support measures stated in regulations | Increase in other measures taken by schools |
|---|---|
| study support group/lessons with special education teachers or speech therapists | support lessons or consultations from subject teachers after lessons |
| individual curriculum | counselling by class teacher |
| help from speech therapist, psychologist or social pedagogy teacher | |
| long day groups | |

Although 75% of the **students repeating a year** over those years were studying on stage III (grades 7-9), the share among them who received support before having to repeat a year was the smallest compared to the other two stages of basic school. The largest share of students supported during the previous academic year was studying on stage I of basic school (grades 1-3). Similarly, among the **students transferred to the next grade with non-satisfactory grades** or had **non-satisfactory grades at the first quarter** of the academic year, the smallest share of supported students was at stage III of basic education during the years of supervision.

*Analysis of students with special educational needs and availability of support measures (2008)*

The focus of Kanep's (2008) analysis was to give an overview of SEN students and measures taken to support them in their studies at general education schools both on basic and upper secondary level.

The concept of students with special needs has changed over time in Estonia and the notion of which students fall under this term has become rather obscure. One can say that every child is different and teachers have to take into account everybody's individual characteristics and needs in order to give them the best possible education, therefore every student should actually be a SEN student. Concerning support measures for preventing school failure, it seems that the line between a SEN student and a regular student is blurry since both might need the same kind of support (like psychological counselling or additional lessons from subject teachers). Most of the data available/collected today (in EHIS) focuses on measures to students whose needs are rather extreme compared to most children (i.e. different kinds of disabilities or health diagnoses), this does not allow to get an overview of all the support measures in use in Estonia. It seems that the measures meant to support SEN students with extreme needs are elaborated in great detail, but most of the measures implemented to support regular students to improve their performance in a certain subject or coping in general have not been described at all. This makes collection of data difficult as well.

Kanep (2008) also discusses the definition of SEN students and suggests to MofER to be guided by the additional needs of a SEN student compared to regular students. Acknowledging the inconsistencies in data between SEN categories and support measures in EHIS, Kanep analysed the available data of academic year 2006/2007 and suggested a classification of support measures by the nature of special

needs.[58] Unlike others, Kanep's analysis comprised also students of USGE although she did not distinguish the results or discussion by the levels of education.

**Table 55.** Support measures for SEN students in general education in 2006/2007 according to EHIS database.

| % of all measures implemented to support SEN students | Intervention measure implemented |
|---|---|
| 48,9% | support from speech therapists |
| 36,1% | study support groups with special education teachers or speech therapists |
| 4,8% | Counselling |
| 8,1% | individual curriculum |
| 0,5% | studying as Estonian as their second language |
| 0,4% | extended individual curriculum |
| 1,1% | support person appointed to help |

*Source: Kanep (2008), authors' calculations*

The results of analysing EHIS data of intervention measures showed that SEN students mostly received support from speech therapists and took part of study support groups with special education teachers or speech therapists (see Table 55)(Kanep 2008).

These proportions vary by the type of curriculum (differentiating students of regular national curriculum, simplified national curriculum and students attending coping classes, see p. 51 in Kanep (2008) for more details). In addition to measures mentioned in the table, 9% of students had the possibility to use boarding school facilities.

Statistics of different types of SEN classes reveals that only 14% of the students studying in a class for a simplified national curriculum did so at regular schools, most of those classes operating in SEN schools. Same applies to students of coping classes – only 13% of them studied in regular school environments. On the other hand, most of the classes for students with behavioural problems operated in regular schools; only 17% of the students of those classes were studying in SEN schools and 9% in adult upper secondary schools. Regarding students learning in coping classes, the division between regular general education schools and SEN schools was 50:50.

Since the EHIS database includes no complete list of support measures and there are suspicions that also for the listed measures the data is not complete (as discussed earlier), Kanep also carried out a survey in general education schools, one of the aims being to get an overview of what kind of measures schools implemented to support their students during the 3 previous academic years (during 2004-2007). Two types of SEN students were considered: 1) having temporary learning difficulties and/or 2) difficulties with writing, reading and/or arithmetic. 82% of schools answered that these students would be taking part in long day groups where they get help/consultation from subject teachers and/or class teachers, 59% of the schools supported these students by consultations from (subject) teachers and additional lessons. 75% of the schools offered speech therapy (either in

[58] Needs concerning physical access and study materials (incl. socio-economic needs, home schooling, need for a support person); needs concerning goals of curriculum and study process (incl. location of study, meaning special classes and schools). For more details, see pp 49-54 in Kanep (2008).

school or provided by other bodies) and 72% of schools organised study support groups with special education teachers or speech therapists. There were also other support measures mentioned[59] (Kanep 2008).

Help of speech therapists and social pedagogy teachers can be provided by the schools or students can be referred to speech therapists and social pedagogy teachers outside school (e.g. local government employees). Speech therapy was provided as follows (Kanep 2008):

- 68% of schools responded that speech therapy is carried out by their own employee(s),
- 6% of schools noted that service of speech therapy is provided by the local government and/or some other body outside school,
- 9% helped parents of those students needing speech therapy to find help outside school,
- 15% of schools did not offer any speech therapy support to students having temporary learning difficulties and/or difficulties with writing, reading and/or calculating.

42% of schools who responded to the questionnaire said the help of a social pedagogy teacher is available, mostly within the school. 49% of schools were able to provide psychological counselling, 24% said that students can get psychological counselling provided by local government. The respondents also listed support measures concerning physical access and study conditions for students with physical and sensory disabilities.[60](Kanep 2008)

The survey also contained a question of whether the teachers who support these students with temporary learning difficulties and/or difficulties with writing, reading and/or arithmetic would need any support themselves (Kanep 2008):

- 74% of schools noted those teachers would need a support teacher to help them with their work,
- 79% of schools noted those teachers would need methodological guidance,
- 22% of schools mentioned some other support measure to support teachers or the school in teaching those SEN students,[61]
- only 10 schools were certain their teachers of those SEN students do not need any additional support.

*Keskel et al. (2010) Support measures for students with behavioural problems*

Keskel *et al.* (2010) collected some information about the usage of four specific measures intended to support SEN students with behavioural problems concentrating on the level of basic education:

[59] See Appendix 2 for some examples from Kanep (2008).

[60] Support teachers; home schooling; different study materials; individual support or curriculum; additional lighting, magnifying study material if needed; nursing classes; appropriate furniture and ways of transportation between floors like elevators; support person; inclined planes (*kaldteed*); adjusting furnishings of certain subject classes; help from peer students; toilets for disabled students.

[61] Suitable/relevant study materials; help from specialists (psychologists, speech therapists, social pedagogy specialists); subject teachers would prefer teaching smaller groups of students; preparation (incl. psychological) for teaching students with behavioural problems; better motivation; possibilities to exchange experiences; counselling for teachers; financial support for study and teaching materials, also to pay teachers for their additional work.

long day groups, classes for students with behavioural problems, boarding school facilities and vocational education in basic schools and upper secondary school (*kutsealane eelkoolitus*).

There were 13,316 students participating in long day groups in 2009/2010, making up approximately 12% of all the basic education students. 60% of general education schools implement the support measure. Although juvenile committees have the jurisdiction to refer a student to a long day group, it's been mostly a measure that is being implemented by schools themselves (Keskel *et al.* 2010).

In 2009/2010 classes for students with behavioural problems existed in 36 basic schools, altogether 0.4% of all basic education students in Estonia study in those specific classes. There are 3 counties (out of 15) in which there are no classes for students with behavioural problems at all. Similarly to long day groups the juvenile committees have not practised sending students to those classes as much as schools themselves, if they did, the reason was mostly not attending school(Keskel *et al.* 2010).

Boarding school facilities were available at 40 schools in 2009/2010 for altogether 1% of all basic education students in Estonia. For 60% of them, facilities are available for them with state funding because of their socio-economic problems (Keskel *et al.* 2010).

Vocational education in basic schools and upper secondary school (*kutsealane eelkoolitus*) is a support measure which is not as common as the 3 measures above. Schools and juvenile committees agree that the possibilities to implement this measure are a lot smaller than the need for it, which is quite high. Developing vocational skills parallel to acquiring basic education increases interest and motivation to study considerably and prevents students from dropping out. Teaching practical vocational skills to students with behavioural problems also supports their entry to the labour market. In 2009/2010 there were 3 VET schools in Estonia offering this kind of parallel vocational education courses to all together 72 basic education students. Two of those vocational courses are available for students from all over Estonia, one is meant only for students from the county the school is situated in. The possibility of implementing those vocational courses is created in cooperation with local general education schools and also includes studying in special classes for students with behavioural problems and boarding school facilities. The measure is usually implemented by suggestion students' of parents, previous school or social worker (Keskel *et al.* 2010).The studies take place on the basis of a separate curriculum and last for at least 15 study weeks during which pupils acquire basic knowledge of the selected profession and receive a certificate confirming the completion of the vocational education course. The knowledge and skills acquired in the basic school or upper secondary school can be taken into account in further studies if the pupil wishes to continue their studies in the same specialty. (Vocational...)

As one can see, the overview of intervention measures implemented to improve upper secondary education graduation rate (e.g. reduce school failure) used in general education is quite patchy since the sources address the topic from different angles and aspects covering only parts of the issue at hand in this paper not to speak of different periods of time and varying subjects of analysis.

From an interview conducted with one of the persons responsible for teaching management in a large public school it seems that not all schools apply the system for dealing with SEN issues uniformly. Also, at the moment the movement of information between the schools on SEN issues is

only possible if a parent is willing to pass this information forward. While this is understandable for data protection issues, this can mean a serious lag in addressing child's special educational needs if for some reason the parent is not interested in passing on this information to the new school.

The research done so far leaves us with conclusion that there is much to do in order to improve the quality of the data and also that the partial lack of information about the implementation of measures is not only a technical problem related to filing the data to the information system. It is quite plausible that school address the assessment of SEN (as well as application of respective measures) very differently and under these circumstances even a correct data entry procedure cannot guarantee adequate picture of SEN and usage of SEN measures in Estonia.

## Upper secondary vocational education in VET schools

### General framework and measures

*Introduction*

Besides USGE one can acquire upper secondary education at vocational education and training (VET) schools. High drop-out rate among VET students has been a problem for Estonian education system for over 10 years and different development plans have stated reducing dropout rate as a priority for years. USVE students dropping out of school definitely constitutes a major share of school failure in Estonia.[62]

The preventive support measures that can be implemented in order to avoid dropping out of school are scattered in different documents and acts, the main source in the form of legal act being the Vocational Educational Institutions Act (KÕAS) that lists a couple of general support measures to all students and the minister's regulation issued based on KÕAS providing the rules and conditions for SEN students in VET schools, which gives a list of examples of measures which the schools might use to fulfil their duty to engage SEN students in vocational education and training. However, there are several measures that are implemented in the schools that are not listed in these acts but are still implemented in quote a large number of schools. In order to give a full picture of measures implemented, these will be included in this overview as well.

According to the "Development Plan for the Estonian Vocational Education and Training System 2009-2013" the current drop-out monitoring system in EHIS is insufficient in order to analyse the reasons of dropping out. The main reason is probably the fact that it is difficult to make a student reveal the main reason of dropping out (the option "Other reasons" is used quite intensively), however, also the classification as such could be improved.

The state's supervision reports (Õppeasutuses... 2008) also list the main reasons for USVE students dropping out as not being able to keep up with curriculum, especially at math and other science subjects (general education subjects), and not attending school. Also SEN students who have previously studied based on simplified curriculum in basic school drop out of VET school because they're are not able to acquire the knowledge of general education subjects at the level on upper

[62]It is important to keep in mind that school failure in this document is defined as failure to obtain secondary education.

secondary education. In the opinion of VET schools heads, inadequate career guidance before choosing a VET specialty is one of the reasons there are so many early school leavers. Other explanations of the high drop-out rate at the USVE level are (Õppeasutuses... 2008):

- entering labour market (especially after finishing practical training in companies) (11.2% of all drop-outs in 07/08),
- the specialty chosen turns out to be unsuitable,
- choosing another school to study,
- economic and family related reasons,
- moving to another location,
- behavioural problems etc.

Since one of the reasons of dropping out from VET is because the chosen specialty turned out to be unsuitable, it's most probable that some of those drop-outs return to acquire USVE choosing another specialty or continue studies in general education (USGE). This means they won't be adding to school failure in Estonia by dropping out and there are not many effective support measures for them – career counselling would help them to figure out a suitable specialty (and of course during career counselling some of them might rethink the unsuitableness of their current choice of specialty and they won't drop out in the first place). In general, support measures to help students acquire upper secondary vocational education should be taking account the above-mentioned reasons in order to be effective.

Concerning SEN students at VET schools – heads of schools note that mostly the fact that a student has special educational needs does not occur before beginning with the studies, student candidates generally do not include this information in their entry applications. That can be a problem for planning support measures they need or might need. SEN students in VET schools are mostly integrated to regular study groups, some subject programmes have been modified to their needs or they study based on simplified curriculum or coping curriculum (Õppeasutuses... 2008).

Appendix 3gives a brief overview of intervention measures arranged in same categories as previously for general education. Since the information available about intervention measures meant for VET students is scarce, the list of measures drawn up below is based on every possible official source of information on which measures should be or have been used in VET schools (regulations, state supervision reports). In the existing sources there is mostly no distinction between different levels of VET when talking about VET students and support measures to help them acquire their chosen education. Therefore one should keep in mind that the major part of the measures listed below is meant for students studying at both levels: upper secondary vocational education (USVE) and post-secondary vocational education (PSVE). All in all, the list is quite long and includes in measures similar in many aspects as the list for general education. The most important difference is probably the lack of compact legislation similar to the one that has been established for general education.

*Implementation of measures*

There is no regularly updated and published data of intervention measures used in VET schools to support the students in their endeavour to acquire upper secondary education (or any level of education in VET schools) and prevent dropping out. MofER has briefly addressed the issue in annual

state supervision reports, but since the problem of high drop-out rate has been there for years there seems a lot of work to do.

According to the MofER state supervision report of academic year 07/08 (Õppeasutuses... 2008),VET schools have not been able to do enough to employ support specialists in order to meet the special needs of students neither on USVE nor PSVE level. Several schools have emphasized their effort to find support specialists, but confess that specialists are difficult to find. Measures used by schools were mainly psychological counselling, assistant teachers and help from social pedagogy teachers or social workers. Measures were mostly provided by referring students to relevant bodies outside school (e.g. sign language interpreters, special education teachers). Health services were available only at a few schools; instead the services of general practitioners were used (Õppeasutuses... 2008).

With all VET students, the schools have different possibilities to support their students in order to prevent them from dropping out. As is the case with supporting SEN students, schools have not been able to hire the specialists needed, mostly for financial reasons. Therefore the measures taken so far have been the ones that take fewer resources from their budget – mostly additional help and consultations from subject teachers. According to the state supervision report in the academic year 2006/2007, other support measures were: work groups to support study and development of SEN students, improving cooperation with social partners (parents, local government and companies), developing support networks (Õppeasutuses... 2008).

In addition, local governments can and some do support their students with everyday expenses. Some schools give out free uniforms for their students (Raudsepp 2010). In order to reduce the drop-out rate at USVE level caused by socio-economic reasons, VET schools cooperate with local governments to provide free meals, remunerate transportation costs from home to school and offer free boarding school facilities to students in financial difficulties (Tugisüsteemide.. 2006, Õppeasutuses... 2008).

There are also standalone projects aiming to decrease the number of dropouts in VET schools (rather as one of the goals). One example is Järva County Vocational Training Centre's best practice partnership project under EU Leonardo Da Vinci programme "Competence Based Guidance Development is The Key to Lifelong Employability" (2009-2011). The aim is to develop a student counselling methodology which would help students to find their strengths in acquiring education better. The project includes a questionnaire to students at risk of dropping out or already dropped out of VET schools. The responses of the questionnaire will be used to come up with recommendations to the competence based guidance manual. Also training seminars for the practitioners are planned with the drop-outs and students at risk are also participating (information about responses is not yet available) (Competence...).

Although there is no system of support measures drawn up to prevent school failure in VET schools, MofER has stated a couple of future plans for support measures in "Development Plan for the Estonian Vocational Education and Training System 2009-2013" (2009): "In order to reduce interruption [dropping out], it is important to analyse more thoroughly the reasons of dropping out and to arrange an interruption monitoring system in EHIS (including on education organised for imprisoned persons). A set of measures need to be developed and implemented that would include various activities to support students and study work (including study counselling and coping with

learning, behavioural and social problems). More attention must be paid to issues of school healthcare, preventive activities and health education and youth work (including hobby activities) in VET institutions must be supported." The same is suggested in the audit of the NAOE on public VET schools' restructuring process (2009) – the data should be collected and analysed about the reasons behind VET students dropping out in order to develop preventive support measures.

The above-mentioned development plan also includes pieces of information about the current situation of some support measures: "The current system of study allowances for vocational learners is based on learning performance and does not ensure equal access to VET for everybody interested. The amount of study allowance is small and it can be paid only to 50% of learners" (Development... 2009).

As said earlier, the information about the situation of intervention measures implemented in schools is scarce, therefore one can only conclude the same as we did in previous chapter about general education – the key to get an overview of which measures are in use or are available to students in need of support to complete upper secondary vocational education is collecting accurate data as a first priority.

### Recuperative measures to increase the number of young people with upper secondary education

In addition to preventive measures there are a few measures meant for bringing dropouts back to school. Following the approach taken by Lyche in the OECD working paper (2010) on policies to prevent dropout and early school leaving, we are concentrating only on preventive measures and hereby will describe recuperative measures only briefly:

- As a new measure established just in year 2010, there is a possibility for basic school graduates who graduated basic education by the simplified national curriculum to prolong their study by an additional year if they're not ready to continue at or were not successful at applying to upper secondary level education (Basic...). The aim is to provide them additional knowledge, skills and support in order to continue their education or enter the labour market.
- It's stated in the Vocational Educational Institutions Act that dropouts at USVE level have a right to continue their studies at upper secondary schools to acquire USGE (Vocational Educational Institutions Act...).
- The VÕTA programme is a framework of accreditation for prior learning and work experience for continuing previously interrupted studies either in VET or higher education level. Among other levels of education, VÕTA allows drop-outs from the USVE level to come back to study either same specialty or another without re-taking the relevant subjects already acquired before dropping out. The VÕTA programme is supported by the European Social Fund Primus (VÕTA...).
- The KUTSE programme is another ESF financed programme, but established especially for students who left a VET school without graduating. The aim is turn at least 400 VET drop-outs (sum of USVE and PSVE level early school leavers) into graduates by 2013. State commissioned study places are created for that, all the support and rights are the same as

for any other students. There are some limits for applying for these study places: the time period of dropping out and the amount of studies already finished before dropping out.[63] Applicants can also use the VÕTA framework to take into account their work experience or additional courses to reach the necessary share of previously finished studies (KUTSE...).

- There are also Adult Upper Secondary Schools for students over 17 (the age limit for compulsory schooling) which allow adults to acquire basic and general secondary education in a more flexible way through distance learning, evening courses or external study (Adult...). The coping classes and classes for students with behavioural problems are support measures also implemented at adult upper secondary schools (Kanep 2008). Acquiring basic education in those schools is free for students. According to the NAOE audit of 2002, the possibilities for dropouts to attend adult schools are available in almost every county but there is a lack of student places for all the applicants, especially in the capital Tallinn and especially for people with less than 8 grades of completed studies. The reasons for turning down applications to acquire basic education have been different: applicants are too young (younger than 17), not enough applicants to open a group, applying in the middle of an academic year, less than 8 years of previously completed studies, not enough space in school facilities. It's also relevant to mention that more than 1/3 of adult schools students drop out because of poor performance (Re-entry... 2002).
- In addition to those recuperative measures to reduce school failure, there's another possibility to continue studies for students who left basic school without graduating and are over compulsory schooling age – vocational training without the requirement of basic education. Although this vocational programme does not include acquiring basic nor upper secondary education but is just vocational training, the students who attend this vocational training can continue their general education studies with the aim of obtaining a basic education (either parallel to vocational training or after completing the vocational curriculum) (Vocational Educational Schools Act, Kutseharidusstandard, Vocational...).
- There is also apprenticeship training (*õpipoisikoolitus*) in VET which started as a Phare project in 2002 having basic school dropouts as one of the target groups but has since developed into an official separate type of VET studies. The apprenticeship training scheme works as an agreement between the school, student and his/her employer placing substantial emphasis on practical study outside school. There are simplified admission criteria that make the program a new alternative for students with less satisfactory academic performance in general education. Therefore it is possible for early school leavers from basic school or upper secondary education drop-outs to return to education through apprenticeship scheme and maybe eventually acquire upper secondary education. In 2007 and 2008 there were 29 and 13 students respectively who had previously dropped out from basic education, in addition there were students in apprenticeship scheme studying by a curriculum which grants upper secondary vocational education by completion (10 in 2007 and 11 in 2008) (Toom 2008).

[63]Those who have interrupted their studies at VET or applied higher education curricula in the period from 01.01.2003 to 01.09.2009 and have previously or based on VÕTA principles completed at least 50% if the curriculum. Starting from 01.01.2011, eligible for participation are those who have interrupted their studies at VET or applied higher education curricula in the period from 01.01.2000 to 01.09.2010 who have fulfilled at least 35% of the curriculum either previously or through VÕTA.

## Conclusions

To sum up, the situation of implementation of school failure intervention measures in Estonia, there are undoubtedly numerous measures available and in use by schools (and other relevant bodies). There are measures to support all students and also those who need help for some specific matter(s) or subject(s), there are also several ways to support SEN students in acquiring education. Unfortunately, these measures do not form a well structured support system, in legislation the measures are scattered under different acts and regulations (especially as far as vocational education is concerned) and the questions of when, to whom, why and how to implement those measures is largely left to schools' and teachers' discretion and local governments' budget constraints.

## 5.2. Efficiency and cost effectiveness

### Introduction

There is one prevailing problem of measuring the efficiency of support measures to students – separating the effect of a certain measure from other factors also (and maybe simultaneously) affecting the probability of a student graduating upper secondary education and training. As said before, there are no existing rigorous research findings or proper evaluations of any support measures or programmes implemented being effective by means of helping upper secondary education students (at risk of dropping out) to complete their studies and thereby not contributing to school failure. In addition to that most of the measures described in previous chapter have no formulated goal of supporting students to graduate upper secondary education in particular; a lot of the measures, especially in general education, are implemented on basic school level and are aimed at increasing the completion rate of compulsory schooling/basic education.

It's internationally agreed and proven by several studies that in setting of preventing school failure, the earlier the intervention, the better the outcome. For example, according to Cunha and Heckman (2006), preschool exhibits the highest social rate of return among all education interventions (Psacharopoulos 2007). Although the measures taken at the level of basic school most likely help to improve the students life following graduation as well, it remains unknown if and to what extent those support measures (no matter how successful in acquiring basic education) are helping them to complete upper secondary education and training in particular (which is the main goal of intervention measures in our context of reducing the costs of school failure). Also it remains arguable whether the students at risk of dropping out already at the level of basic education would be able to continue and graduate studies at the next level. This would certainly depend on the causes that lead up to the status of the students being at risk of dropping out. We are not going to address the philosophy of support measures at this point nor the different causes of school failure and their relationship to the measures taken. The aim of this chapter is to give an overview of the few sources which have provided some sort of assessment of the efficiency of a few of the intervention measures described in the previous chapter.

Legislation provides only sporadic guidance of when and how one should assess the efficiency of support measures implemented. It is stipulated in the Basic Schools and Upper Secondary Schools Act that in case of measures implemented to support SEN students, after the end of the implementation period the coordinating person has to assess the efficiency of measures taken in cooperation with teachers and support specialists and provide suggestions for further actions (changing measures, adding measures, additional consultations or medical examinations etc.). Also the teachers of SEN students and support specialists have to describe SEN students' developments and ability to cope every year. The counselling committees have the same duty concerning the measures recommended by them.

Unfortunately, those assessments are not available nor is there any known document giving a general overview of the results of those assessments. All the more, these guidelines in legislation mandate the assessment of the effectiveness of measures only for SEN students, meaning only a limited set of measures for selected students.

Available sources which have provided some information on the effectiveness of these measures are the audits of the National Audit Office of Estonia (NAOE) and state supervision reports conducted by the Ministry of Education and Research (MofER). As already mentioned before, these results are not indicative of the effectiveness of the system that is currently in force because significant changes in the legislation came into force in 2010.

## General education

**NAOE audit of compulsory school attendance and the efficiency of enforcement (2007)**

The main sources treating the topic of efficiency of support measures implemented to help improve students' performance in education are NAOE's two audits on compulsory schooling attendance (Compulsory... 2002, Compulsory... 2007). Both audits emphasize the fact that there is no monitoring system of support measures in Estonia which would allow assessing the measures' efficiency on students' performance and attendance. The lack of reliable data about which support measures are used and for which reasons is hindering the assessment which measures have been successful at preventing students of dropping out.

The aim of these NAOE audits was to assess the efficiency of intervention measures using general indicators and also evaluate from the standpoint of the persons getting help – to see if measures affect the student's attendance. Due to changes in data collection methodology during preceding years, it was not possible to compare general indicators over time. Although an increase in implementation of support measures in schools is noticeable in the data, it isn't known if the support is sufficient, if the help is available to all students in need or at risk of dropping out. Due to the lack of data it is also not possible to report how many potential drop-outs were able to complete basic education due to the support measures implemented.

In 2007, NAOE carried out a web survey among schools, visited general education schools and interviewed students at risk of dropping out. Auditors also visited local governments (school owners) in order to get some feedback about which support measures are successful and which not.[64]The NAOE audits concentrate on compulsory school attendance, limiting their analysis to basic education.

The survey responses revealed schools valued most opportunity classes for teaching children with learning difficulties, but it's also the least implemented support measure. Also boarding school facilities and classes for students who have behavioural problems were considered effective and implemented quite infrequently (since the audit was conducted the availability to use boarding school facilities has increased). Boarding school facilities have been thought as having great effect on students' compulsory education attendance since a lot of problems with school attendance develop from social problems and problems at home. It's one of the few support measures the schools can affect outside school factors behind non-attendance. Those special classes mentioned by schools where teachers have special education and skills were also valued by students – their opinion is that

[64] Online survey was responded by 189 schools; auditors visited 10 schools and conducted in-depth interviews with 14 students at risk. The assessment of measure efficiency was given by schools on 4-point scale: effective - rather effective – not so effective – not effective.

smaller classes entail a more individualised approach than in regular classes and the level of learning would be more even among students.

Another measure students appreciated substantially was psychological (or psychiatric) counselling because it was important for them to be able to discuss their problems with an adult who is supportive and able to give advice, but schools assessed its effectiveness as less than average.

Juvenile committees were considered the least effective measure by both schools and students. The NAOE audit (2007) discusses the possible reasons behind this result, noting that the main reason was probably the lack of resources to implement all the measures – the possibilities to use the measures differ significantly by county. Students at risk who were interviewed and had had experience with juvenile committees even said the effect was negative. For more detailed analyses see NAOE's follow-up audit of juvenile committees and specialised schools (Follow-up... 2010).

In students' opinion, another intervention measure with negative effect has been repeating an academic year. They responded to NAOE interviews that retention can be the beginning of even bigger problems for the student. In 2005 the procedure of repeating a year was changed to a bit more flexible and reasoned system.

As schools noted in the NAOE audit (2007), there are children to whom none of the existing support measures are of any help. The results of their analysis of students who have repeated a year (or more) and of dropouts from basic school acknowledged the same notion – even if several different measures are implemented to help the students, some still remain to repeat a year or leave school early. Students' problems can be rooted in factors outside of schools' reach and maybe even of local government officials' ability to help. And often the success of support measures depends on financial capacity of the school or local government, the variety of measures in their use being limited by their budget and by the labour market situation for the specialists needed.

In order to be more effective in preventing dropping out, NAOE suggested to involve parents more in the study process and support measures, to establish support measures involving parents of the students at risk and supporting parents as well.

The NAOE audit from 2010 (Follow-up... 2010) also addressed the issue of further developments of the students who leave specialised schools who need special treatment due to behavioural problems. According to the NAOE audit of 2010, the problem is that those specialised schools are not effective measures of preventing or reducing juvenile offences, in addition these schools are an expensive measure. A large share of students who have been referred to such schools commit new offences after leaving the school at the end of their prescribed time there. Approximately 4/5 of students commit an offence and 2/5 commit a crime after leaving a specialised school for students with behavioural problems. Only a few years after leaving the school, 43% of them end up in a penal institution and most of them do not complete basic education (Follow-up... 2010).

**Annual state supervision reports by Ministry of Education and Research**

State supervision reports conducted by MofER also address the issue of which measures are successful at improving compulsory school attendance and student performance in basic school. The methodology of assessing the efficiency of support measures used to help 3 different groups of

students of basic education(students already having problems keeping up with their curriculum: 1) students who are repeating an academic year; 2) students who have been transferred to next grade with one or some non-satisfactory grades from the previous academic year; 3) students who have non-satisfactory grades at the first quarter of academic year) was comparing general indicators; data came from visiting general education schools (Overview... 2008-2010).

The notion of the efficiency of a support measure varies by the group under observation. Obviously, since the reports concentrate on compulsory education, none of the conclusions drawn state the efficiency of a measure as students graduating upper secondary education (which would be an indication of effectiveness in the context of school failure). For the groups of students who are repeating an academic year and who had been transferred to the next grade with one or a few non-satisfactory grades of the previous academic year, the measures taken to support them were assessed by the amount of students transferred to the next grade. For the students who had non-satisfactory grades at the first quarter of the academic year, the indication of a measure's success was having more positive grades by the end of the year (Overview... 2008-2010).

Several conclusions have been made about the efficiency of support measures in every report and the last one analyses the information from all previous academic years as well (2005/2006-2009/2010):

- It was difficult to implement support measures for many the students who were repeating a year, because the non-satisfactory grades leading to repeat the year was a consequence of not attending school. Therefore the measures taken were not effective (Overview... 2009).
- Repeating a year as a support measure is in itself not effective since approximately 23% of them did not complete the academic year or graduate basic school (most of them were studying at III level of basic school). On average 32% of 9$^{th}$ grade students who had repeated a year left school without graduating (the reason was mainly reaching the age limit of compulsory schooling) (Overview... 2009). Only 66% of students who had to repeat a year during 2005/2006-2009/2010 got positive grades by the end of academic year or graduated basic school (Overview... 2010).
- In 2006/2007, 85% of students who had been transferred to next grade with one or some non-satisfactory grades of the previous academic year did not have good enough grades by the end of the year and were either appointed an additional study period during school holidays or to repeat a year. Some also left school early. It was stated in the supervision report that if the above share is more than half of the students, it is an indication of support measures implemented during the academic year being ineffective (Overview... 2008). Over the years, only 62% of students in this group completed the academic year with positive grades (Overview... 2010).
- It can be concluded that just implementing support measures won't improve students' grades. It is important for the teachers to take into account every student's individuality and modify teaching methods according to the students in class. In general, no support measure is effective on its own – if there is no cooperation between teachers, specialists and parents the support given to students is not effective enough (Overview... 2008).
- A large share of the students who were repeating a year and students who had been transferred to the next grade with one or some non-satisfactory grades, it was revealed that

during the previous academic year, no preventive measures were implemented to support them, although they belonged to the risk group of dropping out already at the beginning of the academic year (Overview... 2008).

It is noted in the supervision reports that throughout the period under observation, if a support measure was implemented in schools to help a student during the 1st quarter of the academic year, the schools generally didn't (intend to) make changes in it during the year nor did they try to assess the efficiency of the measure implemented (Overview... 2010).

There are a few other conclusions made in those supervision reports about the efficiency of support measures. Unfortunately there were inconsistencies concerning the methodology on which those conclusions were drawn and are therefore not reflected here:

- Conclusions were drawn about indicators changing over the years by comparing data from different year's reports, but it's not clear if the methodology of choosing research samples for state supervision reports supports that kind of generalisation. Every year the sample of schools under supervision were intentionally chosen to be different from previous years and the selection was not random, therefore it's not clear if the sample of schools for every academic year was representative for all Estonia and if the indicators/groups are directly comparable.
- There is no measure by measure information available about efficiency (besides repeating a school year as a measure itself), the conclusions are drawn comparing how many students of the group under observation improved their performance by the end of school year. Nor were the conclusions differentiated by stages of basic school.

### Upper secondary vocational education in VET schools

Measures taken at upper secondary vocational education have been addressed in a few MofER's state supervision reports.

In the report of 2006/2007, the supervisors conclude that the intervention measures implemented to support VET students have not been successful. The assessment of measures' efficiency has been insufficient by schools and the need for support measures exceeds the amount implemented. There is lack of statistical data about early school leaving, no analyses about prevention measures or their efficiency. Analyses of measures and concrete action(plan)s to prevent drop-out are also not present in schools' documentation (Overview of thematic... 2007). A year later, the state supervision report notes that the situation has not changed – the schools haven't been analysing the efficiency of support measures (enough) (Õppeasutuses... 2008).

In the latest report of 2009/2010 (Overview of state supervision in vocational education 2010), an attempt of assessing the efficiency of support measures is made. The goal was to examine VET students' study performance, get a picture of how non-satisfactory grades and the amount of non-attendance as well as which intervention measures have the VET schools implemented in order to improve study results and if the measures have been effective. In general, the report concludes that if the opportunities have been created in school and if students have interest in improving their results, every measure taken to help them can be effective. Unfortunately, more detailed conclusions of measures' efficiency are not reliable since they're based on comparison of incommensurable data.

## Conclusion

This chapter demonstrated that existent sources of information and assessments of measure efficiency are scarce. Only the NAOE audits and MofER supervision reports have addressed the issue to some extent, not covering the whole range of possible intervention measures and the level of upper secondary general education is completely uncovered. Those two sources unfortunately do not go any further than comparing general indicators and asking schools' overall opinions about the success of measures implemented – they are indirect estimates of efficiency and no rigorous research or evaluation methods were applied to assess the efficiency of different measures.

The MofER audit has been attempting to cover the topic on a regular basis for a few academic years but addresses it selectively only at the level of basic education. It also has some methodological flaws which limit the use of their conclusions about the efficiency of the measures under supervision. The NAOE audit is based on more reliable methodology but drawing any conclusions about efficiency is still hindered by the lack of reliable data. Therefore there is no way of deciding which measures would be more preferable to use in relevant cases and which not. Any estimates of the efficiency and cost-effectiveness of the intervention measures based on currently available data would probably be flawed.

## 5.3. Support measures in international literature and lessons for Estonia

### Introduction

As currently available data does not allow for fast-track assessment of efficiency or cost effectiveness of currently used school failure measures, one could get some ideas for policy design from the experience of other countries. An excellent review of internationally used measures for combating school failure has only recently been published by OECD (see Lyche 2010). Therefore if would serve no meaningful purpose to duplicate this report in this paper. The following chapter gives only a general overview of measures that have been deemed as effective and encourages the reader to address Lyche (2010) for further detail.

### Short overview of main intervention measures

A recent OECD working paper by Lyche (in November 2010) gives a thorough overview of international research and literature about the causes of dropout before acquiring upper secondary education and preventive[65] measures taken to support completion for students at risk in OECD countries. The topic of the causes of dropping out is much more researched than issues about intervention measures, where a large share of papers do give suggestions about the possible measures to be used but only a few actually evaluate the efficiency of support measures in preventing dropout.

Emphasizing that dropout, more than an outcome, is a cumulative process of disengagement or withdrawal that occurs over time, Lyche (2010) classified the support measures proven to have effect on reducing dropping out cumulatively by the level of education (Lyche 2010):

- At pre-primary and primary level:
  - Broad measures to develop cognitive and non-cognitive skills
  - Identifying risk behaviour and providing adequate social support for both child and family
  - The early involvement of parents in their children's education
  - Encouraging the development of pro-social bonds for instance to school staff or to positive peers as they may lead to a commitment and attachment to school
- At lower secondary level:
  - Introducing substance-abuse curricula
  - Challenging low-performing unmotivated students rather than simplifying their tasks.
  - Tutoring initiatives, either through peers or external tutors
  - Providing extra-curricular activities and sports involving families
  - Connecting schools and their local communities, either through the world of work or community service action
- At upper secondary level:
  - Providing recuperative courses before school start upon entry into upper secondary level
  - Mentoring and tutoring the remaining few that haven't been picked up by earlier intervention

[65] The paper deals only with preventive measures and not with recuperative ones.

    - Teaching substance abuse curricula and providing sports activities
    - Providing high quality VET-tracks as a real alternative to non-engaging academic tracks
- At all levels of the education system:
    - Risk behaviour must be identified and should be followed by intervention for instance through the connection to an adult within or outside school.
    - Transitions between school levels should be supported
    - Reliable data should be collected, first on the extent of the challenge itself, second on the risk factors highly correlated with non-completion. This data should be transferred between school levels to guarantee early preventive measures and selective interventions.

In general the successful measures target several factors related to the student's status being at risk of dropping out. Measures should involve simultaneous interventions within and outside school and systemic level as well, meaning cooperation between students, teachers, schools management, specialists and local government officials. "Preventive measures must address not only the direct visible cause of dropout but the underlying causes that influence the cumulative process of student disengagement that ultimately leads to the decision to leave education or training" (Lyche 2010).

Lyche (2010) sums up the properties of support measures in preventing students leaving school early at different levels of education:

> *"Preventive measures to reduce early school leaving should start early. The earlier the prevention begins, the broader the target will be. The later the intervention, the more targeted it needs to be."*

The measures found to be effective by rigorous research methods (like econometric estimation) are more in a form of separate programmes which often subsume and combine different measures affecting different relevant factors/persons. Those measures often coincide to the ones listed in the first chapter – support measures implemented in Estonia. The implementation of measures in a programme-like fashion probably allows easier evaluation of effectiveness contrary to less clearly structured everyday work done in Estonian schools. However, it makes it also more difficult to draw any conclusion about the potential effectiveness of Estonian if one would like to use international experience as reference. To be fair, we do not even have reliable data about all the measures used and to what kind of needs and in which situations let alone about the combinations of measures. Also, no information about the effect of measures on individual student's status being at risk of dropping out.

Keeping this in mind, there are nevertheless some interesting measures described in Lyche's (2010) overview (see the paper for more detailed descriptions). Hereby we are going to refer to some more interesting results that could be useful also in adjusting Estonian policy design:

- **The intervention must start early** – in early stages broad measures can target larger groups of students. Later on where problems become more intense, each intervention has to be more specific.

- In pre-primary and primary level the focus should be on **broader development of cognitive and non-cognitive skills**. The measures must be capable of **picking up risk behaviour** and adequate **social support** has to be accessible to both children as well as their parents.
- In **lower secondary school smooth transition** is important. Where necessary substance-abuse curricula should be introduced. Schools where demands are higher have a higher completion rate, meaning more course requirements and higher demands lead to fewer students dropping out. **It is suggested to challenge low performing unmotivated students by placing them in advanced programmes instead of reducing their study load or simplifying their tasks**. With combination of a few other support measures it has been proven to be effective in preventing dropping out. Extra-curricular activities (preferably involving families) are important.
- In **upper secondary level recuperative courses before the school begins**, also mentoring and tutoring courses id additional help is needed. Extra-curricular activities are also relevant in this level as well as providing high-quality vocational education tracks for those who are not interested in academic studies.

Hammond *et al*. (2007) sums up key components of successful measures from the literature:

- The timeframe of implementation should be long enough to allow for an impact (Catalano et al., 2004; Gottfredson, 1998, MRC, 1994a);
- The programmes should be rigorously evaluated (Catalano et al., 1999; MRC, 1994a)and use behavioural outcome measures to monitor resulting reduction in problem behaviours and addition of positive behaviours (Catalano et al., 1999; Gottfredson, 1998)
- The implementation of multiple measures simultaneously has a positive impact on the outcome (Gottfredson, 1998; Lehr et al., 2004; NIDA, 2004)

They add:

> *"One must evaluate programmes' effectiveness and use behavioural outcome measures in order to observe if problematic behaviour decreases and if behaviour becomes more positive as an outcome of the programme or not".*

In attempting to suggest or apply the support measures found effective in other countries to Estonian students, one has to be cautious since the link between the reasons of students being at risk and non-satisfactory results is not identical everywhere. As the PISA results have shown, in Estonia the connection between students' PISA 2006 and 2009 performance and their socio-economic status (SES) was one of the smallest compared to other OECD countries. Also it was found that Estonia is one of the countries were the PISA results did not depend on the school the students were attending (Tire *et al.* 2010, Henno *et al.* 2008).Mündi (2006) investigates the connection between dropping out of basic school and dropouts' family SES before the event of dropping out. Although a simple comparison of dropouts to the control group reveals differences in average indicators (single parent, unemployed parent(s), parents' level of education and relationship with students, their interest to children's education) between the groups – the dropouts being worse off than students in control group, the results of logistic regression showed statistically insignificant relationship (Mündi 2006).

## Conclusions

There are many interesting measures than can be used for combating school failure and these measures are seldom single measures. Instead, effective measures include activities both inside as well as outside the school and engage not only students but a broader group of people (e.g. parents, teachers). However, also in other countries it is difficult to find measures that have been properly tested for cost efficiency.

It should also be kept in mind that it is very difficult to draw any conclusions about the efficiency of Estonian measures based on international experience as it is very difficult to address the concrete set of measures a person at risk of failing school receives in Estonia. Also, differences in cultural contexts can influence the efficiency of measures.

All this suggests that the Estonian education system should not concentrate that much on picking up new measures from abroad (as we already saw, with few exception the measures used abroad are also listed among Estonian intervention tools) than on arranging and systematising currently used measures, developing unified procedures for applying these measures and bringing into life a system that allows for precise overview of who, when and why has been exposed to these measures.

# 6. Policy recommendations

Education plays a very important role in shaping our future both at the individual level as well as in impacting the overall economic performance of the country. Despite the recent decline in the share of early school leavers amongst 18-24 year olds, in 2010 11.6% of the people in this age group had neither achieved upper secondary education nor were striving towards it. This figure is higher than the Lisbon target (10%) agreed at the European level.

The first policy suggestion rising from this report is that it is important to tackle school failure because it's costly for Estonian society. When using 6% interest rate, Estonia loses ca 78 thousand EUR over each person's lifecycle who has obtained lower secondary education, but has not graduated from upper secondary programme. If half of the persons stopping their studies at lower secondary level in 2011 could be brought to graduation at the upper secondary level, the school failure costs that could be avoided over their lifetime would amount to 0.35% of GDP. This is a large amount of money. Thus, from a very pragmatic point of view **reducing the school failure should be high in every government's agenda.**

Estonia has introduced a new Basic Schools and Upper Secondary Schools Act that provides a lengthy list of possible intervention measures as well as general principles for addressing school failure. In principle, the **approach chosen in this act is reasonable**, emphasizing continuous work from the early stages with both students and their parents and describing how the problem is to be solved through teamwork with extra competences being brought in, depending on the severity of the problems that need to be addressed. However, the devil is usually in the details and quite often in the implementation details. As the new act stepped into force only in the beginning of 2011, it is very difficult to say anything about the effectiveness of implementation of the measures listed in the Act. There are, however, some lessons that can be drawn from the period before the new Act stepped into force.

First, it is unclear **how accurate the information in the Estonian Educational Information System is regarding the measures taken for combating school failure**. The teachers must file in the system the student's special educational needs (SEN) and measures that have been taken to address them. In case of such a large system as the general education system, special care has to be devoted if one wants to achieve a coherent approach to students' educational needs all over the country. Often the problem is not so much in reporting data but in differences in teachers' understanding of what constitutes a SEN and when special treatment is needed. We would recommend **a training programme specifically aimed toward unifying the practices** of how to spot early signs of problems that can lead to dropping out of the school and how to address special educational needs. The emphasis of this training programme should be not so much on how to approach specific severe SENs but rather on how to spot less severe learning and behavioural problems and how to benefits from the network of specialists both inside and outside the school to solve these problems already at the root. SEN issues are a component of teachers' base training (maybe with slightly lesser intensity than the topic actually requires), but the average age of a teacher in the Estonian general school being 47 years, for most of the teachers the base training is long in the past. If the new system is really to have some tangible impact then a refreshment of the knowledge of SEN issues for most of the teachers is of vital importance.

In addition to training, **tools for picking up first signs of potential problems** should be made available for teachers. Today, there exists the example of the individual development card – a tool that can be used by all teachers for recording SEN and keeping track of the measures that have been implemented. However, according to our interviews, use of this tool is not very widespread and each school can use a different kind of tool. In order to give the topic of SEN a kick-start, we propose that a standardized from of individual development card should be used. Also, it should be more user-friendly and, what's most important, already integrated to the currently used "*e-kool*" IT solution. The individual development card could be something in line with "early warning systems" that have been designed in several other developed countries.[66]

Some improvements could also be made in the **exchange of information between schools in case of transfer from one school to another**. At present, the information on SEN as well as measures implemented by the school will only become available to the new school if the parent of the student agrees to pass this information on. It is not unusual that the reasons for dropping out of the school are linked to problems at home. In some cases, the parents are not sufficiently interested in how their child is doing at the school or what the nature of the problems at the school is. It might even be that the parent's personal characteristics become an obstacle in passing the relevant information on to the new school. Eventually, teachers in the new school will also rediscover the special educational needs and design new measures, but meanwhile valuable time is lost. One could redesign the system so that under special circumstances (e.g. strong emotional level conflicts between teacher and student), a parent can demand that the information on SEN and applied measures will not be sent to the new school but otherwise the relevant information is passed on without any obstacles.

Finally, it is fair to say that **the data that is currently available does not allow for good quality impact evaluation** of the new components of school failure prevention that were introduced with the new Basic and Primary School Act. Striving towards the comparison of two otherwise equal groups – one that has been exposed to the measure under evaluation and the other that has not – is at the heart of a good impact evaluation. The implementation of new measures should thus be carefully planned, starting with adequate data collection and choosing the treatment and control groups. A better understanding of the actual impact of the measures is the cornerstone of well-functioning policy. Unfortunately, these necessary steps of planning have not been implemented in the case of this specific reform. Hopefully, this can be corrected next time a larger policy initiative is launched.

In addition to suggestions arising purely from Estonia-specific experience, there are also some **general results from international experience** that are worth keeping in mind for potential further adjustments in policy. There is at least one OECD paper (Lyche 2010) that gives a quite recent overview of international experience with different policy measures. The following list is not composed with the intention to duplicate the results of this excellent report. It only highlights some more important general aspects that could come handy in further policy design (Lyche 2010):

[66] A nice example is the Early Warning System (http://www.betterhighschools.org/EWIMSTool.aspx) that has been developed by National High School Centre that was established by U.S. Department of Education.

- **The intervention must start early** – in early stages, broad measures can target larger groups of students. Later, where problems become more intense, each intervention has to be more specific.
- At **pre-primary and primary levels,** focus should be on **broader development of cognitive and non-cognitive skills**. The measures must be capable of **picking up risk behaviour,** and adequate **social support** has to be accessible for both children as well as their parents.
- At **lower secondary school, smooth transition** is important. Where necessary, substance-abuse curricula should be introduced. Schools where demands are higher have a higher completion rate, meaning more course requirements and higher demands lead to fewer students dropping out. **It is suggested to challenge low performing unmotivated students by placing them in advanced programmes instead of reducing their study load or simplifying their tasks**. In combination with a few other support measures, it has been shown to be effective in preventing dropping out. Extra-curricular activities (preferably involving families) are important.
- At **upper secondary level, recuperative courses before school begins should be introduced,** along with mentoring and tutoring courses if additional help is needed. Extra-curricular activities are also relevant, as well as providing high-quality vocational education tracks for those who are not interested in academic studies.

## References


1. Adult Education: Educational Possibilities, Ministry of Education and Research. http://www.hm.ee/index.php?149996
2. Alaealise mõjutusvahendite seadus, Riigi Teataja I 1998, 17, 264.
3. Aldy, J. E., Viscusi, W. K. (2007) Age Differences in the Value of Statistical Life: Revealed Preference Evidence, Review of Environmental Economics and Policy, volume 1, issue 2, pp. 241–260
4. Allensworth, E., Easton, J. Q. (2007) What matters for staying on-track and graduating in Chicago Public High Schools: A close look at course grades, failures and attendance in the freshman year. Chicago: Consortium on Chicago School Research. *Via Heppen, J., Therriault, S. (2008) Developing Early Warning Systems to Identify Potential High School Dropouts. National High School Center, Issue Brief, July 2008, pp. 13.*
5. Arrow, K. (1997) The benefits of education and the formation of preferences, in The Social Benefits of Education (Eds) J. Behrman and N. Stacey, The University of Michigan Press, Ann Arbor, pp. 11–16
6. Ashenfelter, O. and A.B. Krueger (1994) Estimates of the economic return to schooling from a new sample of twins, American Economic Review, 84 (5), 1157-1173.
7. Balfanz, R., Letgers, N., Hertzog, L. (2010) An Early Warning System. Educational Leadership, October 2007, Volume 65, Number 2. *Early Intervention at Every Age*, 28-33 p.
8. Basic Schools and Upper Secondary Schools Act (*Põhikooli- ja gümnaasiumiseadus*), Riigi Teataja I 2010, 41, 240.
9. Baum, S.; Ma, J. (2007) Education Pays: The Benefits of Higher Education for Individuals and Society. The College Board http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.171.690&rep=rep1&type=pdf
10. Baum, S.; Ma, J.; Payea, K. (2010) Education Pays: The Benefits of Higher Education for Individuals and Society. The College Board http://trends.collegeboard.org/downloads/Education_Pays_2010.pdf
11. Baum, S.; Payea, K. (2004) Education Pays: The Benefits of Higher Education for Individuals and Society. The College Board http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.177.8261&rep=rep1&type=pdf
12. Becker, G. S. (1964) Human capital: a theoretical and empirical analysis, with special reference to education. Chicago: The University of Chicago Press.
13. Becker, G.S., Mulligan, C.B (1997) The Endogenous Determination of Time Preference. The Quarterly Journal of Economics, Vol.12, No.3, pp.729-758
14. Belfield, C.R (2008) The Cost of Early School-leaving and School Failure. Retrieved from http://siteresources.worldbank.org/INTLACREGTOPPOVANA/Resources/BELFIELDCostofSchoolFailure.pdf
15. Belfield, C.R., Levin, C.R. (2007) The Price We Pay – Economic and Social Consequences of Inadequate Education. Brooklin Institution Press. Washington D.C, 273 p.
16. Bellhouse, D.R., Stafford, J.E. (2001) Local Polynomial Regression in Complex Surveys. Survey Methodology, Vol. 27, No. 2, pp. 197 – 203
17. Brand, J. E. (2010) Civic Returns to Higher Education: A Note on Heterogeneous Effects. Social Forces, 89 (2), pp. 417-434.

18. Brehm, J.; Rahn, W. (1997) Individual-level evidence for the causes and consequences of social capital. Americas Journal of Political Science. Vol. 41, No.3, pp. 999-1023.
19. Campbell, D. E. (2006) What Is Education's Impact on Civic and Social Engagement? In Measuring The Effects Of Education On Health And Civic Engagement: Proceedings Of The Copenhagen Symposium; OECD http://www.oecd.org/dataoecd/14/63/37425694.pdf
20. Card, D. (1999) The causal effect of education on earnings. Handbook of labour economics. Available at: http://linkinghub.elsevier.com/retrieve/pii/S1573446399030114.
21. Card, D. (2001) Estimating the return to schooling: Progress on some persistent econometric problems. Econometrica. Available at: http://www3.interscience.wiley.com/journal/118971651/abstract.
22. Cassel, C., Lo, C. C. (1997) Theories of Political Literacy. Political Behavior, Vol. 19, No. 4, pp. 317-335.
23. Catalano, R., Berglund, M., Ryan, J., Lonczak, H., & Hawkins, D. (1999) Positive youth development in the U.S.: Research findings on evaluations of the positive youth development programs. NewYork: Carnegie Corporation. Retrieved December 21, 2005, fromhttp://aspe.hhs.gov/hsp/PositiveYouthDev99/index.htm.
24. Claibourn, M. P.; Martin, P. S. (2000) Trusting and joining? An empirical test of the reciprocal nature of social capital. Political Behaviour, Vol. 22, No. 4, pp. 267–291.
25. Clement, D. (2002) Interview with Gary Becker in The Region June 2002; The Federal Reserve Bank of Minneapolis http://www.minneapolisfed.org/publications_papers/pub_display.cfm?id=3407
26. Competence Based Guidance Development is The Key to Lifelong Employability, Leonardo da Vinci project, http://www.jkhk.ee/5305
27. Compulsory school attendance (2002) Report of National Audit Office of Estonia (NAOE) to Riigikogu n0 7038, Tallinn, 25. November 2002, pp. 40.
28. Compulsory school attendance and the efficiency of enforcement (2007) How to help thousands of children who do not want to attend school? (2007) Report of National Audit Office of Estonia (NAOE) to Riigikogu, Tallinn, pp. 53.
29. Pedro, C. and Pedro, F. ( 2000). The Young Person's Guide to the Theil Index: Suggesting Intuitive Interpretations [Report]. - [s.l.] : UTIP Working Paper Number 14.
30. Cunha, F, J.J. Heckman (2006) Investing in our young people. Working Paper, University of Chicago. *Via Psacharopoulos, G. (2007) The Costs of School Failure A Feasibility Study. European Expert Network on Economics of Education (EENEE)*.
31. Cutler, D. M., & Richardson, E. (1998) The Value of Health: 1970-1990. The American Economic Review , 88 (2), 97-100.
32. Cutler, D. M., Richardson, E., Keeler, T. E., Staiger, D. (1997) Brookings Papers on Economic Activity. Microeconomics, Vol. 1997 (1997), pp. 217-282
33. Dee, T. (2003) Are There Civic Returns To Education? National Bureau Of Economic Research. Working Paper 9588. http://www.nber.org/papers/w9588.pdf
34. Denny, K. (2003) The Effects Of Human Capital On Social Capital: A Cross-Country Analysis. The Institute for Fiscal Studies. London http://www.ifs.org.uk/wps/wp0316.pdf

35. Developing an Educational Counselling System, The National Examinations and Qualifications Centre. http://www.ekk.edu.ee/the-esf-programmes/developing-an-educational-couns
36. Development Plan for the Estonian Vocational Education and Training System 2009-2013 (2009), Estonian Ministry of Education and Research, Tartu 2009, pp. 118.
37. Dropping out of Basic School (*Põhikoolist väljalangevuse ennetamine*) (2010) Overview of external evaluation of the Education System in academic year 2009/2010. Ministry of Education and Research, Tartu, 2010, p. 106-110.
38. Duan, N. (1983) Smearing Estimate: A Nonparametric Retransformation Method. Journal of the American Statistical Association, Vol. 78, No. 383, pp. 605-610
39. Dynarski, M., Gleason, P. (1998) How Can We Help? What We Have Learned from Evaluations of Federal Dropout-Prevention Programs, Report for the U.S. Department of Education (Princeton, N.J.: Mathematica Policy Research, Inc., 1998).via John H. Tyler and Magnus Lofstrom (2009) Finishing High School: Alternative Pathways and Dropout Recovery. America's High Schools VOL. 19. NO. 1, SPRING 2009, Princeton, NJ: Woodrow Wilson School of Public and International Affairs and The Brookings Institution, Pp. 77-103.
40. Early Warning System Tool v2.0 and Supporting Documents, National High School Centerat the American Institutes for Research. http://www.betterhighschools.org/ews.asp#EWS2
41. Enguita, M. F., Martinez, L. M., & Gómez, J. R. (2010).School Failure and Dropouts in Spain.Social Studies Collection. Retrieved from http://multimedia.lacaixa.es/lacaixa/ondemand/obrasocial/pdf/estudiossociales/vol29_en.pdf.
42. Erivajadused ja tugiteenused – täiendav info (2008). Eesti hariduse infosüsteem (EHIS), Kasutajajuhend õppeasutustele: Õppurite alamsüsteem, Üldharidus, Tallinn. http://www.hm.ee/ehis/help/oppur_juhend_yld_10_09_10.htm#_Erivajadused_ja_tugiteenused-_täien
43. Erivajadusega isikute kutseõppeasutuses õppimise tingimused ja kord, Riigi Teataja Lisa 2006, 66, 1217.
44. Estonian Ministry of Education (2009) Education and Research in Estonia 2009 http://www.hm.ee/kogumik2009/en/5.html
45. Eurostat (2010) Youth education, lifelong learning, early leavers from education and training – Annual data, Eurostat metadata, http://epp.eurostat.ec.europa.eu/cache/ITY_SDDS/EN/lfsi_edu_a_esms.htm
46. Executive Summary PISA 2006: Science Competencies for Tomorrow's World, 54 p.
47. Florio, M., Maffii, S. (2008) Guide to COST-BENEFIT ANALYSIS of investment projects, 257 p. http://ec.europa.eu/regional_policy/sources/docgener/guides/cost/guide2008_en.pdf
48. Follow-up audit of juvenile committees and specialised schools (2010) Report of National Audit Office of Estonia (NAOE) to Riigikogu, Tallinn, 01.12.2010, pp. 27.
49. Fukuyama, Y. F. (2001) Social capital, civil society and development, Third World Quarterly, Vol. 22, No. 1, pp. 7-20.
50. Functions and Performance of Special Schools (2004) Report of National Audit Office of Estonia (NAOE) to Riigikogu no 2-5/04/45, Tallinn, 18.06.2004, pp. 37.

51. Gibson, J. (2001) Unobservable Family Effects and the Apparent External Benefits of Education, Economics of Education Review, Vol 20, No. 3, June 2001, pp. 225-33. http://www.management.ac.nz/Departments/staff/johng/PDF_Files/Published/EERTwinsVolunteer.pdf
52. Gottfredson, D. (1998) School-based crime prevention. In L.W. Sherman, D. Gottfredson, D.MacKenzie, J. Eck, P. Reuter, & S. Bushway, Preventing crime: What works, what doesn't, what's promising, A report to the United States Congress. Washington, DC: National Institute ofJustice and University of Maryland Department of Criminology and Criminal Justice, NCJ165366. Available online at http://www.ncjrs.org/works/wholedoc.htm orhttp://www.preventingcrime.org.
53. Granberg, D.; Holmberg, S. (1991) Self-Reported Turnout and Voter Validation. American Journal of Political Science, Vol. 35, No. 2 (May, 1991), pp. 448-459.
54. Griliches, Z. (1977), Estimating the returns to school: some econometric problems, Econometrica 45:1-22
55. Groot, W., Maassen van den Brink, H. (2007) The health effects of education. Economics of Education Review , 26, 186-200.
56. Groot, W., Maassen van den Brink, H. (2010) The effects of education on crime. Applied Economics. 42: 3, 279 - 289
57. Grossman, M. (1972) On the concept of health capital and the demand for health. Journal of Political Economy, 80 (2), 223–255.
58. Grossman, M. (2004) The demand for health, 30 years later: A very personal retrospective and prospective reflection. Journal of Health Economics , 23 (4), 629–636.
59. Grundersen, D.; Rajamma, R.; Capozzoli, E. (2008) Learned Ethical Behaviour: An Academic Perspective. Journal of Education for Business July/August 2008; 315
60. Gunji, H., Hanaoka, C. (2004) Standard error and confidence interval for QALY weights. Economics Bulletin, Vol. 9, No. 1 pp. 1−12
61. Hammond, C., J. Smink, S. Drew (2007), Dropout Risk Factors and Exemplary Programs, National Dropout Prevention Center, Communities in Schools, Inc., Clemson.
62. Hanushek, E. A. (2005) The Economics of School Quality. German Economic Review 6(3):, 269–286.
63. Hanushek, E. A., &Wößmann, L. (2007).The role of education quality for economic growth.World.Retrieved from http://papers.ssrn.com/sol3/papers.cfm?abstract_id=960379.
64. Hanushek, E. A., &Wößmann, L. (n.d.).Forthcoming.The Role of Cognitive Skills in Economic Development.Journal of Economic Literature.
65. Heckman, J.J., Lochner, L.J. & Todd, P.E., (2006) Earnings Functions, Rates of Return and Treatment Effects: The Mincer Equation and Beyond. Handbook of the Economics of Education, 1, p.307–458. Available at: http://linkinghub.elsevier.com/retrieve/pii/S1574069206010075.
66. Helliwell, J. F.; Putnam, R. (1999) Education and social capital. National Bureau of Economic Research No. 7121.
67. Henno, I., Lepmann, T., Reiska, P., Ehala, M. (2008) PISA 2006 Eesti tulemused.Haridus- ja Teadusministeerium, Tallinn, 2008, pp. 23.

68. Heppen, J., Therriault, S. (2008)Developing Early Warning Systems to Identify Potential High School Dropouts. National High School Centerat the American Institutes for Research, Issue Brief, July 2008, pp. 13.
69. Hodgkinson, V. A.; Weitzman, M. S. (1988) Giving and Volunteering in the United States: Findings from a National Survey, 1988 Edition. Washington, DC: Independent Sector.
70. Hoskins, B.; D'Hombres, B.; Campbell, J.(2008) Does Formal Education Have an Impact on Active Citizenship Behaviour? European Educational Research Journal Vol 7 No 3 2008 http://www.wwwords.co.uk/rss/abstract.asp?j=eerj&aid=3355&doi=1
71. Huang, J.; Maasen van den Brink, H.; Groot, W. (2009) A meta-analysis of the effect of education on social capital. Economics of Education Review, Vol. 28, pp. 454–464.
72. Jamison, E. A., Jamison, D. T., Hanushek, E. A. (2007) The effects of education quality on income growth and mortality decline. Economics of Education Review, 26(6), 771–788. Elsevier.Retrieved from http://linkinghub.elsevier.com/retrieve/pii/S0272775707000611.
73. Kanep, H. (2008) Analysis of students with special educational needs and availability of support measures, Part II of research paper "Students with special educational needs on school map, availability of support measures to students with special educational needs, Tartu, veebruar 2008, pp. 100.
74. Kennelly, L., Monrad, M. (2007) Approaches to Dropout Prevention: Heeding Early Warning Signs With AppropriateInterventions, Linking Research and Resources for Better High Schools. Report by National High School Center at the American Institutes for Research, pp. 33.
75. Keskel, A., Kereme, H., Silla, K.A. (2010) Support measures for students with behavioural problems, Analysis by Ministry of Education and Research and Estonian Youth Work Centre, Tallinn, 2010, pp. 20.
76. Kooli õppe- ja kasvatusalastes kohustuslikes dokumentides esitatavad andmed ning dokumentide täitmise ja pidamise kord. Riigi Teataja I 2010, 60, 420
77. KUTSE – Kutseõppes õpingud katkestanute jätkuõppe programm, Ministry of Education and Research.http://www.hm.ee/index.php?0511487
78. Kutseharidusstandard, Riigi Teataja I 2006, 16, 131.
79. Kõiv, K. (2007) Koolist väljalangenute vaatenurk. Resümee. Väljalanguse peamised põhjused ja agressiivse käitumise kogemus koolist väljalangenute hinnangul. Haridus, 11-12/2007, p.58-64.
80. Lau, T.-C. (2011) Ethical Beliefs Amongst Malaysian Consumers: A Look At Demographic Indicators. International Journal of Academic Research Vol. 3. No. 1. January, 2011, Part III
81. Lehr, C. A., Johnson, D. R., Bremer, C. D., Cosio, S., & Thompson, M. (2004, May) Essential tools.Increasing rates of school completion: Moving from policy and research to practice.Minneapolis, MN: National Center on Secondary Education and Transition, College of Educationand Human Development, University of Minnesota.
82. Leinsalu, M., Vågerö, D., Kunst, A. E. (2003) Estonia 1989–2000: enormous increase in mortality differences by education. International Journal of Epidemiology, 32, pp. 1081–1087.
83. Lemieux, T., 2006. "The Mincer equation" thirty years after schooling, experience, and earnings. Jacob Mincer A Pioneer of Modern Labour Economics, p.127–145. Available at: http://www.springerlink.com/index/x453371810l04751.pdf.

84. Levin, H., Belfield, C., Muennig, P., & Rouse, C. (2007).The costs and benefits of an excellent education for all of America's children. Retrieved January, 23, 2008.
85. Lochner, L. (2004) Education, work, and crime: a human capital approach, International Economic Review, 45, 811–43. [http://web.ebscohost.com/ehost/pdfviewer/pdfviewer?hid=8&sid=1773fdd7-45e9-4e5c-9850-99f58c0a2ed9%40sessionmgr12&vid=2]
86. Lumley, T. (2004) Analysis of complex survey samples. Department of Biostatistics. University of Washington. 19 p.
87. Lyche, C. (2010) Taking on the Completion Challenge: A Literature Review on Policies to Prevent Dropout and Early School Leaving, OECD Education Working Papers,No. 53, OECD Publishing, pp.64
88. Mandal B.N. Global Encyclopaedia of Welfare Economics [Book]. - [s.l.] : Global Vision Publishing House, 2009.
89. Magnette, P. (2003), European Governance and Civic Participation: Beyond Elitist Citizenship?. Political Studies, 51: 144–160. doi: 10.1111/1467-9248.00417
90. Matsi, A., Oja, L. (2009) Estonian Health Interview Survey 2006 – Tables, National Institute for Health Development, 257 p.
91. Manning, W. G., Morris, C. N., & Newhouse, e. a. (1981) A Two-Part Model of the Demand for Medical Care: Preliminary Results from the Health Insurance Study. Health, economics and Health economics .
92. McCloughanP.; Batt, W.H.; Costine, M.; Scully, D. (2011) Second European Quality of Life Survey, Participation in volunteering and unpaid work. Luxembourg: Publications Office of the European Union http://www.eurofound.europa.eu/pubdocs/2011/02/en/1/EF1102EN.pdf
93. Memo of EHIS in September 2010. Eesti hariduse infosüsteem (EHIS).http://www.hm.ee/ehis/failid/september_2010_yldharidus.htm
94. Midwest Regional Center for Drug-Free Schools and Communities (MRC). (1994a) Studyfocuses on successful prevention programs. Midwest Forum, 4(1). North CentralRegional Educational Laboratory and Learning Point Associates. Retrieved May 24,2006, from http://ncrel.org/sdrs/areas/issues/envrnmnt/drugfree/4-1study.htm.
95. Milligan, K.; Moretti, E.; Oreopolous, P. (2004) Does Education improve Citizenship: Evidence from the United States and the United Kingdom. Journal of Public Economics Vol. 88, pp. 1667– 1695.
96. Mincer, J. (1963) Market Prices, Opportunity Costs, and Income Effects in Carl F. Christ, ed., Measurement in economics: Studies in mathematical economics and econometrics in memory of Yehuda Grunfeld. Stanford, CA: Stanford University Press, pp. 67-82.
97. Ministry of Economic Affairs and Communications (2007) Transpordi infrastrukturi arendamise meetme tingimused ja investeeringute kava koostamise kord. Regulation passed 29.05.2007 no. 39. RTL 2007, 46, 806, last reduction RT I, 21.07.2007, 26 https://www.riigiteataja.ee/akt/12834768?leiaKehtiv
98. MoJ (2010) Kuritegude kontrollimise ja ennetamisega seotud kulud. (unpublished).
99. MORA, T., ESCARDÍBUL, J. O., & ESPASA, M. (n.d.).THE EFFECTS OF REGIONAL EDUCATIONAL POLICIES ON SCHOOL FAILURE IN SPAIN.revecap.com. Retrieved from http://www.revecap.com/revista/aceptados/mora_escardibul_espasa.pdf.

100. Mrozek, J. R., & Taylor, L. O. (2002) What Determines the Value of Life? A Meta-Analysis. Journal of Policy Analysis and Management , 21 (2), 253–270.
101. Möller, G.; Ender, J.; Mänd, K.; Surva, L. (2008) Vabatahtlikus tegevuses osalemine Eestis http://www.vabatahtlikud.ee/UserFiles/uuringud/osalemine2008.pdf
102. Mündi, Š. (2006) Põhikoolist väljalangenud ja lõpetanud õpilaste riskikäitumine, haigestumine, sotsiaalmajanduslik taust ja toimetulek koolis, Tartu, 2006, pp. 74.
103. National basic school curriculum (*Põhikooli riiklik õppekava*), Riigi Teataja I, 14.01.2011, 1.
104. National Institute of Drug Abuse (NIDA). (2004, February) Lessons from prevention research. NIDA InfoFacts. Washington, DC: National Institutes of Health, U.S. Department ofHealth and Human Services. Available online athttp://www.drugabuse.gov/pdf/Infofacts/prevention04.pdf.
105. National upper secondary education curriculum (*Gümnaasiumi riiklik õppekava*), Riigi Teataja I, 14.01.2011, 2.
106. Nellthorp, J., Sansom, T., Bickel, P., Doll, C., Lindberg, G. (2001) Valuation Conventions for UNITE. Version 1, 35 p.
107. Nickell, S. (1979) Education and Lifetime Patterns of Unemployment. The Journal of Political Economy Vol 8: S117-S131.
108. Nie, N. H.; Junn, J.; Stehlik-Barry, K. (1996) Education and Democratic Citizenship in America. Chicago: University of Chicago Press
109. OECD (2008) Glossary of Statistical Terms, OECD Publications
110. OECD (2007) Executive Summary PISA 2006: Science Competencies for Tomorrow's World. http://www.pisa.oecd.org/dataoecd/15/13/39725224.pdf
111. OECD (2010) OVERCOMING SCHOOL FAILURE: POLICIES THAT WORK. http://www.oecd.org/dataoecd/54/54/45171670.pdf
112. Osher, D., Sprague, J., Weissber, R.P., Axelrod, J., Keenan, S., Kendziora, K., Zins, J.E. (2007) Promoting social, emotional, and academic growth in contemporary schools. Best Practices in School Psychology, Vol. 4, pp. 1–16. *Via Heppen, J., Therriault, S. (2008) Developing Early Warning Systems to Identify Potential High School Dropouts. National High School Center, Issue Brief, July 2008, pp. 13.*
113. Overcoming School Failure: Policies that work. (2010) OECD Project Description. April 2010, pp. 33.
114. Overview of state supervision in general education. (2008) Overview of external evaluation of the Education System in academic year 2007/2008. Ministry of Education and Research, Tartu, 2008.
115. Overview of state supervision in general education. (2009) Overview of external evaluation of the Education System in academic year 2008/2009. Ministry of Education and Research, Tartu, 2009.
116. Overview of state supervision in general education. (2010) Overview of external evaluation of the Education System in academic year 2009/2010. Ministry of Education and Research, Tartu, 2010.
117. Overview of thematic state supervision in Vocational Education Schools. (2007) Overview of state supervision of the Education System in academic year 2005/2006. Ministry of Education and Research, Tartu 2007, p. 46-61.
118. Parandusõpperühma töökorralduse aluste kinnitamine, Riigi Teataja Lisa 1999, 98, 1196.

119. Preparation of Study Materials for Students with Special Educational Needs, The National Examinations and Qualifications Centre. http://www.ekk.edu.ee/the-esf-programmes/preparation-of-study-materials-for
120. Psacharopoulos, G. (2007) The Costs of School Failure A Feasibility Study. European Expert Network on Economics of Education (EENEE).
121. Public Transport Act, Riigi Teataja I, 31.12.2010, 32.
122. Putnam, R. D. (1993) *Making democracy work: Civic tradition in modern Italy*. Princeton: Princeton University Press.
123. Põhihariduse baasil tegutseva kutseõppeasutuse pooleli jätnud õpilase gümnaasiumis keskhariduse omandamiseks õpingute jätkamise tingimuste kinnitamine, Riigi Teataja Lisa 1998, 366, 1553.
124. Rannala, I-E., Tiko, A., Rohtla, A. (2006) Youth with behavioural problems and the measures implemented for them in juvenile committees. Justiitsministeerium, Tallinn, pp.67.
125. Raudsepp, K. (2010) A bridge to the future: European policy for vocational education and training 2002-10. National Policy Report – Estonia. Innove - Foundation for Lifelog Learning Development, Tallinn, 2010, pp. 64.
126. Raus, T., Timmus, L. (2005) Kuritegevust mõjutavad sotsiaalmajanduslikud ja demograafilised tegurid. Justiitsministeerium, Kriminaalpoliitikauuringud 3.
127. Re-entry of Basic School Dropouts into the Education System (2003) Report of National Audit Office of Estonia (NAOE) to Riigikogu N0 2-5/03/59, Tallinn, 04.07.2003, pp. 57.
128. Rumberger, R., Lim, S. (2008), Why Students Drop Out of School: A Review of 25 Years of Research, California Dropout Research Project, Santa Barbara. *Via Lyche, C. (2010), Taking on the Completion Challenge: A Literature Review on Policies to Prevent Dropout and Early School Leaving, OECD Education Working Papers,No. 53, OECD Publishing, pp.6*.
129. Sakk, T. (2004) Põhikoolist väljalangemise põhjused õpilase kodusest ja koolikeskkonnast lähtuvalt, Tallinna Pedagoogikaülikool, Tallinn, 2004, pp. 79.
130. Silles, M. A. (2009) The causal effect of education on health: Evidence from the United Kingdom. Economics of Education Review, Vol. 28, 122-128.
131. Simplified national basic school curriculum (*Põhikooli lihtsustatud riiklik õppekava*), Riigi Teataja I, 28.12.2010, 14.
132. Special educational support, Ministry of Education and Research. http://www.hm.ee/index.php?149405
133. Spence, A. (1973) Job Market Signaling. Quarterly Journal of Economics, 355-379.
134. Statistics Estonia
135. Student mapping tool. Department of Education and Early Childhood Development, State Government of Victoria.http://www.education.vic.gov.au/sensecyouth/careertrans/smt/default.htm
136. Supporting Children with Special Educational Needs, Ministry of Education and Research. http://www.hm.ee/index.php?1510027
137. Tenn, S. (2005) An Alternative Measure of Relative Education to Explain Voter Turnout The Journal Of Politics, Vol. 67, No. 1, February 2005, p. 271–282
138. Therriault, S., Heppen, J., O'Cummings, M., Fryer, L., Johnson, A. (2010)Early Warning System Implementation Guide, National High School Centerat the American Institutes for Research,

September 2010.http://www.betterhighschools.org/documents/NHSCEWSImplementationGuide.pdf
139. Tire, G., Puksand, H., Henno, I., Lepmann, T. (2010) PISA 2009 – Eesti tulemused, Eesti 15-aastaste õpilaste teadmised ja oskused funktsionaalses lugemises, matemaatikas ja loodusteadustes. Riiklik Eksami-ja Kvalifikatsioonikeskus, Haridus- ja Teadusministeerium, Tallinn, 2010, pp. 147.
140. Toom, K. (2008) Õpipoisiõppe (töökohapõhise õppevormi) perspektiivid. Presentation at the Final Seminar of ESF Project „Töökohapõhise õppevormi (õpipoisikoolituse) rakendamine kutseharidussüsteemis“, Tallinn, 8. mai 2008.http://www.innove.ee/4269
141. Toomla, R. (2011) Kes ei käi valimas? Võrdlev ülevaade kolmest Riigikogu valimisest in Riigikogu Toimetised 23, 2011 http://www.riigikogu.ee/rito/index.php?id=14461
142. Tugisüsteemide rakendamine õpilaste toetamiseks, õppepraktika korraldus ja koostöötööandjatega (2006) Overview of state supervision of the Education System in academic year 2005/2006. Ministry of Education and Research, Tartu, 2006, p. 55-67.
143. Using an Early Warning System to Identify and Support Students at Risk for High School Dropout (2011) National High School Center at the American Institutes for Research. http://www.betterhighschools.org/documents/EWSBrochure.pdf
144. Uslaner, E. M. (1997) Voluntary organization membership in Canada and the United States. Working paper http://www.bsos.umd.edu/gvpt/uslaner/acsus97.pdf
145. Vals, K. (2005). Haiguskoormuse tõttu kaotatud eluaastad Eestis. Magistritöö. Tartu Ülikooli tervishoiu instituut, 72 p.
146. Vocational Education, Educational possibilities. Ministry of Education and Research.http://www.hm.ee/index.php?1510002
147. Vocational Educational Institutions Act (Kutseõppeasutuse seadus, KÕAS), Riigi Teataja I 1998, 64, 1007.
148. Wolfe, B; Haveman, R. (2002) Social and Non-Market benefits of education; Education in the 21st Century: Meeting the Challenges of a Changing World; Conference Series 47, June 2002 http://bostonfed.org/economic/conf/conf47/conf47g.pdf
149. VÕTA – Varasemate õpingute ja töökogemuse arvestamine, http://primus.archimedes.ee/node/14, http://vota.archimedes.ee/
150. Õpilase hindamise, järgmisse klassi üleviimise, täiendavale õppetööle ning klassikursust kordama jätmise alused, tingimused ja kord, Riigi Teataja 2006, 83, 1518.
151. Õppeasutuses rakendatavad meetmed õpilaste väljalangevuse vähendamiseks (2008) Overview of external evaluation of the Education System in academic year 2007/2008. Ministry of Education and Research, Tartu, 2008, p. 49-53.
152. Õppetoetuste ja õppelaenu seadus, Riigi Teataja 2003, 58, 387.
153. Õppuri andmete muutmine: Õppimise andmete muutmine. Eesti hariduse infosüsteem (EHIS), Kasutajajuhend õppeasutustele: Õppurite alamsüsteem, Üldharidus, Tallinn, 2008. http://www.hm.ee/ehis/help/oppur_juhend_yld_10_09_10.htm
154. Yamigishi, T.; Yamigishi, M. (1994) Trust and Commitment in the United States and Japan, Motivation and Emotion, Vol. 18, pp. 129-166.

155. Youth education, lifelong learning, early school leavers - Annual data. Reference Metadata in Euro SDMX Metadata Structure (ESMS) Eurostat. http://epp.eurostat.ec.europa.eu/cache/ITY_SDDS/EN/lfsi_edu_a_esms.htm.
156. Wilson, S.J. and Tanner-Smith, E. and Lipsey, M.W. (2011) Dropout Prevention and Intervention Programs: Effects on School Completion and Dropout among School-Aged Children and Youth.Society for Research on Educational Effectiveness, http://www.campbellcollaboration.org/lib/download/1590/.
157. Wood, S.N. (2011) Fast stable restricted maximum likelihood and marginal likelihood estimation of semiparametric generalized linear models. Journal of the Royal Statistical Society (B) 73(1):3-36

# APPENDIX

# Appendix 1. Earnings from national registries

## Introduction

The previous calculations relied on survey data. The surveys used are representative for the whole labour force, but they have the usual problems like small number of observations for many of the groups we are interested in. In order to get a more detailed evaluation of the labour market performance of students who failed to achieve at least upper secondary education we continue with a unique dataset matching people from Estonian national educational database (EHIS) with tax records from Estonian Tax and Customs Board.

The dataset contains people born from 1982 to 1995 who had left the education system before 1th of January, 2011 and has, among other things, information on the final level of studies they completed or participated in, average grade for national test at the end of lower secondary school (people with birth years after 1988) and type of curriculum. We also have the yearly gross wages and the number of months people have been observed working during each year.

The dataset has several limitations:

1. we cannot follow unique persons through the years;
2. it only contains people from recent cohorts, so we can only observe people at the start of their working career;
3. we have only knowledge of what happens in Estonia – if someone has completed upper secondary education in Estonia, after which she achieved third level education abroad and returned to work in Estonia, then she is still having upper secondary education in our dataset. If someone has switched to a school abroad, not completing the level in Estonia, she is in the "failing" group for this level of education. We do not have any information about people working abroad;
4. we only know the number of months a person has worked during a year if he or she has worked at least one month, been in the military service or had a maternity leave during the same year. We do not see a person at all if she has been unemployed or inactive for entire year.

The dataset has also some obvious advantages, having some additional information not available through surveys and covering almost everyone in the studied cohorts.

## Data and method

Groups containing at least three people each were first formed using data from Estonian Educational Information System. Two grouping methods were used as the data availability for these cohorts were born before and after 1988 was different.

**First dataset (birth years 1988-1995)**

First dataset contains people who were born after 1988 and for whom the national test scores for exams at the end of lower secondary education are available.

The groups were formed in the following manner: first we selected students who were supposed to graduate from lower secondary school (9-th grade) after 2004 (birth years 1988 to 1995). Only

people who were not engaged in education system at the start of year 2011 were chosen. The remaining students were grouped together by:

1. year of completion or failure of highest level of studies;
2. maximum level of studies (either failed or completed);
3. status of studies (failed or completed);
4. vocational/not vocational curriculum;
5. average grade for national tests at the end of 9-th grade. The tests are graded with marks ranging from 2 to 5 with "2" meaning "failed" and "5" reflecting excellent results. As a grouping basis the mean grade for mathematics and first language was used. The continuous scale was transformed into a discrete one with three outcomes (average grade below or equal to 3, average grade above or equal to 4.5 and average grade between these values);
6. whether they had an interrupt in their studies in upper secondary school (finishing the level at least one year later than the nominal time would allow considering completion of primary school);
7. gender;
8. study language of the school (either Estonian or Russian).

Groups containing more than three persons were directly included into the analysis. If group included less than three persons, the selection process proceeded by dropping one characteristic at the time as long as the size of the group exceeded or equalled 3. In the dataset the characteristic that was dropped was coded as “not known”. A small number of persons whom we were not able to group by first four characteristics were dropped.

Estonian Tax and Customs Board made available data for 597 groups, containing the following data separately for years 2005 to 2010: annual wages for members of the groups in their database (derived from the social tax contributions paid by their employers; number of months during which the employers of the persons in each group have been making their social tax contributions; number of months the government has been making the social tax contributions for the people in the military service or maternity leave).

Only people who have failed or completed lower and upper secondary education are included in the analysis from this cohort (the number of people who had attained professional education after secondary education or tertiary education during the observation period is small).

**Second dataset (birth years 1982-1988)**

The second dataset contains people who were born before 1988 and after 1982. The people who were still engaged in education system at the start of year 2011 were excluded from the dataset. As a second precondition, on only people who had at least started upper secondary education were included as primary education was covered with previous sample. They were then grouped together by their:

1. year of completion or failure of highest level of studies;
2. final level of studies (either failed or completed);
3. status of studies (failed or completed);

4. name of the school what was completed (in case of third level education, names of smaller schools dropped);
5. field of study (in case of third level education);
6. gender;
7. average percentile in state exams at the end of secondary studies, separately for humanities (languages and history) and sciences (mathematics, chemistry, physics, biology). Four categories are formed: average percentile below 25 (lowest), 25-50 (medium-low), 50-75 (medium-high) and 75-100 (highest). Note that people are unevenly distributed between these levels as it is not a percentile of the average, but average percentile. If someone is in the 10-th percentile from the top in mathematics and 15-th from the bottom in biology, the resulting average percentile will be (90+15)/2=52.5.

The following process, as well as data from Estonian Tax and Customs Board was identical to the one described with first dataset.

The two datasets are used both separately and being pooled together. We restrict our analysis to observations starting from the first full year after leaving the school (someone who graduated in July 2006 will be included from 2007 year on). Years 2006 to 2010 are selected as observation period and people are observed during maximum of four years after leaving school.

A new variable indicating gross monthly salary was formed by dividing yearly gross salary by the number of months the person was working.

Detailed description of the dataset can be found at the end of this chapter.

**Regression specification**

Multiple regression analysis predicting logarithm of monthly earnings is performed to describe the relationship of variables in the dataset. Four different specifications are estimated:

1) Basic specification:

$$ln(w) = \beta_0 + \sum_j \beta_j^{educ} * EDUC_j + \beta_c * STATUS + \beta_e * EXP + \beta_G * GENDER + \beta_v VOC + \beta_{c*e} * STATUS * EXP + \sum_i \beta_i^{year} * YEAR_i + \varepsilon$$

Where w is gross wage, *EDUC* is level of education (lower secondary, upper secondary, professional postsecondary, tertiary), STATUS is 0 if person finished the studies and 1 if not, EXP is 1 for the first full calendar year after leaving school, 2 the year after etc, *YEAR* denotes dummies for each year for removing time effects.

The regression is run on pooled data, as all of the variables are shared between the datasets.

2) Second specification goes deeper into detail and distinguishes between levels of education in lost earnings due to failing to complete the level. Cross terms for final status and level of studies, status and if the curriculum was vocational and status and gender are added.

$$ln(w) = \beta_0 + \sum_j \beta_j^{educ} * EDUC_j + \beta_c * STATUS + \beta_e * EXP + \beta_G * GENDER + \beta_v VOC + \beta_{c*e} * STATUS * EXP + \sum_k \beta_k^{educ*status} * EDUC_k * STATUS + \beta_{v*c} VOC * STATUS + \beta_{G*C} GENDER * STATUS + \sum_i \beta_i^{year} * YEAR_i + \varepsilon$$

Second specification is again run on pooled data, as all of the variables are shared between the datasets.

3) Third specification is similar to second but takes advantage of additional information in the first dataset (younger cohort) adding language of the school, whether there was an interruption during the studies and average grade (three levels) at two national exams (mathematics and mother tongue) done at the end of lower secondary education.

$$ln(w) = \beta_0 + \sum_j \beta_j^{educ} * EDUC_j + \beta_c * STATUS + \beta_e * EXP + \beta_G * GENDER + \beta_v VOC + \beta_{c*e} * STATUS * EXP + \sum_k \beta_k^{educ*status} * EDUC_k * STATUS + \beta_{v*c} VOC * STATUS + \beta_{G*C} GENDER * STATUS + \beta_{iu} * Interrupted + \sum_m \beta_m^{grades} * GRADES_m + \sum_i \beta_i^{year} * YEAR_i + \varepsilon$$

4) Fourth specification starts again with second specification and adds additional information from second dataset (older cohort). It includes controls for national exams at the end of upper secondary education, separately for humanities (languages and history) and sciences (mathematics, chemistry, physics, biology).

$$ln(w) = \beta_0 + \sum_j \beta_j^{educ} * EDUC_j + \beta_c * STATUS + \beta_e * EXP + \beta_G * GENDER + \beta_v VOC + \beta_{c*e} * STATUS * EXP + \sum_k \beta_k^{educ*status} * EDUC_k * STATUS + \beta_{v*c} VOC * STATUS + \beta_{G*C} GENDER * STATUS + \beta_{iu} * Interrupted + \sum_m \beta_m^{Hum} * AVHum_m + \sum_n \beta_n^{Sci} * AVSci_n + \sum_i \beta_i^{year} * YEAR_i + \varepsilon$$

## Results

Table 56 contains selected results related to school failure of regression analysis (Appendix 2 describes a longer list of coefficients). The coefficients are interpretable as roughly the relative change in gross wages if the variable changes by one unit, taking an exponent of the coefficient will give a precise result. Statistical significance level of the coefficients not being equal to zero are included, but readers should take into account that due to large sample size very small (and possibly insignificant in any real sense) effects will be statistically significant. It is thus important to first and foremost concentrate on effect sizes.

**Table 56.** Regression estimates – effect compared to completion of upper secondary education

| | 1 | 2 | 3 | 4 |
|---|---|---|---|---|
| | Estimate | Estimate | Estimate | Estimate |
| | *se* | *se* | *se* | *se* |
| Status = failed | -0.130 *** | -0.040 *** | -0.056 ** | -0.018 |
| | *0.007* | *0.009* | *0.018* | *0.011* |
| lower secondary*failed (in addition to Status=failed) | | 0.071 *** | 0.091 *** | |
| | | *0.014* | *0.020* | |
| postsec. voc. ed. *failed (in addition to Status=failed) | | 0.078 | | 0.091 *** |
| | | *0.010* | | *0.011* |
| higher ed. failed (in addition to Status=failed) | | -0.279 *** | | -0.262 *** |
| | | *0.009* | | *0.010* |
| voc. ed. * status: failed | | -0.076 *** | -0.087 *** | -0.092 *** |
| | | *0.008* | *0.015* | *0.009* |
| experience * status: failed | 0.000 | -0.014 *** | -0.020 ** | -0.016 *** |
| | *0.003* | *0.003* | *0.007* | *0.003* |
| interrupted upper sec | | | 0.021 | |
| | | | *0.021* | |
| status: failed * gender: male | | 0.022 *** | 0.043 ** | 0.013 *** |
| | | *0.007* | *0.014* | *0.007* |
| | | | | |
| other: | | | Average grade at national examinations at the end of lower sec. ed. language of studies | Proficiency in humanities and realities (if available) |
| | intercept, yearly dummies, dummy for vocational education, level of education, potential experience in all specifications | | | |
| dataset: | pooled | pooled | younger cohorts | older cohorts |
| Observations: | 136738 | 136738 | 27874 | 108864 |
| R-squared | 0.18 | 0.18 | 0.11 | 0.19 |

*Source: authors' calculations*

***-statistically significantly different from zero at level 0.001, **-statistically significantly different from zero at level 0.01, * - statistically significantly different from zero at level 0.05

In the full dataset the failure to complete any kind of education will result with earnings loss (conditional on working, we do not take into account the higher probability of unemployment here) of 12%-13% on average (specification 1, coefficient for Status = failed).

Specifications 2 to 4 which employ cross-terms for level of studies and failure/completion status show that the effect of discontinuing of studies on earnings depends crucially on the level of the studies. Failing to complete general secondary education (estimate for coefficient status: failed + experience*status: failed) or vocational education after upper secondary level (estimates status:

failed +postsec.voc.ed*failed+experience*status: failed) will result in smaller wages in the range of 3-9% during the first year (without taking into account the probability of continuing in higher education) and the difference is growing by 1-2% (estimate: experience*status: failed) with each additional year at the labour market (on average, during the first four years). However – people who do not start upper secondary education at all and stay with lower secondary face 20-25% lower wages than those with upper secondary education (this comes from the coefficient of lower secondary education in full regression table in appendix) – there is either a very strong selection effect or studying at least some time in the upper secondary level has a strong positive effect. A combination of both is plausible and this means that we will have positive effect for every additional year in school even if the end result is dropping out.

Failing to complete upper secondary education with vocational curriculum (apart from post secondary vocational education) has an additional negative effect of 7-12% on top of this 3-9%. Concentrating on the dropout at this level may have the highest immediate returns.

Not completing lower secondary education has an unexpected positive sign and large magnitude (6-10%), probably related to some selection or data issues.

Failing to complete studies has slightly larger effect on women than on men in all specifications.

The highest difference between graduates and non-graduates comes from tertiary education reaching up to 30%.

These general results are in line with our previous estimates from survey data (we seem to overestimate the wage difference between upper secondary and lower secondary education for women and slightly underestimate it for men for the first four years in the labour market; this is not unexpected though, as the survey does not allow high precision for smaller age brackets).

### Constraints and limitations

While we are able to account for some heterogeneity in abilities here dividing people into groups based on their average performance on exams, this measure does not add much in terms of explanatory power for the earnings of people who do not complete upper secondary education. If anything, the results suggest that people belonging to the highest grade group at the end of lower secondary education may even have lower earnings than people with lower grades (95% confidence intervals for this parameter being -5% to +0.5%). There is an intuitive explanation for this – if the people with high grades at the end of lower secondary level fail to graduate upper secondary education or do not continue with higher education (in which case they are not in our dataset as only a handful from this cohort had finished before 2010), then this can only be due to some strong disadvantages in somewhere else than cognitive abilities measurable by exams. Alternatively the tests at the end of lower secondary education are not a good measure of abilities.

There are thus strong indicators that some important variables remain unmeasured, biasing the results. The only way to confront this would be to find some natural experiment-like situation where people are selected to education based on some exogenous variable, not related to earning potential.

**Table 57.** Regression estimates from combined dataset of Estonian education information system and Estonian Tax and Customs Board

| Specification: | | 1 | | 2 | | 3 | | 4 | |
|---|---|---|---|---|---|---|---|---|---|
| | | Estimate | | Estimate | | Estimate | | Estimate | |
| | | *se* | | *se* | | *se* | | *se* | |
| education (comparison: upper secondary) | lower secondary | -0.216 | *** | -0.255 | *** | -0.208 | *** | | |
| | | *0.007* | | *0.009* | | *0.012* | | | |
| | postsec. voc. education | 0.134 | *** | 0.115 | *** | | | 0.081 | *** |
| | | *0.005* | | *0.005* | | | | *0.006* | |
| | higher education | 0.436 | *** | 0.538 | *** | | | 0.477 | *** |
| | | *0.004* | | *0.006* | | | | *0.007* | |
| | Status = failed | -0.130 | *** | -0.040 | *** | -0.056 | ** | -0.018 | |
| | | *0.007* | | *0.009* | | *0.018* | | *0.011* | |
| Effect of failure: (compared to upper secondary educ) | lower secondary failed | | | 0.071 | *** | 0.091 | *** | | |
| | | | | *0.014* | | *0.020* | | | |
| | postsec. voc. ed. failed | | | 0.078 | | | | 0.091 | *** |
| | | | | *0.010* | | | | *0.011* | |
| | higher ed. failed | | | -0.279 | *** | | | -0.262 | *** |
| | | | | *0.009* | | | | *0.010* | |
| | vocational education | -0.014 | *** | 0.015 | *** | 0.049 | *** | 0.029 | *** |
| | | *0.004* | | *0.004* | | *0.010* | | *0.006* | |
| | voc. ed. * status: failed | | | -0.076 | *** | -0.087 | *** | -0.092 | *** |
| | | | | *0.008* | | *0.015* | | *0.009* | |
| | experience | 0.039 | *** | 0.046 | *** | 0.062 | *** | 0.038 | *** |
| | | *0.002* | | *0.002* | | *0.005* | | *0.002* | |
| | experience * status: failed | 0.000 | | -0.014 | *** | -0.020 | ** | -0.016 | *** |
| | | *0.003* | | *0.003* | | *0.007* | | *0.003* | |
| | interrupted upper sec | | | | | 0.021 | | | |
| | | | | | | *0.021* | | | |
| | Russian language school | | | | | -0.111 | *** | | |
| | | | | | | *0.007* | | | |
| | gender: male | 0.312 | *** | 0.317 | *** | 0.287 | *** | 0.325 | *** |
| | | *0.003* | | *0.004* | | *0.009* | | *0.004* | |
| | status: failed * gender: male | | | 0.022 | *** | 0.043 | ** | 0.013 | *** |
| | | | | *0.007* | | *0.014* | | *0.007* | |
| Humanities (compared to medium-high) | low | | | | | | | -0.074 | *** |
| | | | | | | | | *0.008* | |
| | medium-low | | | | | | | -0.026 | *** |
| | | | | | | | | *0.008* | |
| | highest | | | | | | | 0.052 | *** |
| | | | | | | | | *0.012* | |
| Sciences (compared to group with medium-) | not known/no exams taken | | | | | | | 0.007 | |
| | | | | | | | | *0.007* | |
| | lowest | | | | | | | -0.042 | *** |
| | | | | | | | | *0.010* | |
| | medium-low | | | | | | | -0.020 | *** |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | | | | *0.010* | * |
| | | highest | | | 0.100 | *** |
| | | | | | *0.014* | |
| | | not known/no exams taken | | | -0.087 | *** |
| | | | | | *0.008* | |
| Grades at the end of lower sec (compared to medium) | | lowest | | -0.033 | *** | |
| | | | | *0.008* | | |
| | | highest | | -0.027 | | |
| | | | | *0.015* | | |
| | | other: | intercept, yearly dummies in all specifications | | | |
| | | dataset: | pooled | pooled | younger cohorts | older cohorts |
| | | Observations: | 136738 | 136738 | 27874 | 108864 |
| | | R-squared | 0.18 | 0.18 | 0.11 | 0.19 |
| model *F*-statistic: | | df: | (12, 136725) | (19, 136718) | (19, 27854) | (25, 108838) |
| | | *F*-statistic: | 2466 | 1640 | 173 | 1025 |
| | | *p*-value: | < 2.2e-16 | < 2.2e-16 | < 2.2e-16 | < 2.2e-16 |

*Source: authors' calculations*

***-statistically significantly different from zero at level 0.001, **-statistically significantly different from zero at level 0.01, * - statistically significantly different from zero at level 0.05

# Appendix 2. Earnings from national registries – descriptive statistics

## Descriptive of the first dataset (younger cohorts)

**Table 58.** Experience

| experience | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | n | | missing | | unique | | Mean | | | |
| | 32018 | | 0 | | 4 | | 1.856 | | | |
| distribution: | | | | | | | | | | |
| 1 | (14284, 45%), | | 2 | (10112, 32%), | | 3 | (5565, 17%), | | 4 | (2057, 6%) |

Note: Experience is set to be 1 at first full year after leaving the school.

**Table 59.** Gender

| gender | | | | | | |
|---|---|---|---|---|---|---|
| | n | | missing | unique | | |
| | 32018 | | 0 | 3 | | |
| distribution: | | | | | | |
| female | (11861, 37%) | male | | (20070, 63%), | not known | (87, 0%) |

**Table 60.** Status

| status | | | | |
|---|---|---|---|---|
| | n | missing | unique | |
| | 32018 | 0 | | 2 |
| distribution: | | | | |
| completed | (17929, 56%), | failed | (14089, 44%) | |

**Table 61.** Year of leaving school

| Year of leaving school | | | | | | |
|---|---|---|---|---|---|---|
| | n | missing | unique | Mean | | |
| | 32018 | 0 | 6 | 2007 | | |
| distribution: | | | | | | |
| | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 |
| Frequency | 392 | 2537 | 6121 | 10591 | 8089 | 4288 |
| % | 1 | 8 | 19 | 33 | 25 | 13 |

**Table 62.** Number of months on maternity leave

| Nr of months on maternity leave | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | n | missing | unique | Mean | 0.05 | 0.1 | 0.25 | 0.5 | 0.75 | 0.9 | 0.95 | | |
| | 32018 | 0 | 13 | 1.0 | 0 | 0 | 0 | 0 | 0 | 4 | 10 | | |
| distribution: | | | | | | | | | | | | | |
| | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
| Frequency | 27848 | 257 | 263 | 251 | 275 | 264 | 284 | 307 | 287 | 320 | 289 | 315 | 1058 |
| % | 87 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 3 |

**Table 63.** Number of months with social contribution payments

| Nr of months with social contribution payments | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | n | missing | unique | Mean | 0.05 | 0.1 | 0.25 | 0.5 | 0.75 | 0.9 | 0.95 | | |
| | 32018 | 0 | 13 | 6.3 | 0 | 0 | 2 | 6 | 11 | 12 | 12 | | |
| distribution: | | | | | | | | | | | | | |
| | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
| Frequency | 4144 | 2756 | 2278 | 2079 | 1835 | 1650 | 1719 | 1656 | 1461 | 1504 | 1537 | 2094 | 7305 |
| % | 13 | 9 | 7 | 6 | 6 | 5 | 5 | 5 | 5 | 5 | 5 | 7 | 23 |

**Table 64.** Number of months conscripted

| Nr of months conscripted | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | n | missing | unique | Mean | 0.05 | 0.1 | 0.25 | 0.5 | 0.75 | 0.9 | 0.95 | | |
| | 32018 | 0 | 13 | 0.38 | 0 | 0 | 0 | 0 | 0 | 0 | 4 | | |
| distribution: | | | | | | | | | | | | | |
| | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
| Frequency | 29428 | 100 | 257 | 485 | 254 | 891 | 328 | 69 | 33 | 8 | 10 | 41 | 114 |
| % | 92 | 0 | 1 | 2 | 1 | 3 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |

**Table 65.** Level of education

| Level of education | | | | | |
|---|---|---|---|---|---|
| | n | | missing | unique | |
| | 32018 | | | 0 | 2 |
| distribution: | | | | | |
| Upper secondary | (22193, 69%), | | Lower secondary | (9825, 31%) | |

**Table 66.** Vocational curriculum

| Vocational curriculum | | | | | | |
|---|---|---|---|---|---|---|
| | n | | missing | | unique | |
| | 32018 | | 0 | | 2 | |
| distribution: | | | | | | |
| Yes | (19225, 60%), | | No | | (12793, 40%) | |

**Table 67.** Earnings according to social contribution tax (monthly, EEK)

| Earnings according to social contribution tax (monthly, EEK) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | n | missing | unique | Mean | 0.05 | 0.1 | 0.25 | 0.5 | 0.75 | 0.9 | 0.95 |
| | 27874 | 4144 | 23456 | 7236 | 1797 | 2714 | 4388 | 6534 | 9347 | 12563 | 14776 |
| | | | | | | | | | | | |
| lowest | 750 | 752.5 | 753 | 759 | 765.5 | | | | | | |
| highest: | 21572 | 21611 | 21657.2 | 21668.6 | 21673.8 | | | | | | |

Note: top 2.5% and bottom 1% of earnings have been removed.

**Table 68.** Year of observation

| Year of observation | | | | | |
|---|---|---|---|---|---|
| | n | missing | unique | | |
| | 32018 | 0 | 5 | | |
| distribution: | | | | | |
| | 2006 | 2007 | 2008 | 2009 | 2010 |
| Frequency | 700 | 2538 | 6408 | 9099 | 13273 |
| % | 2 | 8 | 20 | 28 | 41 |

**Table 69.** Average grade for final exams in lower secondary education

| Average grade for final exams in lower secondary education | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | n | | missing | unique | | | | |
| | 32018 | | 0 | 4 | | | | |
| distribution: | | | | | | | | |
| middle | (9024, 28%), | high | (1631, 5%), | low | (12763, 40%), | not known | (8600, 27%) | |

Note: High: average grade is from 4.5 (incl) to 5, middle from 3.1 to 4.5, low up to 3 (incl)

**Table 70.** Teaching language

| Teaching language | | | | | |
|---|---|---|---|---|---|
| n | | missing | unique | | |
| 32018 | | 0 | 3 | not known | (108, 0%) |
| distribution: | | | | | |
| Estonian | (23789, 74%), | not Estonian | (8121, 25%), | | |

**Table 71.** Finished secondary education after interruption

| Finished secondary education after interruption | | | | | |
|---|---|---|---|---|---|
| n | | | missing | unique | |
| 32018 | | | 0 | 2 | |
| distribution: | | | | | |
| Yes | (31344, 98%), | | No | (674, 2%) | |

Note: Interruption is defined as finishing secondary education at least one year after what would be expected from nominal time required to complete the level (dependent on the school) and starting time.

## Description of second dataset (older cohorts)

**Table 72.** Experience

| n | Missing | Unique | Mean | | | | |
|---|---|---|---|---|---|---|---|
| 118072 | 0 | 4 | 2.242 | | | | |
| Distribution: | | | | | | | |
| 1 | (37545, 32%) | 2 | (33636, 28%) | 3 | (27657, 23%), | 4 | (19234, 16%) |

**Table 73.** Gender

| n | | Missing | Unique | | |
|---|---|---|---|---|---|
| 118072 | | 0 | 3 | | |
| Distribution: | | | | | |
| female | (49512, 42%) | male | (61090, 52%), | not known | (7470, 6%) |

**Table 74.** Status

| | n | missing | unique | |
|---|---|---|---|---|
| | 118072 | 0 | | 2 |
| distribution: | | | | |
| Completed | (77450, 66%) | failed | (40622, 34%) | |

**Table 75.** Year of graduating/leaving the school

| | n | missing | unique | Mean | | | | |
|---|---|---|---|---|---|---|---|---|
| | 118072 | 0 | 8 | 2006 | | | | |
| distribution: | | | | | | | | |
| | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 |
| Frequency | 727 | 5038 | 11215 | 24861 | 29032 | 25508 | 14778 | 6913 |
| % | 1 | 4 | 9 | 21 | 25 | 22 | 13 | 6 |

**Table 76.** Number of months with social contribution payments

| | n | Missing | Unique | Mean | 0.05 | 0.1 | 0.25 | 0.5 | 0.75 | 0.9 | 0.95 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 118072 | 0 | 13 | 8.136 | 0 | 1 | 4 | 10 | 12 | 12 | 12 | | |
| Distribution: | | | | | | | | | | | | | |
| | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
| Frequency | 9208 | 6041 | 5038 | 4846 | 4595 | 4590 | 5253 | 5128 | 4847 | 5351 | 6241 | 11289 | 45645 |
| % | 8 | 5 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 5 | 5 | 10 | 39 |

**Table 77.** Number of months on maternity leave

| | n | Missing | Unique | Mean | 0.05 | 0.1 | 0.25 | 0.5 | 0.75 | 0.9 | 0.95 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 118072 | 0 | 13 | 0.7719 | 0 | 0 | 0 | 0 | 0 | 2 | 8 | | |
| Distribution: | | | | | | | | | | | | | |
| | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
| Frequency | 105258 | 963 | 954 | 948 | 905 | 950 | 963 | 960 | 932 | 983 | 904 | 1014 | 2338 |
| % | 89 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 |

**Table 78.** Number of months conscripted

| | n | Missing | Unique | Mean | 0.05 | 0.1 | 0.25 | 0.5 | 0.75 | 0.9 | 0.95 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 118072 | 0 | 13 | 0.2027 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | |
| Distribution: | | | | | | | | | | | | | |
| | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
| Frequency | 113196 | 185 | 418 | 558 | 444 | 2057 | 694 | 140 | 64 | 32 | 35 | 101 | 148 |
| % | 96 | 0 | 0 | 0 | 0 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |

**Table 79.** Final level of studies

| Final level of studies | | | | | |
|---|---|---|---|---|---|
| | n | missing | | unique | |
| | 118072 | 0 | | 3 | |
| Distribution: | | | | | |
| Upper secondary education | (76096, 64%), | Post secondary vocational education | (16274, 14%), | Higher education | (25702, 22%) |

**Table 80.** Vocational curriculum

| Vocational curriculum | | | | | |
|---|---|---|---|---|---|
| | n | | missing | unique | |
| | 118072 | | 0 | 2 | |
| distribution: | | | | | |
| Yes | (54555, 46%), | | No | (63517, 54%) | |

**Table 81.** Earnings according to social contribution tax (monthly, EEK)

| Earnings according to social contribution tax (monthly, EEK) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | n | missing | unique | Mean | 0.05 | 0.1 | 0.25 | 0.5 | 0.75 | 0.9 | 0.95 |
| | 108864 | 9208 | 82436 | 9095 | 2458 | 3517 | 5294 | 8213 | 12068 | 16184 | 19307 |
| distribution: | | | | | | | | | | | |
| lowest: | 750 | 751 | 756 | 756.7 | 757.6 | | | | | | |
| highest: | 21669.9 | 21670.8 | 21671.3 | 21672.1 | 21673 | | | | | | |

Note: top 2.5% and bottom 1% of earnings have been removed.

**Table 82.** Year

| Year | | | | | |
|---|---|---|---|---|---|
| n | missing | unique | | | |
| 118072 | 0 | 5 | | | |
| distribution: | | | | | |
| | 2006 | 2007 | 2008 | 2009 | 2010 |
| Frequency | 13430 | 20506 | 26763 | 28310 | 29063 |
| % | 11 | 17 | 23 | 24 | 25 |

**Table 83.** National tests, humanities, average of percentiles

| National tests, humanities, average of percentiles | | | | | |
|---|---|---|---|---|---|
| n | missing | unique | | | |
| 118072 | 0 | 5 | | | |
| distribution: | | | | | |
| | H0 | H25 | H50 | H75 | not known |
| Frequency | 16221 | 12327 | 6759 | 3146 | 79619 |
| % | 14 | 10 | 6 | 3 | 67 |

**Table 84.** National tests, sciences, average of percentiles

| National tests, sciences, average of percentiles | | | | | |
|---|---|---|---|---|---|
| n | missing | unique | | | |
| 118072 | 0 | 5 | | | |
| distribution: | | | | | |
| | R0 | R25 | R50 | R75 | not known |
| Frequency | 9801 | 7629 | 4152 | 2214 | 94276 |
| % | 8 | 6 | 4 | 2 | 80 |

## Appendix 3. List of Estonian measures with references

**Basic school (compulsory schooling) and USGE**

*Measures taken by the school*

Support for all students:

- annual student evaluation interviews (*arenguvestlused*) (Basic... §37 lg 3)
- long day groups (*pikapäevalühm*) (Basic... §38)
- schools allow students acquiring basic education to freely use textbooks, workbooks, exercise-books and worksheets required for completion of at least the school curriculum and allow students acquiring general secondary education to freely use textbooks required for completion of at least the school curriculum (*tasuta õppevahendid põhikoolis ja õpikud keskkoolis*) (Basic... §20 lg 1).
- recreational activities at school or provided by school in order to support finishing curriculum (Basic... §40)
- state subsidy for covering lunch costs of full-time students in local government schools (*riigi toetus koolilõuna kulude katmiseks*) (Basic... §42)
- health services at school (*koolitervishoiuteenus*) (Basic... §43)
- reimbursing everyday travel expenses (up to 100%) from home to school (to full-time students in basic school and upper secondary level, incl. vocational programmes) (*sõidukulude hüvitamine*) (Public... §28 lg1)
- informing parents about their child's progress (grades, annual evaluation) and developments at school at regular meetings with parents (*vanemate koosolekud*) or through other channels (Basic... §55-56)

Support for certain students of certain need:

- Measures implemented while student continues to attend regular classes
    - General support measures
        - pupils individual development card (*individuaalse arengu jälgimise kaart*) (Basic ... §48 lg 6)
        - differentiated teaching, if necessary for developing the abilities and talents of students (diferentseeritud õpe) (Basic... §37 lg 1)
        - counselling by special education teacher (*eripedagoog)* (Basic... §37 lg 2),
        - counselling by social pedagogy teachers (*sotsiaalpedagoog*) (Basic... §37 lg 2),
        - councelling by psychologist (*psühholoog*) (Basic...§37 lg 2),
        - student evaluation interviews (*arenguvestlused*) (Basic... § 37 lg 3),
        - long day groups (*pikapäevarühm*) (Basic... §38),
        - study support group/lessons with special education teachers or speech therapists (*õpiabirühm eripedagoogilise või logopeedilise abi osutamiseks, end. parandusõppe rühm*) (Basic... §51 lg1).
        - consultations with parents (addressing students behaviour at school) (Basic... §58 lg 3),

        - consultations with headmaster (addressing students behaviour at school) (Basic... §58 lg 3),
        - discussion of students behaviour in teachers' council*õppenõukogu*) (Basic... §58)
        - appointing a support person to the student (*tugiisik*) (Basic... §58)
        - repeating an academic year (*klassikursuse kordamine*) (Basic... §29).

    - Measures to improve learning outcomes in certain subjects
        - additional lessons (*lisatunnid*) (Basic... §37 lg1);
        - additional study period during school holidays (*täiendav õppetöö peale õppeperioodi lõppu ehk suvetöö*) (Basic... §29 lg 4);
        - individual curriculum (*individuaalne õppekava*), either in some or all subjects (Basic... §18);
- More intervening measures, changes in learning environment (curriculum/ class/ school)
    - classes for students with behavioural problems acquiring basic education (*käitumisprobleemidega õpilaste klass*) (Basic... §51 lg1 p2);
    - classes for students with severe somatic illnesses (*raskete somaatiliste haigustega õpilaste klass*) (Basic... §51 lg1 p3);
    - classes for students with a speech impairment, visual impairment, hearing impairment or physical/motor disability (*kõne-, nägemis-, kuulmis- või liikumispuudega õpilaste klass*) (Basic... §51 lg1 p4);
    - classes for students with specific learning difficulties acquiring basic education (*õpiraskustega õpilaste klass*) (Basic... §51 lg1 p5);
    - classes for students with moderate learning difficulties (*lihtsustatud õppel olevate õpilaste klassid)* (Basic ... §51 lg 6);
    - classes for students with emotional and behavioural disorders acquiring basic education (*tundeelu- ja käitumishäiretega õpilaste klass*) (Basic... §51 lg1 p7);
    - classes for students with multiple disabilities acquiring basic education (*liitpuuetega õpilaste klass*) (Basic... §51 lg1 p8);
    - classes for students with moderate learning difficulties (toimetuleku õppel olevate õpilaste klass) (Basic... §51 lg1 p9);
    - classes for students acquiring basic education whom the counselling committee has, based on their specific educational needs, recommended studying in a small class, including students with autism spectrum disorders, activity and attention disorders or addiction disorders or students whose talent in combination with another special need results in the need to study in a small class – the upper limit of the size of the class is 4 students (National basic..., Basic... §51 lg1 p10);
    - classes for students with severe and profound learning difficulties (*hooldusõpe raske ja sügava intellektipuudega õpilastele*) (Basic... §51 lg1 p11);
    - classes for students with behavioural problems (young offenders and students who constantly skip classes) (*kasvatusraskustega õpilaste klass*)) (Basic... §51 lg1 p12);
    - schooling focusing on teaching one student (*ühele õpilasele keskendatud õpe õpilase terviseseisundist tulenevalt*) (National basic..., Basic... §52);

- home schooling and hospital schooling arising from health status (*terviseseisundist tulenev koduõpe ja haiglaõpe*) (Basic... §53);
- Additional schooling for students who have graduated from basic school under simplified national curriculum for basic schools (*lisaõpe põhikooli lihtsustatud riikliku õppekava järgi lõpetanutele*) (Basic... §54);
- combined classes for students with special needs (*liitklassid HEV õpilastele*) (Basic... §51 lg3);
- home schooling (*koduõpe*)(either because of students health or based on parents request) (Basic... §23);
- schools for students with special needs (*kasvatuse eritingimusi vajavate õpilaste kooli*) (intended for students with physical disabilities, speech impairments, sensory or learning disabilities, or mental disorders, and for students who need special treatment due to behavioural problems, there are also sanatorium schools for students with severe somatic diseases and specialised schools for students who need special treatment due to behavioural problems[67]) (Basic ... §2 lg4).

- Actions the school can take to find other measures outside of schools' jurisdiction
  - referring a student to (county) counselling committees (also existent in larger cities), for confirming special educational needs and determining SEN measures (Basic... §48-49)
  - recommending that the student see a specialist doctor, a specialist of a particular field (*suunamine erialarsti või spetsialisti juurde*) (Basic... §48 lg 5)
  - conducting further investigations (*täiendavate uuringute läbiviimine*) (Basic... §48 lg 5)
  - referring a student to local government officials who might in turn refer the student to a juvenile committee dealing with young offenders (Basic... §13)

<u>Measures decided by bodies outside of school</u>

- General support to students/families/schools - there are no general measures that are by law obligatorily provided by decision outside bodies. All that kind of measures addresses specific problems.
- Measures to support students with certain problems/to act in certain situations
  - Counselling committees: Counselling committee is organized by county governor and consists of at least 5 members (special education teacher, speech therapist, school psychologist social worker and local government representative). The recommendation of the counselling committee of the county or a city is required for application of the simplified national curriculum or the curriculum for students with

[67] The main difference of the specialised schools for students with behavioural problems from regular general education institutions is the freedom of movement is restricted and daily regime is strict discipline (NAOE 2004). Students can be referred to those schools by juvenile committees; the referral needs a court's approval. Juvenile committees can refer delinquent minors (age 12-18, exceptionally 10) to those specialised schools if the other support measures taken by the school and committee itself have not been successful. Length of the stay in specialised schools is up to 2 years, the class size is up to 12 students and students live in boarding school facilities (NAOE 2004).

moderate and severe learning disabilities and for referring to classes for students with special needs, for home schooling or concentrated study to single student. The counselling committee also gives recommendations about postponing school attendance, selecting schools or classes for children with special needs or other measures (like allowing non-stationary schooling in age of obligatory school attendance, release from learning a compulsory subject and reduction or replacement of the learning outcomes provided for in the national curriculum)(Basic... §18 lg 2) (Basic... §49-50)

- Intervention by local government officials in social affairs or education, including fining the parent if child has skipped more than 20% of lessons (Basic... § 36 lg 1)
- Local government provides training courses for parents whose children are not fulfilling their duty of compulsory schooling in order to support them in creating conditions needed for their children to attend school. (Basic... §36 lg2-3)
- Local government applies for state-supported places in boarding school (*riiklikult toetatav õpilaskodu koht*) (Basic... § 39)
- Juvenile committees for students younger than 18 years goal is to help and assistance to rehabilitate young offenders and prevent further offences. Juvenile committees have a jurisdiction to implement following measures: 1) warning 2) community service 3) refer students to classes for students with behavioural problems; 4) refer students to long day groups; 5) refer students to specialists needed 6) provide surety/guarantee 7) arbitrage 8) refer students to social programmes 9) refer students to specialised/ SEN schools 10) obligate students to live with their parents 11) other measures. (Rannala *et al.* 206, Alaealise... § 3)

**Upper secondary vocational education in VET schools**

*Measures taken by the school*

<u>To support all students:</u>

- health services at school (*koolitervishoiuteenus*) (only at USVE level) (Vocational Educational Institutions Act...§31 lg2, Basic... §43);
- state subsidized school lunch (*koolilõuna*)(only at USVE level) (Vocational Educational Institutions Act...§31[1]);
- reimbursing travel expenses from home to school to full-time students (only at USVE level) (Public... §28 lg1);
- study allowance system to cover costs related to studying (*õppetoetusepõhitoetus*) (Vocational Educational Institutions Act...§31 lg1 p8);
- varied recreational activities at school or provided by school (Õppeasutuses... 2008, lk 51);
- student feedback questionnaires (Õppeasutuses... 2008, lk 51);
- meetings with alumni of the school (Õppeasutuses... 2008, lk 51).

<u>To support certain students of certain need:</u>

- Measures implemented while attending regular courses
    - General support measures (general improvement of results)

- counselling from social pedagogy teachers (Erivajadusega... §2 lg1);
- help from special education teacher (Erivajadusega... §2 lg1);
- psychological counselling (Erivajadusega... §2 lg1);
- speech therapy (Erivajadusega... §2 lg1);
- student evaluation interviews for SEN students (*arenguvestlus*) (Erivajadusega... §4);
- scheduled regular support lessons or consultations (Overview.. 2010, lk 49);
- interviews to support students coping abilities (*õpilase toimetulekut toetavate vestluste läbiviimine*) (Overview.. 2010, lk 49);
- communication with parents (Overview.. 2010, lk 49);
- possibility to acquire USVE in Russian language (Raudsepp 2010, lk32, 35);
- additional Estonian language courses for students from different language environment (Õppeasutuses... 2008, lk 51);
- strenuous attendance-taking (Õppeasutuses... 2008, lk 51);
- additional special education training for teachers (Õppeasutuses... 2008, lk 51);
- special learning modules for SEN students to prepare their social skills and support their independent ability to cope in VET school. (Erivajadusega... §2 lg5);
- transforming the school environment in order to meet the needs of students with physical disabilities (wheelchair access, acoustics to support listening etc.) (Erivajadusega... §2 lg4).

  - Measures to improve learning outcomes of certain subjects
    - using assistant teacher in classroom work (Erivajadusega... §2 lg1);
    - individual curriculums and study schedules (*individuaalsete õppeplaanide ja õppegraafikute*) (Erivajadusega... §2 lg7, §5);
    - additional time to catch up with the curriculum, complete overdue assignments (*õppevõlgnevuste likvideerimiseks*) (Overview.. 2010, lk 49);
    - support lessons or consultations from subject teachers after lessons (Õppeasutuses... 2008, lk 51);
    - differentiating study methodology and assignments for SEN students by increasing the share of practical studies and individual instruction. (Overview... 2007, lk51).

- More intervening measures
  - for SEN students with a personal rehabilitation plan the study process and conditions are adjusted to it (in cooperation is essential with other bodies relevant to fulfil the plan. (Erivajadusega... §1 lg3);
  - distance courses/ e-studying for students who cannot take part of regular study process for a long time for relevant reasons (*e-õppe rakendamine*) (Erivajadusega... §2 lg1, Õppeasutuses... 2008, lk 51);
  - possibility to use sign language (translators) in studies (Erivajadusega... §2 lg1);
  - transferring to a VET curriculum which does not give upper secondary level education (*üleviimine kutseõppele*) (Overview.. 2010, lk 49);

- special study groups for SEN students[68] who in basic school had studied based on simplified curriculum, coping curriculum, individual curriculum or in special education schools (sanatorium school or other specialized school) (Overview... 2007, lk51);
- modifying practical training options (*õppepraktika*) for SEN students (Erivajadusega... §2 lg6);
- simplified curriculums or subject syllabuses for SEN students mostly in general subjects (needed to acquire upper secondary level). (Overview... 2007, lk51);
- simplified curriculums in vocational subjects [69] for SEN students (Overview... 2007, lk51).
-

- Actions the school can take to find other measures outside of schools' jurisdiction
  - referring a student to specialists outside school (e.g. local government employees) (Erivajadusega... §1 lg2).

*Measures decided by bodies outside of VET school*

As measures decided by bodies outside of VET school there are 2 measures known to be implemented: as general support to students, families and schools the measure is strengthening cooperation between the school and relevant bodies outside the school and as a measure to support students with certain problems boarding school facilities are organised by local government as well as keeping discipline in these facilities (Õppeasutuses... 2008, lk 51).

[68] In general there is no need for special groups for SEN students. Separate study groups are formed if there is several SEN students acquiring the same specialty and if forming a separate group allows better conditions of study to SEN students.

[69] For example if regular students acquire the profession of baker-pastry cook, then SEN students of that area specialisation acquire only profession of a pastry cook.

## Appendix 4. Examples of additional measures from Kanep (2008)

There were also other support measures mentioned by schools in the survey (Kanep 2008):

- individual help/lessons outside regular study time (most common measure);
- a functional cooperation network between the student, relevant teachers and specialists and parents together in order to work out the most suitable support system for the student;
- a study support contract between the student, parents and teacher;
- students can take part in lessons of developing functional reading skills;
- students with temporary learning difficulties get a correction card (file);
- support teachers;
- different additional group lessons;
- support networks of specialists in schools: speech therapist, social pedagogy teacher, psychologist, schools administration;
- USGE level students being support persons for primary school students;
- an additional lesson before the beginning of the school day;
- study performance interviews;
- using temporary help of teachers already retired from work;
- lessons for doing home work;
- additional (home work) lessons or study groups at the boarding school facility with the help of a teacher.

## Appendix 5. Per person differences in components of school failure costs - higher compared to upper secondary education

The goal of this appendix is to give a summary of differences in private earnings, tax revenues, health costs, expenditure on social benefits and pensions as well as costs of crime for people with higher education compared to people with upper secondary education. While this is an interesting piece of information, one should keep in mind, that these figures are not commonly understood as estimates of costs of school failure.

**Table 85.** Per person differences in components of school failure costs – higher compared to upper secondary education, EUR

| | Discount rate 3% | | Discount rate 6% | |
|---|---|---|---|---|
| | Men | Women | Men | Women |
| 1. Earnings | 104,704 | 76,084 | 46,513 | 34,897 |
| 2. Tax revenue | 80,000 | 58,000 | 39,000 | 29,000 |
| 3. Health | 102,446 | 104,570 | 59,777 | 65,569 |
| 4. Social assistance | -3,812 | -2,460 | -574 | -291 |
| 4.1. Subsistence benefit | 121 | 119 | 79 | 71 |
| 4.2. Unemployment allowance | 58 | 85 | 38 | 54 |
| 4.3. Unemployment insurance | 288 | 265 | 190 | 167 |
| 4.4. Disability benefit | 90 | 88 | 41 | 38 |
| 4.5. Pension | -4,370 | -3,016 | -921 | -621 |
| 5. Crime | 4,116 | 460 | 2,530 | 275 |
| TOTAL | 287,454 | 236,654 | 147,245 | 129,450 |

# Appendix 6. Suggestions for improving the methodology and ideas for future research

## General considerations

Current study evaluates the differences in life outcomes conditional to level of education attained and uses these differences at the level of pseudo-cohort as a proxy for effect of education at the level of upper secondary school. There are strong assumptions involved, as is discussed in the chapter concerning constraints. While these estimates can be advanced further **we consider measuring the effect of interventions** to be most relevant for policy design and evaluation in the future.

As was mentioned in the constraints section the general problem plaguing any kind of observational research in social sciences is the so called selection problem. There are ways to mitigate this by e.g. using instrumental variables (variables that strongly influence educational attainment while not influencing other outcomes), regression discontinuity designs etc. But these kinds of setups are notoriously hard to find. Even if we would have had something theoretically exploitable event in the recent past (and in fact we do – the increase of secondary education from 11 to 12 years) the overwhelming changes in society and recent macroeconomic volatility would make measurement even close to the precision needed unattainable. The demographic changes will add to the problem in near future – as the cohort size shrinks we will expect noticeable increase in returns to tertiary education[70]; it would be very hard to distinguish this from other changes.

The general analysis of correlations of life outcomes to the levels of education has its use in describing the potential benefits of education but we feel that the most policy-relevant questions to pose in the future are about the effectiveness of interventions. **It is not the magnitude of the problem that warrants intervention, but only our ability to mitigate it.**

While it will probably not yet be possible to do straightforward randomized trials (which are increasingly used for evidence based policy-making) quasi-experimental set-ups with **considerations of treatment and comparison groups before the interventions** are strongly advised (a recent overview of 167 experimental or quasi-experimental studies concerning school dropout is given in Wilson, Tanner-Smith and Lipsey (2011)). The usual way is to phase in the treatments by extensive pilot programs for the first year(s), taking into account aforementioned need for comparison and treatment groups.

The effect of these interventions may go further and have additional benefits to reducing dropout rate, which are important to cover in this kind of analysis. While there is some evidence that keeping children in school may have its own benefits (this is time spent out of the street, but dropping out of school may also be either an irrational choice or “cultural mismatch” with the school environment, not connected to abilities), in the context of school failure, **the advancement of cognitive skills and**

[70]People with up to upper secondary education seem to share the job opportunities with everyone having the same education, jobs for tertiary education seem to be more age-specific – less people in one age group will mean a relative deficit for these people and will increase the level of wages for this age group. Thus we would expect the wages for young college graduates to start to rise more quickly than for any other group, including their peers with lower education, during the next years.

**distribution of cognitive skills is even more important indicator to monitor**. PISA test, registering the results of national exams at the end of lower secondary education with additional precision or adding a section specifically meant to measure the lower end of the basic cognitive skills levels (the latter applies also to national exams at the upper secondary level) would be good inputs for evaluating the effectiveness of interventions in terms of increase in skill level. Financial returns to this improvement of skills in the bottom deciles (and not only the completion of upper secondary school), can then be monitored by matching it with data from Tax and Customs Board.

### Improving the current analysis

The current study took a very broad view of education and life outcomes. Data from nine different data-sets spanning up to eight years was combined with each having their set of limitations. In general the method used in this report for assessing costs school failure matches the data availability. Thus, if no other data resource becomes available, continuing with this methodology in the future is a reasonable course of action – we do see potential for qualitatively improved results using the current survey data.

There is one general point that might be worth pursuing in the immediate future - the current analysis is done for the whole life cycle evaluated at the point of entering upper secondary education. While this is important and shows the full extent of the effects, the same calculations for shorter time spans may also add value for giving an understanding of the shorter term fiscal effects and enabling calculations of the time in which the policies pay for themselves.

There are several concerns related to data quality – life expectancies have been calculated using Estonian Social Survey as source for educational distribution of the population. The number of observation in such surveys, even if the data from several years is pooled together, does not allow to get reliable information on the size of smaller socio-economic groups (e.g. non-ethnic Estonian woman with only basic education). This is the reason, why nationality – non-ethnic Estonians tend to show different labour market behaviour with noticeably lower wages – has been dropped from the control variables. Therefore, the results should be recalculated based on new population census data (census will be organized in 2012), which, among other things will generate micro-data including information of the education level of every person living in Estonia.

**Earnings, employment and payroll taxes**

Only payroll taxes are accounted for in the current analysis. Increasing the overall productivity in the economy, which is what mitigating the school failure is about, will have an influence on the economy as a whole but we do not see much added benefit from computing general equilibrium effects, as the relative increase in overall productivity will not be large due to the number of early school leavers being small in context of whole economy. We would also not expect the general equilibrium effects of wage levels to be significant (decreasing the number of people with low qualification may in theory increase their wages).

On the other hand as the fiscal effects are important – the investments come from state, we feel that a wider base of tax revenues should be included starting from Value Added Tax on consumption. This should be relatively straightforward to model using data from Estonian Household Budget Survey (LEU).

An initial approximation would be to:

a) Find the average consumption level at the income level of typical person who would be the target of policy (an average person with lower secondary education in the current study).
b) Average consumption level at the income level of typical person after the treatment (an average person with higher secondary education in the current analysis).
c) The difference between these times the VAT would be additional value added tax revenue.

We expect this to add 15-30% to the tax revenues reported, more than every other benefit apart from health.

The qualitative difference would come from using the registry data. We were able to match data from education information database (EHIS) and Estonian Tax and Custom Board. It is currently only possible by aggregating the data beforehand and "blindly", which is why we can only say that average of two compulsory state exam grades grouped to three levels at the end of lower secondary school is not well usable as a proxy for ability by itself for the group who will either fail the upper secondary education or stay only with upper secondary education[71]. An exploratory data analysis is first needed to find if there are any good proxies for ability in EHIS (disaggregation of the grades could do) or if data from e.g. PISA scores could be added. We are confident that possibilities for this kind of analysis will be available in the time coming.

The model allows to experiment with different types of age-earning profiles for the current cohort. The historical one used in this study is skewed towards young people having higher wage levels, consistent with quick changes in the economy (and education system being up to the task to adapt and give each new generation the education matching the new needs better). This may or may not change, implicitly we have taken the view that the changes will continue at a quick pace.

**Effect of education on health costs**

One specific assumption that affects the results a lot is the value of statistical life. This is taken from transport projects which makes the result comparable to other investment projects faced by government, but is somewhat questionable. Several willingness-to-pay studies have shown that the value of statistical life changes considerably over the life cycle (see Aldy *et al* 2007, p 257). The willingness-to-pay value of statistical life tends also to change depending on the topic. We recommend carrying out a willingness-to-pay survey in Estonia in order to get over the age-specific estimates of value of statistical life (VSL) and value of statistical life year. The review of important aspects in calculating age-specific VSL is available through Aldy *et al* (2007). This number may have a big effect on the results in this section.

This study does not address the costs related to consumption of health services. If one would like to get a complete picture of health related costs the educational differences in health services consumption should be taken into account. It is difficult to say in what direction the inclusion of

[71]The problem is probably due to selection into university. People who have high grades in the lower secondary school but will not go to university after graduating upper secondary or fail graduating upper secondary school must have some other problems creating an whole different selection problem; thus, they do not represent high ability persons with higher secondary education in general in the data.

these services swings the costs of school failure. On one hand low education is correlated with poor health and this should result in higher burden to health care system. On the other hand – more educated people are more aware of health related issues in general and should thus make more visits to the doctor. There are different ways for modelling the impact of education on demand of health care services, appropriate approach depends a lot on the data availability.

A further improvement would be to combine the information on Estonian Health Board data on consumption of health care services with information of these persons education. As a source for education level, again census data could be used. The other reliable source for education level is Estonian Education Information System however, the system is still young and this information is available only for younger cohorts. The same kind approach could also be used for getting more reliable estimations of the effect of education on health condition.

Some difficulties arise from different classifications used for education. There is no unified classification of education levels that is used commonly in all registers and as well as surveys. Using unified classification would allow for more reliable results. The classification that is currently used in Estonian Labour Force Survey could be a good example.

Life expectancies are backward looking and could be improved by adding alternative predictions for the future.

**Unemployment and social assistance benefits**

The main limitations are connected with accuracy of the approach. The Estonian Social Survey does a lot of aggregation in asking people about the source of support received from government institutions. Registry-based data would allow estimating separately the impact of education of different types of benefits and pensions. However, the main shortcoming of registry data is that the registers of the Social Insurance Board are biased – they include only people that have already received some kind of benefits and will thus overestimate the receipt of benefits. This problem could be solved by linking their databases with Population Register data; however, the quality of education information in Population Register is too poor to be used in the analysis. Another way to overcome this obstacle is to estimate the probabilities of receiving a certain kind of benefit from sample based surveys (like the Estonian Social Survey) and then get the cost estimates from registry data. This approach has also its limits, as the Estonian Social Survey data aggregates several benefits into one group. It should also be noted that the quality of the data in the registry is unclear, while surveys conducted by Statistical Office are well documented and reliable.

More accurate measures of costs related to unemployment (insurance) benefits could be obtained if it were possible to combine data from the Unemployment Insurance Fund (the data on yearly payments of unemployment benefits and unemployment insurance benefits) with probabilities of receiving unemployment insurance benefit or unemployment benefit from either Estonian Labour Force Survey or Estonian Social Survey.

The current analysis overlooks the cost of social services. Again – there are problems with the selection bias in the registries of both the Social Insurance Board as well as the Unemployment

insurance fund. Neither the Estonian Labour Force Survey nor the Estonian Social Survey is sufficiently detailed to allow estimation of the probability of the receipt of services.

**Effect of education on cost of crime**

There is also very limited data on actual costs associated with both administrative procedures (like policing and sentencing) as well as on the cost of consequences. Authors are aware that Ministry of Justice is making attempts to assess more precisely the costs of crime. Preferably the methodology listed in the report 'Mainstreaming Methodology for Estimating Costs of Crime' (http://www.costsofcrime.org/CostingPrinciplesAndMethodology/) should be used.

In this report we used registry data that has several limitations. Firstly, it is biased towards more severe crimes and secondly, even if the register would include crimes that do not involve incarceration, any registry data would probably suffer from underreporting. In order to take into account also less severe crimes one could use survey on criminal behaviour (e.g. something similar to 'The Netherlands Survey on Criminality and Law Enforcement' that was conducted in 1996).

Concerning the registers used, a further problem arises – Database concerning prisoners, persons in detention after service of the sentence, detained persons and persons in custody and Database concerning probation supervision use relatively simple education level classification which does not match with other surveys or classification used in Estonian Education Information System. This affects the reliability of our calculations as upper secondary education in this section and in section dealing with, say, private earnings, might not necessarily denote the same thing. A unification of classification of education is in order again classification that is currently used in Estonian Labour Force Survey could be one way to do this.

# Appendix 7. Case study on the pre-primary vocational education program in Põltsamaa Vocational School

## Introduction

The aim of this chapter is to look at one specific measure – the vocational education programme at Põltsamaa Vocational School that targets primary school dropouts (from 8th and 9th grade) and allows them to get a primary school diploma as well as some basic knowledge about specific vocations (PAKEK[72]) – and to give, mostly based on qualitative data, some indication of the relevance, efficiency and effectiveness of this programme. One has to admit that for proper, evaluation more rigorous quantitative evaluation methods would be preferable, unfortunately that kind of exercise did not fit into the scope of this project.

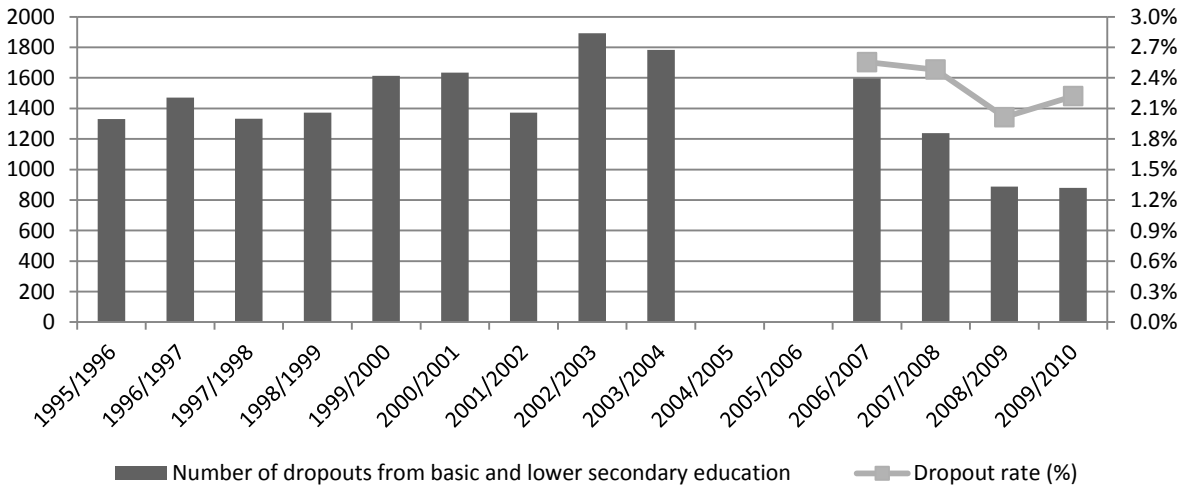
We will start with small introduction of the programme followed by description of the methodology. Then, results from interviews as well as from queries to the Estonian Education Information System are presented, and finally the chapter concludes with summary and recommendations.

## Description of the programme

The programme was launched in the autumn of 2001 as a cooperation project between Põltsamaa Vocational School and Distance Learning Division of Põltsamaa Upper Secondary School.

The aim of the programme was to propose a measure for granting lower secondary school dropouts a chance to continue their studies. At that time roughly 1,400 – 1,600 students dropped out from basic and lower secondary school each year.

**Figure 32.** Number of dropouts from basic and lower secondary education




*Source: Statistics Estonia, Ministry of Education and Research*

In the early days the programme concentrated only to students who were older than 17 years (i.e. past the age of compulsory school attendance). This allowed using the flexible curricula of evening school and distance learning and made it possible to accommodate vocational training elements into

[72] In Estonian: Põltsamaa Ametikooli eelkutseõppe programm.

the programme. The programme can be attended by dropouts from either 8th of 9th grade. In the 8th grade the size of general education curricula is 584 hours, in 9th grade 620 hours. The size of vocational part in the curricula is all together 650 hours.

A graduate from the programme receives:

- A diploma certifying that the graduate has lower secondary education (the diploma is issued by Distance Learning Division of Põltsamaa Upper Secondary School);
- A vocational school diploma certifying that person has received basic training in(issued by Põltsamaa Vocational School):
    - Cookery;
    - Construction;
    - Auto repair;
    - Farming.

The programme allows for mild specification, meaning that students can choose two fields out of four. As the training programme has to accommodate both general education subjects in the amount which would allow to give the graduates lower secondary education and vocational education, some compromises must be made. In this specific case the programme does not include vocational education to an extent sufficient for granting the students a nationally certified diploma in vocational education. The vocational part in the curricula thus serves as basic introduction to a broader set of training areas and if the student considers one of the fields more interesting then he/she can continue the studies in upper secondary vocational programmes.

The introductory chapter of the curricula of the programme lists the following justification for introducing that kind of programme:

- Often the possibilities provided by evening and long distance programmes that are established in the same school where the studies of the student failed are not used by the dropouts as there are personal conflicts between teachers and student and it is difficult to get rid of the “villain’s image”. A special program would allow starting with a clean slate.
- Standard long distance programmes are designed for adults who mostly combine their studies with work. This means that teaching takes place only during one or two days a week. Fresh dropouts, however, are usually unemployed, meaning that ordinary long distance curricula fill only small part of their week. This contributes to the alienation from school life and may bring about dropping out of the programme.
- The decision to drop out of general education is often linked to lack of positive feedback. On the other hand, the manual skills of dropouts are often very good, but in general education the share of subjects that require good manual skills in very low. Introducing a larger-than-usual share of vocational education into the curricula enables to give more positive feedback. Increased motivation from positive experience in vocational subjects has spillover effects also into general education subjects.

Over the years there have been some changes to this approach. The initial approach to include the four areas of vocational training as compulsory parts of the program turned out to be too restrictive,

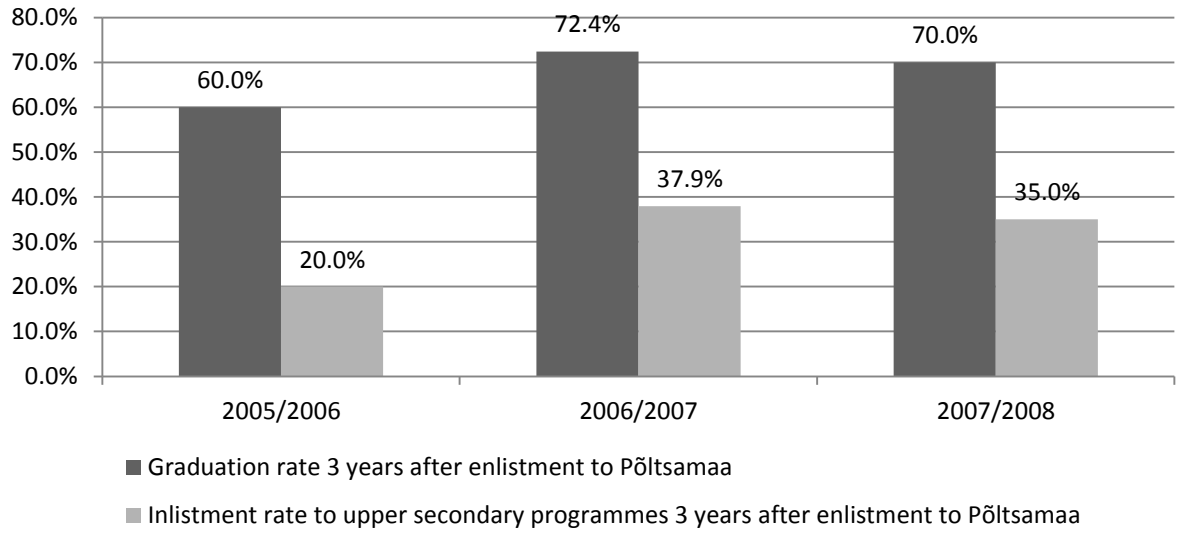
today students can choose two areas out of four. Also, younger than 17 year olds are now also given the opportunity to participate in the programme.

## Opinions on the relevance, efficiency and effectiveness of this programme

**Statistical information – participants, graduates and further studies**

The Estonian Education Information System (EHIS) includes more or less reliable information about the graduation rates from 2005 onwards. During the period 2005-2009, 54 students have enrolled to the programme.

**Figure 33.** Students who have graduated from the programme and continued studies in upper secondary vocational education, by year of enrolment to Põltsamaa pre-primary vocational education programme.




*Source: Estonian Educational Information System, authors' calculations.*

As one can see from Figure 33, the graduation rate from the programme (measured three years after enrolment) is in average ca 70 percent. The enrolment rate to upper secondary programmes (mostly vocational ones in the same school) is somewhat lower – in average 35% of people who enlisted in pre-primary vocational programme continued their studies at upper secondary level.

All in all taking into account that the programme is targeted on students who have dropped of general education, these figures seem quite positive. Nevertheless – one has t o keep in mind there is no adequate reference for comparison and thus these figures do ton say much about the actual effectiveness of the programme.

Now, let's have a qualitative look at the programme through the eyes of teachers and students.

**Teachers' perspective**

The teachers' interviews were all conducted in the Vocational School Põltsamaa Three teachers were interviewed; two of them subject teachers and one vocational. They have been teaching in the

programme for 7-10 years are therefore well informed about the possibilities and problems of the programme.

The teachers were asked to describe the most common causes why their students had dropped out of lower-basic school and ended up in the programme in the first place. The purpose of this was to give an overview of the students in the programme. Two most mentioned factors were lack of support from home and school. One of the teachers observed that:

> *"Parents don't even come to the parent-teacher meetings."*

The lack of parental support was also found as a predictor for problems with the school administration:

> "*the problems start at home, where parents don't pay enough attention and then they [students] don't go to school and teachers start to bully these kids.*"

The problems experienced in their past schools have made the children lose their confidence. As one of the interviewees mentioned that:

> "*they have low self-esteem and want to show themselves.*"

This also reflects in the way the children see their new teachers and it takes some time to break the ice:

> "*They assume that teachers are going to yell at them and give them low grades.*"

All of the teachers agreed that mental abilities are not an obstacle, also alcoholism and other risk behaviours were thought to have little influence. Economic reasons, though, were mentioned as a possible cause for dropping out of the programme. There were some contradicting arguments regarding the influence of friends.

Secondly the teachers were asked to assess the programme from the point of view of goals, activities, success factors and shortcomings. They all agreed that the primary goal of the programme is to give an opportunity to continue the path of education (vs. giving the vocational skills and preparing students for the labour market):

> *"Educational advancement is important; this should only be the first stage."*

The relevance of this programme in the context of tackling school failure is in the opinion of teachers clearly high. The vocational preparation was also mentioned as important part of the programme, but not a primary one. The vocational part of studies is mostly seen as a supportive measure:

> "the specialty is what's keeping them here."

It was described as a motivation for the children since it provides an experience of success, which due to bad grades, they are unable to receive in the regular lower-secondary schools.

The teachers found that the current system is very effective with the majority of students continuing education after finishing the programme. In regards to efficiency the teachers were unable to name

alternatives or significant improvements to this programme. Some smaller alternations were proposed; such as adding student firms to the curriculum or developing some parts of the curriculum further. These were perceived by the teachers as a natural development and are therefore not to be considered as a sign of inefficiency of the programme. They agreed that overall the actions taken to achieve the goals of the programme are adequate and sufficient.

When asked what are the success factors the respondents agreed that the combination of regular schooling and vocational training is the key to motivating the students to stay. Also the teachers "don't reproach their [students'] past doings," to help the children overcome their fears of being judged and misunderstood. They need to put a lot of effort into explaining why theoretical knowledge is important and useful "even to 23-year-olds," to boost their motivation to learn. That's also the reason why teachers integrate vocational and general subjects. For example mathematics is used in carpentry and in foreign language lessons the corresponding vocabulary is studied.

Another detail which was found important by all the teachers was flexibility. Because the children lack the habit of studying or working they have a hard time concentrating in class. Therefore the teacher has to be "an artist conducting a choir," reacting to the mood of the children:

> "Every group is different and you can't teach them all the same way."

This methodological approach needs to be supported by the law, which it does not do very well today. According to one of the teachers, they have to write a work plan (tööplaan), but in reality it can be rather "difficult to follow it to the letter and with every new group the plan needs to be rewritten". Although the law does allow for schools to decide themselves when and how the work plans have to be written and approved.

Another shortcoming concerns the textbooks and other material used in the classroom. The students are officially partly students in the local secondary-school, which does not have enough textbooks to lend them to the vocational school. Also "there are too few young people studying to become vocational teachers" and hence the school has a very limited selection of teachers. This specialty needs to be promoted more by the ministry.

**Students' perspective**

To get an overview of the students' perspective on the programme one current and two alumnus students were interviewed. These were individual interviews and the respondents were not influenced by the presence of other students or teachers. Since there were no contradicting opinions we will not distinguish between the answers of different individuals.

Firstly they were asked about the problems causing school failure at the regular secondary-school. All of them admitted that dropping out was mainly their own fault:

> "*I just couldn't be bothered to go to school…had other interests*."

Although the lack of support from parents and teachers appeared to have some influence as well. Neither the economical situation, peer pressure nor risk behaviour were perceived as very relevant factors, however, this does not have to be the case for all students in the school.

Students were also asked to evaluate the programme; its goals, activities, success factors and shortcomings. Overall the respondents were very satisfied with the goals and activities of the programme:

> "*I got what I came for, I'm very satisfied*."

Primary motive was to attain lower-secondary education, but they acknowledged that vocational training was almost as important. They had no suggestions to improve the programme. However, they listed several success factors that in their opinion make the program work. Firstly - the diversity of lessons. For some students the subjects that are taught in general school become uninteresting. It seems that it is necessary to combine them with something new and interesting. As one interviewee said:

> "*that's what motivates, if you can do something practical for a change*."

Secondly, not all students can keep up with the speed of teaching that is used in general schools – a more flexible and individual approach to students is necessary. It seems that the programme is quite effective in addressing individual needs:

> *"If you didn't understand the teacher would come and explain it to you...in the old school there were too many students for this."*

Surprisingly longer lessons were also seen as a positive side:

> *"Everything is taken slowly... the lessons were longer and unlike a regular school there was no rush."*

The students felt that a change of scenery as well influenced them in a positive way and that teachers were really trying to explain things simply and make the theoretical lessons more interesting.

> *"If she saw that we weren't paying attention, the teacher would tell a few jokes."*

According to the students the programme had no shortcomings.

All in all the teachers and students evaluated the programme rather similarly. The students set a bit larger role for the vocational studies in the programme than teachers. The success factors that were mentioned were almost identical. The students had failed to recognize the integration of different subjects in their studies, which the teachers thought to be very important. Probably this is something that the students didn't think of while studying in the programme. Very few shortcomings could be listed from the interviews and the overall satisfaction with the programme seemed to be high.

## Conclusions and recommendations

The aim of the programme is to bring dropouts back to education system. As the admission to the programme is relatively modest (compared to the overall number of dropouts), this programme is not the ultimate cure for the school failure in Estonia. It is also important to keep in mind that it is a recuperative measure that takes action only after the person has already dropped out from the general education system. The literature on school failure, on the other hand, suggest early

intervention (sometimes even in preschool) as more effective means for keeping students in the school system.

This said, for a recuperative measure the programme seems to be working quite well. A substantial share of entrants to the programme graduate and a relatively high share of the latter continue their studies in upper secondary programmes. The interviews with students as well as teachers showed that they are satisfied with the programme and cannot propose any alternative that would be more cost efficient for dealing with the children that have already dropped out of the system.

There are still some points to consider for improving the programme. Some of the proposals for improvement (like introducing the entrepreneurship elements into the programme, making changing the work plan less bureaucratic or allowing for better access to general education textbooks) were already listed in previous chapter. Also, it seems that measures for making vocational teachers trade more popular are in order.

In addition to these problems, some shortcomings in the system were also described during a casual conversation by the head of the school. First one concerned the efficiency calculations of the use of school premises. The students in the programme are divided between two schools so that one student shows up as 0.5 students in Põltsamaa Vocational School and 0.5 students in Põltsamaa Upper Secondary School. Despite the fact that students spend almost all the time in the premises of Põltsamaa Vocational School counting one student as 0.5 students reduces the efficiency indicators of the school. It seems that it would be wise to discuss this matter with the school and find a reasonable solution for efficiency calculations.

The second problem is also related to the fact that students are listed as 0.5 students in both schools. This means that they do not show up in registers as full time students, which in turn means that certain social benefits and pensions are not accessible to them (the specific example concerned survivor's pensions). This problem is significantly more severe than mere inconsistencies in statistics. The financial situation of the students is often not very good and lack of financial resources can even lead to dropping out of the programme. The situation is even more bizarre as actually these children are studying full time and are left without benefits because of imperfection in registries.