Vocational school dropout and the effect of late versus early tracking and prolongation of basic courses.

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Vocational school dropout and the effect of late versus early tracking and prolongation of basic courses

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Contents

Abstract

During the last half year we have analyzed quasi-experimental data and compared different models and types used at a selected number of technical vocational schools to lower dropout-rates in the basic program after a data collection period of 2½ year. The models and types we have identified in the schools – based on the 2007 reform – are created to help students with assumed different problems with mathematics, Danish language, or social issues. The main idea has been to give students more time to complete the normal basic course stipulated to be 20 weeks, typically 30 weeks or 40 weeks. It is not possible to analyze all schools because of incorrect (not optimal) registration of data at the school level. All schools have invented a practice to meet the demands in the 2007-reform. We identified that some schools have established models in which all the students will follow the same course for about 18-20 weeks, and after that will students who have problems or just need more teaching in the same topics be allowed to follow yet another 10 weeks or 20 weeks course. We term this way of organizing the basic course as a wait-and-see model. Many other schools have established a practice which in our definition means that they use a clear-cut model, whereas other schools have a practice which means that they use mixed models. In the main clear-cut model students are separated (or divided) into different tracks, the normal type where students following a 20 week course, the qualification type 1, in which students with smaller problems are following a 30 week course, and finally the qualification type 2, in which students with somewhat bigger problems are following a 40 week course. The two main models are examined.

Firstly, we analyze on the model level in which we compare the two major approaches. Our findings show that the wait-and-see model is better in comparison with the clear-cut model when analyzing technical schools within the construction and technology and communication (electricity) programs. The construction program is common and of outmost importance in the Danish vocational and training system, so we view that our analysis contributes to a better understanding of the association between treatment models and drop-out even if our analysis merely covers two programs. We also found that drop-out has a tendency to fall given that students are allowed to follow longer programs than the normal 20 weeks programs.

Secondly, we examine the different tracks within the clear-cut-model. A quasi-experimental approach was used to investigate whether there is a significant difference between the normal control track and the two treatment tracks termed qualification type 1 and qualification type 2. Because of relatively few observations we pooled observations from different schools, programs and years, and included these as dummies in a linear probability model. An analysis of the single experiments showed qualitatively similar results as the pooled analysis.

We find that students at the clear-cut normal track are similar with students following the clear cut qualification type 1 treatment. After a number of problems in defining the actual experimental groups using five schools we reached the conclusion that students on clear-cut treatment tracks are more likely to drop-out than students in the normal control track possibly because of tracking and lower teacher and peer expectations in the clear-cut treatment tracks. These results are in line with what many other researchers have found in studies of primary and lower secondary schools stating that tracking has a tendency to increase inequality between students who follows separate tracks.

Introduction and earlier research

In this study we are investigating whether initiatives and new supporting programs implemented at the level of basic courses in Danish technical vocational schools in the period 2008-2010 increases the retention rate, *and also whether school inequality is reduced*. In particular, we analyzed whether the specific models and types of basic courses - with the aim of bettering the qualification of the students - contribute to a reduction in drop-out-rates. The analysis is twofold consisting of an analysis in which we compare two main models of organizing basic course types following a quasi-experimental approach and an analysis exploiting a quasi-experimental design in which we offer a comparison of students assigned to intervention groups with students assigned to control groups in programs at technical vocational schools. A major challenge was the actual construction of the control groups.

From 2008 or before schools have started or at least planned different kinds of programs or actions according to a recent law introduced by the Danish government in 2007. The aim of the law is to increase the retention rate. As a consequence of this law and the implementation of action plans, we carried out an investigation of technical schools with the aim of identifying models and types at the program level. Our investigation is composed of three empirical studies; a school investigation to identify models and types, a study of activity codes from UNI-C to link information from the school investigation and the students, and finally a study of official register data containing relevant information about background of the students and their educational history.

It is well-known that the risk of dropping out is closely linked with parental education, family income, basic competences, school skills, labor market attachment, and crime (cf. Nielsen 2011; Jensen and Larsen 2011; Rumberger 2000, 2011; Munk 2011). Other studies show that school effects are smaller than family effects (e.g. Coleman et al. 1966; others), but that specific conditions in the school can make a difference. We hypothesize that conditions in the schools, as longer time to take the courses, the organization of courses implying separation of students based on skills, and specific tracks can make a difference leading to lower drop-out rates, especially for students with weaker professional, social and personal competencies.

It is likely that extra time will make it easier for students who have difficulties in acquiring the skills demanded in the education, and therefore likely have less confidence in himself and his professional

skills. Longer time would assumingly contribute to a decrease in the stress and give weaker students the required time to learn the material, so this type of organizing makes extra time available for additional education, if this is needed. Non-cognitive skills might contribute to the development of the student's maturity and increase personal motivation to complete an education and increased time spent on basic education would allow training in non-cognitive skills.

Our view is supported by a qualitative study that shows that longer time also provides a better community which makes it more easy to live up to the demands in the class (Tanggaard 2011:90). In spite of a major literature search we found few studies who points at extra time in vocational education, but a German drop-out study among university students shows that longer time will reduce the drop-out rate (Glocker 2011; see also Munk and Park 2013). Economic support will extend the duration of study, but at the same will the likelihood of dropout decrease. This leads to our first hypothesis:

H1: Extended basic course types will retain students in longer time.

The view that the specific organization of courses has a positive effect on drop-out is based on a number of studies. It could be that an opportunity to build a sense of social belonging will be somewhat easier if the class is organized as a clearly defined unit with permanent members contrary to classes with very open learning structures or other forms of mixed teams, or classes with clearance of students during the course probably mediated by the interaction between teachers and students (Lee and Burkam 2003). Contrary to this, a big literature shows that tracking or separation of students, the basic idea in the reform 2007, can have an effect on the drop-out rate. Even if the research field of vocational education (Nielsen 2011), is less investigated, there are studies showing that tracking of students according to some criteria sometimes implies a creation of a negative school culture, also termed negative peer-learning in class, which possibly will lead to a higher risk of dropping out (Rumberger and Thomas 2000; Rumberger 2011). It is thinkable that a serious attitude to learning will give less social status among students rather a more rejecting attitude towards the values of the school. It is therefore also likely that presence of strong students in class will have a positive effect on retention and learning as the stronger students may work as role models and they can contribute to the class by sharing their knowledge, skills and understanding with other less stronger or even weaker students. In fact, they may be better in explaining or demonstrating various techniques or facts in the profession,

since they remember and understands difficulties and what is hard to learn simply because they shortly before have been in a similar learning situation where they had to learn the same material.

On the other hand is there also research showing that there should not be too big a difference between the students in the same class. Some research has shown and given examples that non-tracked classes have led to suboptimal results, simply because the stronger students are bored and that weaker students have too many difficulties in keeping up with the required demands in the coursework, or that the teaching is characterized by a lot of routine and that the level of ambition was lowered (Gamoran 2009: 11/2010). Some research is stressing that the risk to fall off the course and stigmatized as weak or lazy is bigger if the group of school weak students are relatively small in comparison with students being at a higher learning level (Gamoran 1992). Finally, it can matter how the separation is arranged. If the division is only carried out on the basis of specific skills it can have positive effects for both groups of students (Gamoran 2009:6/2010). This leads to following hypothesis:

H1b: Pure non-tracking models will lead to suboptimal results. Instead a model where there is a balanced composition of weaker and stronger students will lower drop-out and will in addition increase graduation.

The benefit of specific organization and specific separation is also reported in Tanggaard, Nielsen, Koudahl, and Jorgensen (2012) making it plausible to assume that stabile and supporting environment potentially will increase retention rates. The risk of dropping out of vocational education programs depends on whether students have the feeling of belonging to a group (Bohn and Munk 2012, p. 10).

School Investigation – Identification of Models and Types

During the summer and autumn of 2009 we initiated a study of how the 2007 school reform was implemented at schools by checking homepages and by contacting several schools. In the study, we mainly focused on technical vocational schools. Much of the material posted by the schools are plans and to some degree reports on what were done from 2008 to 2009. Very little of the material on the web was produced in a transparent and standardized way, so it was quite hard to evaluate and judge whether the plans of interventions actually have been carried out or not. Later on we contacted schools by telephone, and quickly it became clear from the pre-investigation that we could not observe whether

these plans actually were started or carried out. Basically, they were not registered in any plausible way. So one of the main obstacles was to find out whether interventions have been carried out or not. One idea which came up in the summer of 2009 was to design a survey with a set of set of relevant questions, and therefore we started to design the questions. However one serious problem with this idea was that we could not be sure that students had meet planned interventions or schools actually had implemented the programs or interventions. Finally in the summer of 2010 we decided to actually to do a school investigation by visiting the schools with the plan to make interviews with teachers and administrators responsible for carrying out the new basic course types already knowing about the complicated way to obtain information about intensity and actual status for different programs with specializations. The investigation was carried out with interviews from October 2010 to September 2011 implying visits or telephone contacts with 33 schools out of the existing 37 possible schools. We chose to investigate technical schools because of a larger drop-out problem for these schools and dealing with each school-type (technical, commercial, social, agriculture) would require different designs because each basic course differs.

We found that the schools in practice organize basic courses in many ways with the purpose of establishing qualifying and extended basic course types aimed for maladjusted students who are at higher risk of dropping out, to increase their vocational, professional and social competences, so that they would become more equipped and prepared for the main course. Based on the empirical material we defined nine models which captures what the schools do to fulfill the requirements for extended basic courses in the 2007-reform (reported in Bohn and Munk 2012 and in Munk, Bohn and Baklanov 2013). We identified that many schools are using a model with planned tracking (separation), some other schools have used models with late tracking, and yet the rest of the schools have used mixed models. Essentially, we investigated how each school organizes their programs, especially focusing on students who require extra time. The majority of schools use what we have defined as the clear-cut (CC) model. The CC-model is the classical organization of students, where they are only taught together with the same classmates. Students are grouped into classes prior to the start of education, which they follow for the full length of the education. Different classes are established based on type and level, so that students with the same prerequisites are grouped together. This implies that weaker students are separated from stronger students. Consequently large variation in course composition and treatments

can be observed between different classes in the same school and model. The CC model is assumed to provide students with a sense of belonging to the group (class), encouraging participation in education and social class activities. However CC may reinforce negative peer-effects, due to the strict dividing (or separation) of students, so that weaker students are not exposed to stronger peers.

Some other schools have established models in which all the students will follow the same course for about 18-20 weeks, and after that will students who have problems or just need more teaching in the same topics be allowed to follow yet another 10 weeks or 20 weeks course. We term this way of organizing the basic course as a wait-and-see (WAS) model which is the second most frequent model. In the WAS model all students, irrespective of prerequisites, start on the same track. The students are then evaluated during the course as to see whether they are able to complete the basic course, based on completion of the course's on-going objectives. Students who are deemed unprepared or not ready, are relocated to new classes: either to smaller or merged courses with other prolonged students or newly established classes with fresh students. The advantage of WAS model is that students are evaluated on the basis of an on-going practice to meet current demands, needs and conditions. The decision is hence more informed about students than in the CC model, where the initial grouping is formed on the basis of prerequisites. On the contrary, students lack constant class experience and potentially social belonging. This leads to our third hypothesis:

H1c: The WAS-model (late tracking) will to higher degree increase retention over time in comparison with the CC-model (early tracking).

In addition to the model level, we identified a type level. In the most frequent clear-cut (CC) model students are separated into specific different tracks, the normal type and some qualification types to enhance the retention rate. We distinguish between two main types of qualifying courses – qualification type 1 (typically 30 weeks, up to 40) for students, who are lacking some academic skills (basic qualification in Math or Danish language) and social prerequisites for completing an education on the stipulated time; qualification type 2 (typically 40 weeks, up to 60) which focuses more on helping students with bigger social, or maybe even psychological and academic problems. Common for both types is that, on top of the extra time, extra resources are used on these courses, and the education is more practical orientated. Type 1 are typically focused at young students, who are immature or are lacking some motivation or needs a bit more academic (school) knowledge, but who is otherwise

equipped for the education. Type 2 is focused on more challenging students, who are weaker in motivation, and in addition further needs social and behavioral prerequisites and skills. These students require more than just more time or extra language training. This group is characterized as having heavier problems than in type 1, and even more emphasis on practically oriented education; often also more focus on non-cognitive skills, such as discipline and appropriate behavior demanded in ordinary education and on the labor market. This leads to the following hypotheses:

H2: Qualification type 1 under model CC reduces drop-out.

H2b: Qualification type 2 under model CC increases the average drop-out.

Not all vocational schools use a registration norm, which allows us to connect classes with specific course types and models.

Our analysis is carried out on two levels: i) the model level, where schools are compared on their organization of courses and students; and ii) the tracks level, where we look at differences in course composition. First we compare dropout-rates and dropout timing between two different models, wait-and-see (WAS) and clear-cut (CC). Then we examine dropout and completion rates for different treatments within the Clear Cut model.

Comparison of Treatments on the Model Level - Wait and See vs. Clear Cut

In this section we will focus on the two most common models: The Wait-and-See (WAS) model and Clear-Cut (CC) model. Our aim is to compare the two alternative models of organizing students and tracks with respect to rate and time of dropout.

Method

While the typical research on school dropout is based on analysis of observed outcomes at a given time normally using discrete choice modes (e.g. logit), few consider the timing and development of dropout over time (Willet & Singer, 1991; DesJardins et al, 1999; Stephen et al, 2002). Hence we implement a prospective alternative to discrete choice models: duration analysis[1]. Duration analysis is concerned with the duration time until the occurrence of a given event. Hence instead of analyzing dropout at a given point in time, duration models consider the development of the hazard rate of dropout over time. A central concept of duration analysis is hazard function, which is the instantaneous probability of the occurrence event at time *t*, given that it has not yet occurred (Cameron & Trivedi, 2005). The most common and computationally simple duration model is the Cox Proportional Hazard model (Cox, 1972), formally:

$$\lambda(t|\mathbf{x}) = \lambda_0(t)\phi(\mathbf{x},\beta)$$

where $\lambda_0$is the baseline hazard as a function of *t*; while ϕ is a function of a vector of covariates, **x**. The major advantage of this model compared to other alternatives is that it does not require any assumptions about the functional shape of the baseline hazard function, making it less vulnerable to misspecification. This Cox model is a semi-parametric model, i.e. it combines non-parametric estimate of the hazard function and parametric estimation of covariate coefficients. The Cox model assumes that explanatory variables have a proportional effect on the baseline hazard; hence changes in these variables can be interpreted as having a multiplicative effect on the baseline hazard (Cameron & Trivedi, 2005). Hence the Cox model allows estimation of explanatory variables' effects on the hazard of dropout, as well as and estimation of the controlled hazard function. We use this model to test whether students under the WAS model have a higher hazard of dropout than students under the CC model.

[1] Duration analysis can also be referred to as reliability analysis survival analysis or event history analysis, depending on the field of study, where it is implemented. Here we primarily rely on terminology from economics.

An extension of duration analysis is the Competing-Risk (CR) analysis, where several competing events can occur: In our case a student can either leave the school at time *t* by dropping out or graduating. Hence we can use a Competing-Risk model (CRM) to model the hazard of dropout, while controlling for the risk of graduation. The advantage of this model is that we are able to use all available observations while the disadvantage is that we need to impose some strict assumptions. The simplest CR model first proposed by Kalbfeisch & Prentice ([1980]2002) is an extension of the Cox duration model, Cox CRM: with a cause-specific hazard function:

$$\lambda_j(t|\mathbf{x}) = \lambda_{0j}(t)exp(\mathbf{x}'\beta_j)$$

where *j* specifies the event, e.g. in our case *j* = (dropout, graduate). This model requires the assumption of mutual independence of alternative outcomes (similar to the IIA assumption for the multinomial logit model). The assumption entails that both outcomes will eventually occur, but we can only observe the time of the first one. This seems reasonable in our case, i.e. if a student does not drop out then he will eventually graduate. Furthermore it seems reasonable to assume that the hazard for completion and dropping out will follow a significantly different development over time, as these events are influenced by different considerations and time restrictions. Higher dropout risk can be expected in the beginning of the education, due to wrong education choice etc., while graduation will be more likely to occur later when requirements have been met. As there are no available statistical test for this assumption, we estimate a more general and robust Fine-Gray CR model (Fine & Gray, 1999) with the same model specifications. As the estimates for this model are consistent with Cox CR model, the latter seems appropriate. We prefer the Cox CR model for the primary analysis, due to its flexibility and wide availability of extensions. Unlike the Fine-Gray model, which considers only the aggregate effect of a covariate, the Cox CR model can separate the direct effect of model choice on dropout hazard and indirect effect on dropout from changed graduation times (Dignam *et al*, 2012; Wolbers *et al*, 2009).

However the Cox CRM has a limitation in the way covariates are dealt with. It assumes proportional hazard, i.e. the covariates affect duration by a constant coefficient throughout the entire duration period. This means that a given background variable can either increase or decrease the risk of dropout by a constant factor relative to the baseline at any time. Hence the model does not allow a covariate to have different effects at different duration points. There are however some model extensions, which are less sensitive to this assumption – such as the stratified Cox model, where the baseline hazards are allowed to vary across different values of a chosen variable (the stratification variable), while all other

coefficients remain fixed. As this model does not yield a coefficient for the stratification variable, we use it to graph the baseline hazard for each stratum. The stratified Cox CRM can be expressed as:

$$\lambda_{jk}(t|\mathbf{x}) = \lambda_{0jk}(t)exp(\mathbf{x}'\beta_j)$$

where *k* indicates strata. Hence we can see that in this model the hazard ratios vary across the event as before, but are constant for both values of the stratification variable (in our case – WAS/CC); while the baseline hazard varies across both the event and strata. Effectively we assume that the covariates affect dropout and graduation differently, but their effects are constant across the two school model types. Hence we use the Cox CRM stratified by model (CC/WAS) in order to estimate and compare the cause-specific hazard functions for the WAS and CC students respectively, while controlling for covariates.

Finally in order to visualize the aggregate model effect on the dropout rate, while controlling for covariates, we can compute a cumulative incidence (CI) curve for dropout on the basis of the stratified Cox Model. The cumulative incidence can be derived using the following formula:

$$I_1(t) = \int_0^t \lambda_1(s)\exp\left(-\int_0^s \lambda_1(u) + \lambda_2(u)\,du\right)ds, \text{ where } j = (1,2)$$

which measures the actual risk of event *j=1* until time *t*: $I_1(t) = P(T \leq t \text{ and } k = 1)$ (Kalbfeisch & Prentice, 2002; StataCorp, 2009). A significant aspect of the CI function of the event of interest (dropout) is that it depends on both the cause-specific hazard of the event of interest and the competing event (Wolbers *el al*, 2009). Hence by estimating the CI curve for dropout, we can observe the aggregate model effect on dropout: the direct effect affecting the hazard of dropout; and the indirect effect affecting the hazard of completion. By examining the cumulative incidence over time we can see a more dynamic picture of the dropout rate.

Data

The analysis data is constructed on the basis of administrative data from Statistics Denmark. The data includes both the response and explanatory variables, where the later include demographical characteristics, family background and previous education history. As the school model is typically constant over school (department) and program for a given year, we were able to identify the implemented model for each school, by combining the results of our school investigation about models and types with the Cumulated Education Register (KOET) for 2011. From this information we have

selected all the schools and departments, which used either the CC or the WAS model. Two schools, where both models were used within the same program but with different specializations, were dropped, as we in the KOET data cannot separate between these groups. We selected the Construction Program for the primary analysis, as it had the highest number of identifiable WAS schools and had no data inconsistencies resulting from the program reorganization of 2007 reform. The program with the second highest number of usable schools, Electricity, Management and IT (EMI), was also analysed - to test the consistency of the primary analysis.

Table 1: Included schools and departments in the analysis, 2008-2010

Model	School	2008	2009	2010	Departments
Wait-and-See	Randers TS	x	x	X	All
	Syddansk Erhvervsskole	x	x	X	All
	Silkeborg	x	x		All
	KTS	x	x	X	Glostrup & Herlev
Clear-Cut	EUC Vest	x	x	X	All
	EUC Nordvest	x	x	X	Thisted
	Herningsholm	x	x	X	All
	CELF	x	x	X	Nykøbing & Nakskov
	Holstebro TS	x	x	X	All
	TECH Aalborg	x	x	X	All

Table 1 gives an overview of the schools and departments which use either WAS or CC for the period 2008 to 2010. The resulting analysis population includes four WAS schools and six CC schools.

Table 2: Total intake of students in the Construction Program by identified model and year

	Only School Track Students				All students			
	2008	2009	2010	Total	2008	2009	2010	Total
CC	21,9	21,8	23,5	22,4	24,9	23,4	25,0	24,5
WAS	21,4	21,8	18,6	20,6	21,7	21,6	18,6	20,7
CC & WAS	14,9	14,0	14,3	7,6	14,0	13,5	13,9	13,8
Other models	41,9	42,4	43,6	49,5	39,4	41,5	42,5	41,0
Survey population	5433	5405	5255	16093	6936	6203	5987	19126
% of entire intake	77,6	78,6	77,5	77,9	76,5	77,3	76,2	76,7

Table 2 shows the composition of all new students in Construction Program from 2008-2010 by model. Hence we can see that 78% of these students went to schools, which participated in our investigation. Of these students, 60% were organized by either WAS or CC model. As 14% attended schools, where it is not possible to separate WAS and CC students, we use 45% of the total population of new students in Construction Program between 2008 and 2010 for the analysis.

An initial investigation of student population revealed large differences in school track and practical training track students[2] both in dropout behaviour and background composition. Practical training track students also seem to be exposed to an altogether different educational experience and process with different incentives and expectations, which all contribute to a wholly different development in dropout for their group. Furthermore the probability of starting a practical training track versus is school track education is highly dependent background composition (Appendix H). Students from a well-off and nuclear family background are more likely to start a practical training track. Children of parents with vocational educations or self-employed parents are relatively more likely to start a practical training track, likely due to better access to firms providing apprenticeships. Furthermore it is unclear how practical training track students are affected by the models, as they spend a large part of their education outside of the schools and are hence not directly affected by organization of tracks. For these reasons we limited our final analysis population to only school track students, who are to a higher extent affected by organizational model in the vocational school.

WAS students are identified by a dummy variable (1=WAS; 0=CC). Furthermore we included a range on demographical and family variables (measured two years before education start); as well as dummy variables for start year, summer start (start before august) and school; GPA from lower secondary school; and dummies for missing values.

A major drawback of our data is that we are unable to separate the model and the (program-specific) school effects on dropout, as the model does not vary within each school. Hence the coefficient of the WAS dummy measures a combined model and school effect. There exist several methods which could potentially be used to address this identification problem: such as fixed-effects (Cameron & Trivedi, 2005) and so-called placebo regression (see e.g. Olsson, 2009). Fixed-effect regressions could potentially be used to estimate a separate model effect by observing students before and after the 2007 reform; this method assumes that schools effects are fixed over time and hence can be controlled for. Unfortunately we are unable to carry out this method, as we do not have the required knowledge of the model organization prior to the 2007 reform. Placebo regressions can isolate a school effects by introducing one or several additional programs, where model is kept constant across schools, i.e. we introduce

[2] Students with an apprenticeship agreement; these students commence their vocational education in a company and carry out a large portion of their education out outside the vocational schools.

"placebo" programs which varies by school but not by model. These additional programs would allow estimating a baseline school effect separated from the model effect. However in order for this method to be successful school effects must be constant across programs and program differences must be constant across schools. Descriptive analysis of dropout in the Construction program and two "placebo" programs: Electricity, management & IT (SSI) and Motor vehicle & other means of transport (BFT), revealed that school effects varies unsystematically across programs and programs differences varies unsystematically across schools. Hence the method misspecifies the school and program effects, making the estimate of the model effect remained unidentified and highly biased. This was supported by a series of trial regressions, where the WAS estimates were highly volatile in significance, magnitude and sign depending on schools and programs included.

Given this unavailability of successful identification methods, we pursued to estimate a combined school model and program-specific-school effect in order to uncover the differences in dropout level and timing between CC and WAS schools. However the proceeding analysis estimates should be interpreted with care. The combined effect may have a mutual conceptual interpretation as the model is a part of a more general program-specific school effect. By using multiple schools for each model, we can estimate an average model effect. Furthermore by including school dummies we can capture some of the school differences, while capturing a common effect across each school model type.

Results

Here we estimate two empirical models outlined in the method section: a Cox CR model with WAS as a dummy variable, i.e. assuming proportional hazard of the model effect; and a stratified Cox CR model, where the baseline hazard is estimated independently for each model, while other covariates are assumed to have constant effects across models.

Table 3 presents the estimates of four simple Cox CRM regressions for each event (dropout and graduation), where different background variables are controlled for. These regressions are carried out to establish a general effect of WAS and other covariates on the dropout level, as well to consider changes in the estimated WAS effect as more controls are included. The estimates are reported as (fixed) hazard ratios, which can be loosely interpreted as the relative increase from the baseline hazard, i.e. a hazard ratio of 0.90 is approximately equivalent to a 10% decrease in hazard for the event. In the first three regressions the WAS estimate is constant around a hazard ratio of 0.87, i.e. WAS schools

have a 13% reduced risk of dropout compared to CC schools; equivalently in the same regressions but for graduation the WAS has a positive hazard ratio of around 1.25. Hence WAS schools seem to increase the graduation rates and decrease the dropout. When we included the school dummies (model IV), the dropout hazard increased to 17% for WAS and the graduation hazard decreased and became insignificant. This regression also indicates a large variation in dropout between the WAS schools: KTS seems to be the best performer of the group, while Randers performs considerably worse.

The demographical variables seem to have considerable impact on dropout hazards: Female students have higher hazards for both dropout and graduation, making the final effect ambiguous. Immigrant students are at higher risk of dropout; this seems to be strongest for second generation immigrant with hazard ratio of 1.2. Students who lived in a nuclear family at age of 15 had significantly lower hazard ratios by around 18%; age at enrolment seems to have increasing positive effect on dropout.

Students of parents with a vocational education seem to be less vulnerable to dropout compared to all other educational groups; the results seem to hold for both mother and father. Children of parents outside of the labour market have larger hazards of dropout out (about 13% for fathers; about 18 % for mothers) while those with self-employed mothers seems to have considerably lower hazards compared to employed low skilled mothers. Parents' income does not have an effect on the hazard for dropout, but seems to increase the hazard of graduating. Finally, GPA from lower secondary schools has negative effect on dropout and a positive effect of graduation.

	Dropout								Graduate							
	(I)		(II)		(III)		(IV)		(I)		(II)		(III)		(IV)	
WAS	0.870***	(0.00)	0.874***	(0.00)	0.868***	(0.00)	0.833*	(0.02)	1.250***	(0.00)	1.243***	(0.00)	1.250***	(0.00)	1.097	(0.24)
start year = 2009	0.816***	(0.00)	0.813***	(0.00)	0.811***	(0.00)	0.803***	(0.00)	0.835***	(0.00)	0.823***	(0.00)	0.821***	(0.00)	0.817***	(0.00)
start year= 2010	0.947	(0.24)	0.950	(0.28)	0.954	(0.32)	0.940	(0.20)	0.831***	(0.00)	0.808***	(0.00)	0.796***	(0.00)	0.789***	(0.00)
summer	1.412***	(0.00)	1.404***	(0.00)	1.401***	(0.00)	1.400***	(0.00)	1.026	(0.56)	1.037	(0.40)	1.045	(0.32)	1.012	(0.78)
female	1.366***	(0.00)	1.321***	(0.00)	1.318***	(0.00)	1.311***	(0.00)	1.849***	(0.00)	1.963***	(0.00)	1.983***	(0.00)	1.940***	(0.00)
Nuclear Family at age 15	0.764***	(0.00)	0.804***	(0.00)	0.820***	(0.00)	0.820***	(0.00)	1.355***	(0.00)	1.248***	(0.00)	1.192***	(0.00)	1.185***	(0.00)
Ethnicity (ref: Danish)																
- Immigrant	1.224**	(0.01)	1.113	(0.21)	1.062	(0.47)	1.048	(0.58)	0.653***	(0.00)	0.819*	(0.03)	0.914	(0.36)	0.864	(0.13)
- Descendent	1.420***	(0.00)	1.281*	(0.02)	1.232*	(0.04)	1.270*	(0.02)	0.694***	(0.00)	0.860	(0.20)	0.958	(0.71)	0.944	(0.62)
Age	1.104***	(0.00)	1.094***	(0.00)	1.064*	(0.02)	1.064*	(0.02)	0.996	(0.84)	1.009	(0.66)	1.052*	(0.02)	1.043	(0.06)
Age^2	0.998**	(0.00)	0.999**	(0.01)	0.999*	(0.04)	0.999*	(0.04)	1.001	(0.23)	1.000	(0.28)	1.000	(0.89)	1.000	(0.84)
Father Education (ref. Primary school)																
- Vocational education	-	-	0.892*	(0.01)	0.901*	(0.02)	0.896*	(0.01)	-	-	0.992	(0.84)	0.968	(0.42)	0.968	(0.43)
- General upper secondary education	-	-	0.927	(0.59)	0.953	(0.73)	0.958	(0.76)	-	-	0.945	(0.68)	0.886	(0.35)	0.869	(0.27)
- Short/medium cycle higher education	-	-	0.877	(0.09)	0.886	(0.12)	0.879	(0.09)	-	-	1.075	(0.27)	1.022	(0.74)	1.007	(0.91)
- Long cycle higher education	-	-	0.886	(0.44)	0.893	(0.47)	0.908	(0.54)	-	-	0.848	(0.20)	0.825	(0.11)	0.855	(0.18)
Mother Education (ref. Primary school)																
- Vocational education	-	-	0.908*	(0.03)	0.921	(0.07)	0.924	(0.08)	-	-	1.156***	(0.00)	1.121**	(0.01)	1.115**	(0.01)
- General upper secondary education	-	-	0.958	(0.70)	0.978	(0.84)	0.962	(0.73)	-	-	1.161	(0.13)	1.111	(0.27)	1.086	(0.38)
- Short/medium cycle higher education	-	-	0.930	(0.35)	0.951	(0.51)	0.959	(0.59)	-	-	1.124	(0.07)	1.073	(0.26)	1.069	(0.29)
- Long cycle higher education	-	-	1.098	(0.53)	1.135	(0.39)	1.144	(0.36)	-	-	0.850	(0.32)	0.781	(0.12)	0.774	(0.10)
Father SES (ref. Low skilled)																
- Self-employed	-	-	1.021	(0.79)	1.026	(0.74)	1.026	(0.74)	-	-	1.116	(0.07)	1.098	(0.12)	1.103	(0.11)
- Employee (high & medium skill)	-	-	1.131	(0.08)	1.139	(0.07)	1.130	(0.09)	-	-	0.956	(0.46)	0.957	(0.45)	0.954	(0.43)
- Employee (other)	-	-	1.064	(0.30)	1.065	(0.29)	1.066	(0.28)	-	-	0.908	(0.09)	0.903	(0.07)	0.892	(0.05)
- Unemployed	-	-	1.025	(0.82)	1.025	(0.81)	1.024	(0.82)	-	-	0.834	(0.08)	0.829	(0.08)	0.805*	(0.05)
- Outside labour market	-	-	1.135*	(0.04)	1.128*	(0.05)	1.133*	(0.04)	-	-	0.964	(0.56)	0.978	(0.72)	0.977	(0.71)
Mother SES (ref. Low killed)																
- Self-employed	-	-	0.776*	(0.04)	0.768*	(0.04)	0.777*	(0.05)	-	-	1.125	(0.18)	1.132	(0.16)	1.133	(0.16)
- Employee (high & medium skill)	-	-	0.945	(0.43)	0.963	(0.60)	0.974	(0.71)	-	-	1.042	(0.47)	0.995	(0.93)	1.022	(0.71)
- Employee (other)	-	-	1.018	(0.79)	1.025	(0.72)	1.036	(0.60)	-	-	1.017	(0.79)	0.990	(0.87)	1.011	(0.85)
- Unemployed	-	-	1.111	(0.19)	1.091	(0.28)	1.081	(0.34)	-	-	0.967	(0.67)	1.006	(0.93)	0.985	(0.86)
- Outside labour market	-	-	1.189**	(0.00)	1.179**	(0.00)	1.183**	(0.00)	-	-	0.876*	(0.02)	0.881*	(0.02)	0.893*	(0.04)
Family Income	-	-	0.999	(0.94)	1.002	(0.91)	1.002	(0.91)	-	-	1.053***	(0.00)	1.049***	(0.00)	1.043***	(0.00)
GPA	-	-	-	-	0.945***	(0.00)	0.942***	(0.00)	-	-	-	-	1.130***	(0.00)	1.123***	(0.00)
Skole (ref.: 15. KTS (WAS))																
- Randers TS (WAS)	-	-	-	-	-	-	1.499***	(0.00)	-	-	-	-	-	-	1.355**	(0.00)
- Syddansk Ervhervsskole (WAS)	-	-	-	-	-	-	1.007	(0.93)	-	-	-	-	-	-	0.913	(0.21)
- Silkeborg TS (WAS)	-	-	-	-	-	-	1.205	(0.17)	-	-	-	-	-	-	0.987	(0.91)
- EUC Vest (CC)	-	-	-	-	-	-	1.121	(0.10)	-	-	-	-	-	-	0.892	(0.08)
- EUC Nordvest (CC)	-	-	-	-	-	-	1.080	(0.53)	-	-	-	-	-	-	1.119	(0.29)
- Herningsholm Erhvervsskole (CC)	-	-	-	-	-	-	1.001	(0.99)	-	-	-	-	-	-	0.919	(0.26)
- CELF (CC)	-	-	-	-	-	-	0.983	(0.81)	-	-	-	-	-	-	0.372***	(0.00)
- Uddannelsescenter Holstebro (CC)	-	-	-	-	-	-	1.101	(0.32)	-	-	-	-	-	-	1.168	(0.09)
Observations	6843		6843		6843		6843		6843		6843		6843		6843	
Pseudo R-squared	0.006		0.007		0.008		0.009		0.007		0.009		0.012		0.016	
AIC	47519.614		47504.213		47470.748		47454.188		57312.585		57245.567		57059.099		56846.241	
BIC	47594.755		47743.297		47723.495		47761.582		57387.726		57484.651		57311.846		57153.635	

Note: Hazard Ratios; p-values in parentheses. Stars indicate statistical significance: *=5%; **=1%; ***=0,1%. Categories for missing values included. Efron method for ties (Cleves et a, 2010: p.151)

(a) Uncontrolled for covariates (b) Controlled for covariates (Stratified Cox CRM)

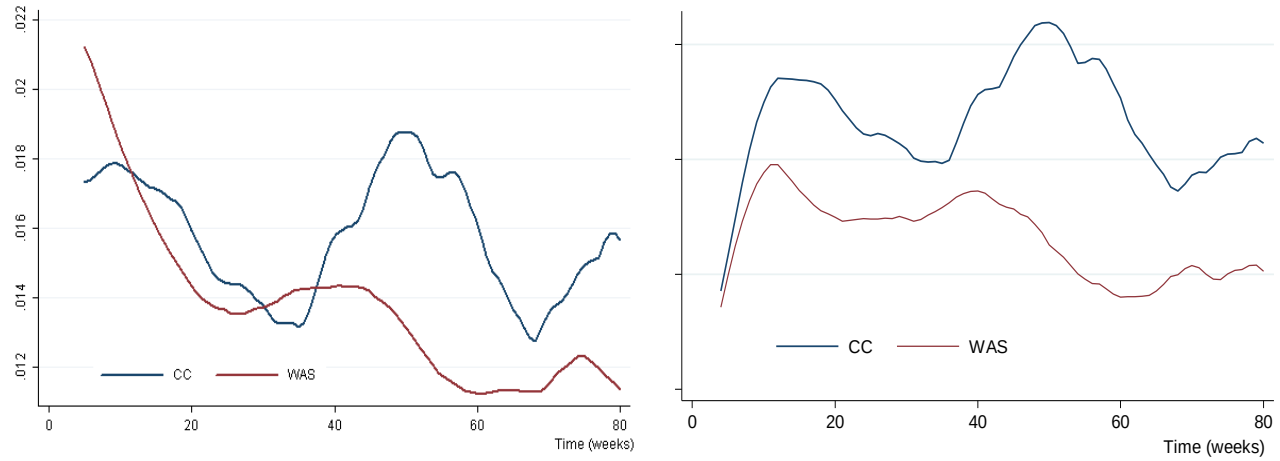

Figure 1: Smoothed Hazard function for WAS and CC (a) uncontrolled and (b) controlled for background variables

As noted before the simple Cox CR model (Table 3) can only show that overall WAS reduces the hazard of dropout. However when we estimate a smoothed hazard function using non-parametric kernel method (Figure 1 (a)) without controlling for covariates, we can see that there is a considerable difference between hazards for CC and WAS depending on the duration time. In order control for this variation, we estimate the stratified Cox CR model, where baseline hazards are allowed to vary across WAS and CC, while all other covariates have a constant effect and are modelled in the same way as in Table 3. The estimated hazard ratios of the four stratified Cox CR models are presented in Appendix G: with the exceptions of WAS, which now does not have a coefficient, the estimates hazards are practically identical those reported in Table 3.

Using the model IV in Appendix G as a base model, we can estimate and compare the baseline hazard for both WAS and CC, while controlling for background variables (Cleves *et al*, 2010; Royston, 2011). The baseline hazards are reported in Figure 1 (b). To estimate the smoothed hazard functions we use the alternative Epanchikov kernel (epan2 in Stata). We attempted using several different kernels including Gaussian and the ordinary Epan(chikov) kernels (Cleves *et al*, 2010). We settled on the alternative Epanchikov kernel as it was the most successful in capturing variation in the data, especially at the end of the hazards. The alternative Epanchikov kernel has the advantage that it used a separate kernel around the endpoints. This allowed us estimate the hazard of dropout shortly after the enrolment

more accurately. We use a bandwidth of h=9.0, which specifies the window around each point to be used for smoothing. We chose this value base on multiple trials to find the most accurate depiction of the data. Optimal bandwidth methods, which minimize the variance, were also tried. These were dropped, as they yielded an overly smooth hazard function, which did not truthfully depict the development in the hazard.

Figure 1 shows the development of the cause-specific hazard of dropout over the first 80 weeks after entering the education. When considering the combined the hazard for both models: the hazard starts rather high around 10 weeks and then decreases for the following 25 weeks (just before the 40 weeks); after 40 weeks the hazard starts to increase again for the following 10 to 20 weeks; from where it decreases until about week 70; which is followed by a minor increase. This seems to indicate that the risk of dropout is high at start of the educations, but decreasing as more time is invested; furthermore there seems to be a sharp (but diminishing) increase in the risk after each of the two cut-off points (standardized education lengths of 40 and 60[3] weeks). This suggests that the risk of drooping out is highest in the beginning of the education, where dropout is characterized by unmet expectations for education choice or poor motivation and prerequisites; and around 40 weeks, when the standardized length of an education comes to an end.

Part (b) of Figure 1 shows that the estimated hazard function for WAS is below that of the CC for the entire period. Overall the figure shows that the hazard under WAS is smoother than under the CC and less volatile to large deviations in the hazard of dropout. There seems to be two peaks in the difference between the two hazards: a smaller one between 10 and 20 and another between 50 and 60 weeks after entry, where the difference in the hazards seems to be at its highest. Hence it appears that high initial controlled risk of dropout (e.g. due to change of education) is already lower for WAS than CC schools; furthermore at the other high risk point between 40-50 weeks, the WAS does not experience the same jump in hazard, which is observed for CC. Instead WAS students have a slightly elevated hazard of dropout at 40 weeks, which is followed by almost immediate fall, 10 weeks before the same decrease is seen for the CC students. This seems reasonable as WAS schools are able to prolong the high risk student to new classes before or as they reach the end of their program (of 40 weeks); while CC students are forced to continue with their current track and examination date.

[3] For 60 weeks there seems to be short lag, which is likely due to presence of school holidays.

When comparing the estimated controlled hazards in (b) with the "raw" non-parametric hazards in (a), there seems be a good match of the peaks. The first half of the hazard curve for WAS seems to be lowered, when we control for covariates: this indicates that the WAS students have lower prerequisites measured by the background variables (this is supported by the descriptive statistics in Appendix B.2). In both graphs the period between 50-60 weeks stands out with the highest difference in the dropout hazards between the two models.

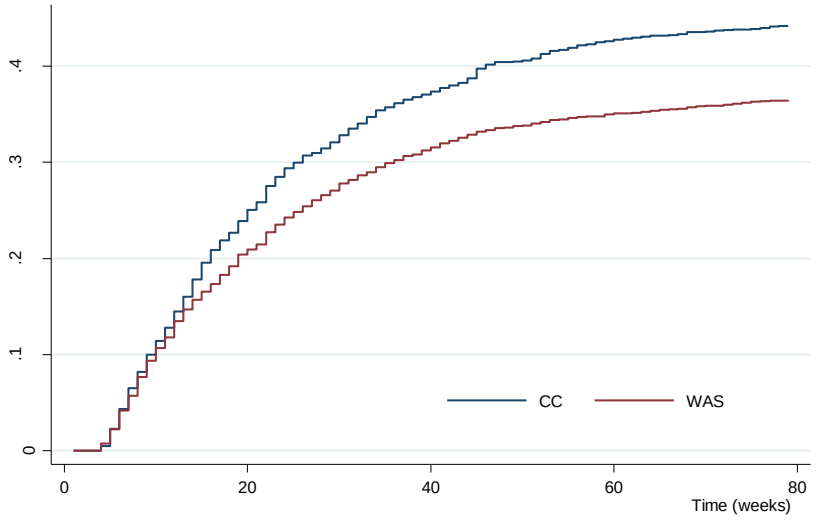

Figure 2: Cumulative Incidence: Stratified Cox CRM

Figure 2 shows the cumulative incidents of the drop-out for WAS and for CC. We used a stratified Cox CRM (Table A.2), where the cause-specific hazards for dropout and completion are estimated from model IV (Dropout and Graduation). We see that the actual dropout rates for the two models follow a very similar development: increasing continuously throughout the period but at a diminishing rate. The dropout rates for the two models start to differentiate shortly after origin, and continuously diverge away for each other. The development in the CI seems to follow that indicated by figure 1: first major diverging occurs between 10 and 20 weeks and the second between 40 and 50 weeks. At 20 weeks the difference between the models is just about 3 pct. point, while at 60 it amounts to around double that. Overall the figure shows that students following the WAS model have a lower risk of dropout compared to the CC students: this difference is present throughout the period and grows up 6-7 pct lower risk after 60 weeks.

Comparison of Tracks within the Clear Cut Model

We now focus on the Clear Cut model and examine the different Clear Cut tracks to see if there is a treatment effect, i.e. we examine hypothesis 2 and 2b. The comparison is made by using a comparison approach.

We use a posttest-only design with nonequivalent groups as we are not able to do pretesting but we can get a comparison or a proxy for an internal control group (Shadish et al. 2002, p. 116). The treatment and control groups are measured and compared after implementation of the intervention, i.e. after the students are assigned to the normal or qualification track. The term ’nonequivalent’ means that we did not control the assignment to groups through the mechanism of random assignment, which is a limitation in the design. As a result, the groups may be different prior to the study (the design is especially susceptible to the internal validity threat of selection). Any beforehand differences between the groups may affect the outcome of the study and this can lead us to under or overestimate the effect of the intervention.

We know from our investigation that there is variation by school level, program, field of study, type of profession, and class, so one of the main issues was to construct comparable treatment and comparison groups which are so similar (except for the treatment) that they can be compared with the aim of isolating the treatment effect from program, year, and school effects. We have grouped the data such that students starting in August in a given year, in the same school, on same field of study are assigned to the same experiment. Students following the normal track are assigned to the control group and students on the qualification tracks are assigned to one of the treatment groups. The analysis period is 43 weeks. See appendix C for an overview of the experiments used in the analysis. Most of the students are only members of either the control or treatment group, but some students are registered on more than one basic course track in the analysis period. One reason for this seems to be that the information from the schools about the classes to be used for the identification of the basic course type included some noise, especially for the normal track classes. To ensure unique identification and avoid overlap between the control and treatment group we have assumed that students that have been following a qualification track for more than 60% of the time belong to the treatment group.

Data and Method

The main population consists of all students who started their education in august on one of the schools and field of study in our sample, see appendix C. In the analysis we have only included the students' first spell.

By linking the information from our school investigation about models and types and the data from UNI-C, we were able to identify the unique connection between course types, models and students. The EASY-S data for UNI-C is based on the schools administrative database, EASY-A, which allows registration of the students' complete education history, which education, courses and classes they are or have been affiliated with. EASY covers information consisting of 26.000 variables, which is composed of 2600 fields and on average 10 items. Typical examples are teacher education, teachers work obligations, teacher-student ratio, student absence, marks and other relevant issues. However not all vocational schools use a registration norm, which allows us to connect classes with specific course types and models. Due to this we finally ended up of the 20 possible. New studies will have to further investigate whether this is true for all schools when data hopefully someday will be organized in a way that makes it possible to analyze all schools.

With information from Statistics Denmark student register (KOET2011) we have constructed two outcome variables for each experiment, which indicates the student's status 43 weeks after start. If the student completed the basic course within the 43 weeks then the variable *completed* equals 1 and zero otherwise and if the student dropped out within the experiment period the variable *dropout* equals 1 and zero otherwise.

The explanatory variables consists a variables from a wide range of register data from Statistics Denmark, see appendix A for definitions and sources.

In order to examine if there is a difference between the students in the control group and the students in the treatment group we estimate a linear probability model for dropout and completion within the experiment period conditional on the explanatory variables in appendix A. The estimated parameters give the difference of a one unit increase of the regressor on the outcome probability.

Results

We now take a closer look at dropout and completion rates for the selected schools with clear cut type basic courses. We present results from the first spell only sample, but the same analysis on all spells gives us more or less the results.

In our first model we have formulated a pooled model of the 15 treatment 1 experiments and the 20 treatment 2 experiments controlling for school, field of study and start-year. The estimated parameter for the treatment indicators shows the average difference in dropout and completion rate between treatment and control group. Appendix D and E show estimates from the same model for each treatment group separately.

Table 6 shows that the students in the treatment group have a higher dropout-rate than student in the control group meaning that the normal track is probably better than the clear-cut type. The dropout-rate for treatment 1 classes are on average 0.10 higher than the dropout rate in the control group and for treatment 2 classes the dropout rate is on average 0.17 higher. The treatment classes also have a relatively poor performance on completion rates. The completion rate in treatment 1 classes is on average 0.15 lower than the completion rate in the control group and the completion rate in treatment 2 classes is 0.30 lower.

One should be careful not to over interpret the estimates. They do not necessarily measure a causal effect of the treatment-type on the dropout-rate. There are still a number of alternative explanations we have to consider. The problem is that we only observe one potential outcome for each student. It could be that treatment 1 and 2 actually reduced the dropout rate compared the dropout probability if the student had followed the normal basic course instead.

Ideally we want to isolate the true treatment effect (i.e. track-effect) from other possible alternative causes that could influence the drop-out probability. There are a lot of threats to the internal validity of the design. For example even if students in the treatment and control groups have the same socioeconomic background and recruitment patterns and conditions they could be dissimilar in terms of other aspects like non-cognitive dispositions including motivation or maturation. Another problem could be the qualitative shift from lower secondary school to vocational school. The whole social setting presumably changes from lower secondary school to vocational school. However, it should be

underlined that students on observed characteristics are very similar (normal and qualification 1 types). Yet it could be that some students are changing between the two tracks during the course (crossovers).We have tried to account for this by only using the first spell

Overall we find that students at the clear-cut normal track are very similar with students following the clear cut qualification type 1 treatment. The students on clear-cut treatment tracks are more likely to drop-out than students in the normal control track possibly because of tracking and lower teacher and peer expectations in the clear-cut treatment tracks. These results are in line with what many other researchers have found in studies of primary and lower secondary schools stating that tracking has a tendency to increase inequality between students who follows separate tracks.

Table 6. Linear Probability Model for dropout and completion. Students on Clear Cut Models

Variable	Dropout		Completed	
	Parameter estimates (std. error)			
Basic course type (ref: Normal)				
Qualification Type 1	0.10 ***	(0.03)	-0.15 ***	(0.03)
Qualification Type 2	0.17 ***	(0.03)	-0.30 ***	(0.03)
School (ref: EUC Vest)				
CELF	-0.13 ***	(0.03)	-0.14 ***	(0.03)
Roskilde TS	-0.12 **	(0.05)	0.26 ***	(0.05)
Herningsholm	-0.08 **	(0.04)	0.00	(0.03)
Syddansk Erhvervsskole	-0.10 **	(0.05)	0.10 **	(0.05)
Field of study (ref: construction)				
Food industry	-0.16 ***	(0.04)	0.10 ***	(0.04)
Trades and technique	0.07	(0.05)	-0.02	(0.05)
Mechanics, carriage and logistics	-0.08 **	(0.04)	0.04	(0.04)
Technology and communication	0.05	(0.03)	-0.07 **	(0.03)
Start year (ref: 2008)				
2009	0.02	(0.02)	-0.06 **	(0.02)
2010	0.13 ***	(0.03)	0.01	(0.03)
Female	0.06	(0.04)	-0.04	(0.04)
Age	0.04 **	(0.02)	0.00	(0.02)
Age^2	0.00 **	(0.00)	0.00	(0.00)
Ethnicity (ref: Danish)				
Immigrants	0.04	(0.09)	-0.03	(0.09)
Descendants	-0.05	(0.07)	0.05	(0.07)
Nuclear family	-0.01	(0.03)	0.05 *	(0.03)
Fathers age	0.00	(0.00)	0.00	(0.00)
Mothers age	0.00	(0.00)	0.00	(0.00)
Fathers education (ref: no education)				
Vocational education	-0.07 ***	(0.02)	0.08 ***	(0.02)
General upper secondary education	0.03	(0.07)	-0.07	(0.07)
Short/medium cycle higher education	0.02	(0.05)	-0.04	(0.04)
Long cycle higher education	-0.05	(0.09)	0.11	(0.09)
Mothers education (ref: no education)				
Vocational education	-0.01	(0.03)	0.04 *	(0.02)
General upper secondary education	-0.08	(0.05)	0.04	(0.05)
Short/medium cycle higher education	-0.02	(0.04)	0.10 **	(0.04)
Long cycle higher education	0.13	(0.12)	-0.21 *	(0.12)
Average family income	-0.01	(0.01)	0.00	(0.01)
Fathers occupation(ref:employed, low skill)				
Employed, medium/high skill	-0.02	(0.04)	0.05	0.04
Empl. Other	0.00	(0.03)	0.04	(0.03)
Self-Empl.	0.06	(0.04)	-0.01	(0.04)
Unemployed	-0.06	(0.09)	0.08	(0.09)
Outside the labour market	-0.06	(0.04)	-0.01	(0.04)
Mothers occupation(ref:employed, low skill)				
Employed, medium/high skill	-0.04	(0.03)	0.00	(0.03)
Empl. Other	-0.02	(0.03)	0.00	(0.03)
Self-Empl.	-0.15 ***	(0.06)	0.05	(0.05)
Unemployed	0.09	(0.08)	-0.03	(0.07)
Outside the labour market	0.03	(0.03)	-0.01	(0.03)
Exam grade 9. grade in written mathematics	-0.03 ***	(0.00)	0.04 ***	(0.00)
Exam grade 9 grade in written danish	0.00	(0.01)	0.01	(0.01)
Intercept	0.27	(0.24)	-0.08	(0.23)
	R^2 = 0.13		R^2 = 0.24	
	N=1805			

Note: Stars indicate statistical significance, *: 10%, **: 5% and ***: 1%. Categories for missing values included. The model is estimated by OLS.

The difference in dropout rate between ground course packages could vary for different student types. It could be that for students with a low GPA the difference is relatively large,

The table below shows the average of individual predicted dropout rate calculated from the linear probability model in table **X** by track and student high school GPA. The group of student with low GPA is here defined as students with grades in mathematics and Danish under 4 and the group of students with high GPA are defined as students with grades over 7.

Predicted Dropout Probabilities by Track and Student GPA

	Normal track			Qualification Type 1			Qualification Type 2		
	Estimate (lower CL, 5%) (Upper CL, 95%)								
All students	0,25	(0,23)	(0,28)	0,36	(0,31)	(0,41)	0,44	(0,39)	(0,50)
Low GPA	0,34	(0,30)	(0,37)	0,41	(0,36)	(0,47)	0,48	(0,42)	(0,54)
High GPA	0,19	(0,16)	(0,23)	0,28	(0,22)	(0,34)	0,33	(0,26)	(0,41)

Note: Probabilities are calculated by linear probability model. Confidence limits are estimated by boot-strapping, 1000 replications.

We see that for the normal track students with a low high school GPA have a dropout rate of 34% on average compared with 19% for students on compared with a high GPA.

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Appendices

Appendix A. Explanatory variables in Regression Analysis

Variable	Definition	DST Register	WAS	CC
Female	1= Female and 0=Male	Befolkningsregistret (BEF)	x	x
Age	Age in years	Befolkningsregistret (BEF)	x	x
Nuclear family	1=Nuclear Family when 15 year old and 0 otherwise	Befolkningsregistret (BEF)	x	x
GPA	Average of grades from written exams in mathematics and Danish in 9. grade	Folkeskolekarakterer (UDFK)	x	x
Math and Danish	Average grade in written exam in 9. in mathematics and Danish, resp.	Folkeskolekarakterer (UDFK)		x
Non-western	1=Immigrants/descendents and 0 otherwise	Indvandrere og efterkommere (IEPE)	-	x
Ethnicity	0=Danish; 1=Immigrants; 2=Descendents	Indvandrere og efterkommere (IEPE)	x	-
Family Income	Sum of family income (100.000 DKK). Income lower than the 1 percentile is recoded to the 1% percentile. Similar recoding for incomes over the 99 percentile.	Indkomstdata (INDH)	x	x
Father Completed Education /Mother Education	0=Lower Secondary 1=Vocational Education 2=Upper Secondary Education 3=Short/Medium Cycle Higher Education 4=Long Higher Education	Uddannelsesregistret (UDDA)	x	x
Father SES /Mother SES	1= Self-employed (medarbejdende ægtefælle) 2= Employee, low skilled (*Reference*) 3= Employee, medium/high skilled 4= Employee, other 5= Unemployed 6= Outside the Labour Market	Indkomstdata (INDH)	x	x
Summer	Education Start: 0=Between January and July 1=Between August and December	Komprimeret Elevregister (KOET)	x	-

Note: Categories for missing variables are also included in the regressions.

Appendix B.1: Descriptive Statistics over Explanatory Variables, in the WAS vs. CC Analysis (BA)

	WAS		CC		Samlet BA tilgang			
	Mean	Std.Dev.	Mean	Std.Dev.	Mean	Std.Dev.	Min	Max
WAS	1,00	0,00	-	-	-	-	-	-
start_year== 2008	0,35	0,48	0,33	0,47	0,34	0,47	0	1
start_year== 2009	0,35	0,48	0,33	0,47	0,33	0,47	0	1
start_year== 2010	0,29	0,46	0,34	0,47	0,33	0,47	0	1
summer	0,35	0,48	0,28	0,45	0,35	0,48	0	1
female	0,17	0,38	0,13	0,34	0,15	0,35	0	1
Family type at age 15 (ref: Other)	0,32	0,47	0,30	0,46	0,32	0,47	0	1
- Nuclear	0,65	0,48	0,68	0,47	0,65	0,48	0	1
- Missing	0,03	0,17	0,02	0,14	0,03	0,16	0	1
Ethnicity (ref: Danish)	0,87	0,33	0,94	0,24	0,89	0,32	0	1
- Immigrant	0,07	0,26	0,04	0,20	0,06	0,24	0	1
- Descendent	0,05	0,22	0,02	0,13	0,05	0,22	0	1
Age	15,81	4,81	15,32	4,44	15,65	4,76	11	60
Father Education (ref. Primary school)	0,31	0,46	0,34	0,47	0,31	0,46	0	1
- Vocational education	0,41	0,49	0,44	0,50	0,42	0,49	0	1
- General upper secondary education	0,02	0,13	0,01	0,12	0,02	0,15	0	1
- Short/medium cycle higher education	0,12	0,32	0,09	0,28	0,10	0,30	0	1
- Long cycle higher education	0,01	0,12	0,02	0,13	0,03	0,16	0	1
- Missing educational information	0,13	0,34	0,10	0,30	0,12	0,33	0	1
Mother Education (ref. Primary school)	0,38	0,49	0,37	0,48	0,35	0,48	0	1
- Vocational education	0,38	0,49	0,40	0,49	0,39	0,49	0	1
- General upper secondary education	0,03	0,17	0,03	0,16	0,04	0,18	0	1
- Short/medium cycle higher education	0,13	0,33	0,14	0,35	0,15	0,36	0	1
- Long cycle higher education	0,02	0,12	0,01	0,10	0,02	0,13	0	1
- Missing educational information	0,06	0,24	0,05	0,21	0,06	0,24	0	1
Father SES (ref. Low skilled)	0,07	0,26	0,08	0,28	0,08	0,27	0	1
- Self-employed	0,13	0,34	0,11	0,31	0,13	0,34	0	1
- Employee (high & medium skill)	0,37	0,48	0,43	0,50	0,38	0,48	0	1
- Employee (other)	0,13	0,33	0,14	0,34	0,13	0,34	0	1
- Unemployed	0,04	0,19	0,03	0,18	0,04	0,19	0	1
- Outside labour market	0,17	0,38	0,14	0,34	0,16	0,37	0	1
- Missing	0,09	0,29	0,07	0,26	0,08	0,28	0	1
Mother SES (ref. Low killed)	0,03	0,17	0,03	0,18	0,03	0,18	0	1
- Self-employed	0,15	0,36	0,17	0,37	0,18	0,39	0	1
- Employee (high & medium skill)	0,40	0,49	0,43	0,49	0,40	0,49	0	1
- Employee (other)	0,09	0,29	0,09	0,29	0,09	0,29	0	1
- Unemployed	0,06	0,24	0,05	0,23	0,06	0,24	0	1
- Outside labour market	0,23	0,42	0,21	0,40	0,20	0,40	0	1
- Missing	0,03	0,17	0,02	0,15	0,03	0,17	0	1
Family income	5,39	2,23	5,53	2,13	5,43	2,23	0,00	12,97
- Missing family income	0,01	0,11	0,01	0,09	0,01	0,10	0	1
Skole (ref.: 15. KTS (WAS))	0,18	0,39	-	-	-	-	-	-
- Randers TS (WAS)	0,16	0,37	-	-	-	-	-	-
- Syddansk Ervhervsskole (WAS)	0,61	0,49	-	-	-	-	-	-
- Silkeborg TS (WAS)	0,05	0,21	-	-	-	-	-	-
- EUC Vest (CC)	-	-	0,22	0,41	-	-	-	-
- EUC Nordvest (CC)	-	-	0,06	0,24	-	-	-	-
- Herningsholm Erhvervsskole (CC)	-	-	0,12	0,33	-	-	-	-
- CELF (CC)	-	-	0,15	0,36	-	-	-	-
- Uddannelsescenter Holstebro (CC)	-	-	0,08	0,28	-	-	-	-
- Tech College Aalborg (CC)	-	-	0,36	0,48	-	-	-	-
GPA - math & dansh - 9th grade	2,86	2,58	3,18	2,56	3,03	2,57	-1,13	12,00
- Missing GPA	0,31	0,46	0,25	0,43	0,28	0,45	0	1
Obs.	3.286		3.560		20.405			

Appendix B.2: Descriptive Statistics over Explanatory Variables, in the WAS vs. CC Analysis (SSI)

	WAS		CC		Samlet SSI tilgang			
	Mean	Std.Dev.	Mean	Std.Dev.	Mean	Std.Dev.	Min	Max
WAS	1,00	0,00	0,00	0,00	0,10	0,30	0	1
start_year== 2008	0,29	0,45	0,27	0,45	0,26	0,44	0	1
start_year== 2009	0,38	0,49	0,38	0,48	0,38	0,48	0	1
start_year== 2010	0,34	0,47	0,35	0,48	0,36	0,48	0	1
summer	0,20	0,40	0,24	0,43	0,28	0,45	0	1
female	0,02	0,15	0,05	0,22	0,04	0,20	0	1
Family type at age 15 (ref: Other)	0,29	0,46	0,24	0,43	0,27	0,44	0	1
- Nuclear	0,67	0,47	0,72	0,45	0,69	0,46	0	1
- Missing	0,04	0,19	0,04	0,21	0,04	0,20	0	1
Ethnicity (ref: Danish)	0,92	0,28	0,92	0,27	0,88	0,32	0	1
- Immigrant	0,05	0,22	0,06	0,24	0,06	0,25	0	1
- Descendent	0,03	0,18	0,02	0,15	0,05	0,22	0	1
Age	15,78	4,96	16,60	5,71	16,42	5,50	11	52
Father Education (ref. Primary sch	0,30	0,46	0,28	0,45	0,27	0,45	0	1
- Vocational education	0,44	0,50	0,43	0,50	0,42	0,49	0	1
- General upper secondary education	0,03	0,16	0,03	0,17	0,03	0,17	0	1
- Short/medium cycle higher educatio	0,12	0,33	0,13	0,34	0,13	0,33	0	1
- Long cycle higher education	0,01	0,12	0,02	0,14	0,03	0,16	0	1
- Missing educational information	0,09	0,29	0,11	0,31	0,12	0,33	0	1
Mother Education (ref. Primary sch	0,31	0,46	0,32	0,47	0,30	0,46	0	1
- Vocational education	0,45	0,50	0,40	0,49	0,41	0,49	0	1
- General upper secondary education	0,05	0,22	0,04	0,21	0,04	0,20	0	1
- Short/medium cycle higher educatio	0,13	0,34	0,17	0,37	0,17	0,37	0	1
- Long cycle higher education	0,01	0,09	0,01	0,12	0,02	0,14	0	1
- Missing educational information	0,05	0,22	0,05	0,22	0,06	0,24	0	1
Father SES (ref. Low skilled)	0,06	0,24	0,08	0,27	0,07	0,26	0	1
- Self-employed	0,18	0,38	0,15	0,35	0,16	0,37	0	1
- Employee (high & medium skill)	0,41	0,49	0,39	0,49	0,38	0,48	0	1
- Employee (other)	0,13	0,34	0,14	0,35	0,13	0,33	0	1
- Unemployed	0,03	0,17	0,03	0,18	0,03	0,18	0	1
- Outside labour market	0,15	0,36	0,13	0,33	0,14	0,35	0	1
- Missing	0,04	0,20	0,08	0,27	0,09	0,28	0	1
Mother SES (ref. Low killed)	0,03	0,16	0,03	0,17	0,03	0,17	0	1
- Self-employed	0,19	0,40	0,19	0,39	0,20	0,40	0	1
- Employee (high & medium skill)	0,44	0,50	0,41	0,49	0,40	0,49	0	1
- Employee (other)	0,09	0,28	0,10	0,29	0,09	0,29	0	1
- Unemployed	0,05	0,22	0,06	0,23	0,05	0,23	0	1
- Outside labour market	0,18	0,38	0,19	0,39	0,19	0,40	0	1
- Missing	0,02	0,15	0,03	0,18	0,03	0,18	0	1
Family income	5,82	2,14	5,54	2,28	5,56	2,31	0,00	12,97
- Missing family income	0,01	0,07	0,01	0,12	0,01	0,12	0	1
Skole:								
- Randers TS (CC)	0,00	0,00	0,07	0,25	0,03	0,16	0,00	1,00
- Uddannelsescenter Holstebro (CC)	0,00	0,00	0,07	0,25	0,03	0,16	0,00	1,00
- EUC Sjælland (WAS)	0,89	0,32	0,00	0,00	0,04	0,19	0,00	1,00
- Syddansk Ervhervsskole (CC)	0,00	0,00	0,40	0,49	0,15	0,36	0,00	1,00
- EUC Vest (CC)	0,00	0,00	0,08	0,27	0,03	0,17	0,00	1,00
- Herningsholm Erhvervsskole (CC)	0,00	0,00	0,08	0,27	0,03	0,17	0,00	1,00
- Djursland (WAS)	0,11	0,32	0,00	0,00	0,00	0,07	0,00	1,00
- Skive (CC)	0,00	0,00	0,03	0,18	0,01	0,11	0,00	1,00
- Tech College Aalborg (CC)	0,00	0,00	0,27	0,44	0,10	0,30	0,00	1,00
GPA - math & dansh - 9th grade	3,45	2,75	3,74	2,93	3,62	2,85	-3,00	12,00
- Missing GPA	0,27	0,44	0,28	0,45	0,28	0,45	0	1
Obs.	367		3349		3716			

Appendix C. Overview of selected Experiments in Clear Cut Analysis

Number of Students

		Start Year	Qualification Type 1	Qualification Type 2
EUC Vest	**Construction**	2008		13
		2009		10
		2010	11	
	Food Industry	2008	11	20
		2009	20	11
	Trades and technique	2008	10	
	Technology and communication	2008		23
		2009		14
Roskilde TS	**Mechanics, carriage and logistics**	2008	45	
		2009	44	12
		2010	13	11
Herningsholm	**Construction**	2008	20	
		2009	17	
		2010	11	
	Mechanics, carriage and logistics	2008	18	
		2009	23	
		2010	15	
Syddansk Erhvervsskole	**Technology and communication**	2008	16	
CELF	**Construction**	2008	34	
	Food Industry	2008		13
	Mechanics, carriage and logistics	2008		14
		2009		55
		2010		47
	Technology and communication	2009		18
		2010		13
Total			**308**	**274**

Appendix D. Clear Cut Qualification Type 1 vs. Normal, LPM

Linear Probability Model for dropout and completion. Students on Clear Cut Models Qualification Type 1 vs. Normal

Variable	Dropout		Completed	
	Parameter estimates (std. error)			
Basic course type (ref: Normal)				
Qualification Type 1	0.13 ***	(0.03)	-0.15 ***	(0.03)
School (ref: EUC Vest)				
CELF	-0.08 **	(0.03)	-0.15 ***	(0.04)
Roskilde TS	-0.24 ***	(0.06)	0.26 ***	(0.06)
Herningsholm	-0.11 ***	(0.04)	0.00	(0.04)
Syddansk Erhvervsskole	-0.16 ***	(0.05)	0.10 *	(0.05)
Field of study (ref: construction)				
Food industry	-0.23 ***	(0.04)	0.13 ***	(0.04)
Trades and technique	0.07	(0.05)	0.00	(0.06)
Mechanics, carriage and logistics	-0.01	(0.04)	0.06	(0.04)
Technology and communication	0.09 ***	(0.03)	-0.09 **	(0.04)
Start year (ref: 2008)				
2009	0.02	(0.03)	-0.06 **	(0.03)
2010	0.18 ***	(0.03)	-0.01	(0.03)
Female	0.07	(0.04)	-0.03	(0.05)
Age	0.04 **	(0.02)	0.01	(0.02)
Age^2	0.00 **	(0.00)	0.00	(0.00)
Ethnicity (ref: Danish)				
Immigrants	0.03	(0.10)	-0.03	(0.10)
Descendants	-0.11	(0.08)	0.04	(0.09)
Nuclear family	-0.01	(0.03)	0.05 *	(0.03)
Fathers age	0.00	(0.00)	0.00	(0.00)
Mothers age	0.00	(0.00)	0.00	(0.00)
Fathers education (ref: no education)				
Vocational education	-0.08 ***	(0.03)	0.08 ***	(0.03)
General upper secondary education	0.06	(0.08)	-0.06	(0.08)
Short/medium cycle higher education	0.01	(0.05)	-0.05	(0.05)
Long cycle higher education	-0.05	(0.09)	0.10	(0.09)
Mothers education (ref: no education)				
Vocational education	-0.02	(0.03)	0.05 *	(0.03)
General upper secondary education	-0.07	(0.06)	0.04	(0.06)
Short/medium cycle higher education	0.01	(0.04)	0.11 **	(0.05)
Long cycle higher education	0.12	(0.13)	-0.18	(0.14)
Average family income	0.00	(0.01)	0.00	(0.01)
Fathers occupation(ref:employed, low skill)				
Employed, medium/high skill	-0.03	(0.04)	0.05	(0.04)
Empl. Other	-0.01	(0.03)	0.06 *	(0.03)
Self-Empl.	0.03	(0.04)	0.00	(0.04)
Unemployed	-0.04	(0.10)	0.11	(0.11)
Outside the labour market	0.06	(0.04)	-0.01	(0.04)
Mothers occupation(ref:employed, low skill)				
Employed, medium/high skill	-0.04	(0.04)	0.01	(0.04)
Empl. Other	-0.02	(0.03)	0.00	(0.03)
Self-Empl.	-0.13 **	(0.06)	0.05	(0.06)
Unemployed	0.09	(0.08)	-0.03	(0.09)
Outside the labour market	0.03	(0.03)	-0.02	(0.04)
Exam grade 9. grade in written mathematics	-0.03 ***	(0.00)	0.04 ***	(0.00)
Exam grade 9 grade in written danish	0.00	(0.01)	0.01	(0.01)
Intercept	0.29	(0.25)	-0.15	(0.26)
	R^2 = 0.14		R^2 = 0.19	
	N=1531			

Note: Stars indicate statistical significance, *: 10%, **: 5% and ***: 1%. Categories for missing values included. The model is estimated by OLS.

Appendix E. Clear Cut Qualification Type 2 vs. Normal, LPM

Linear Probability Model for dropout and completion. Students on Clear Cut Models Qualification Type 2 vs. Normal

Variable	Dropout		Completed	
	Parameter estimates (std. error)			
Basic course type (ref: Normal)				
Qualification Type 2	0.15 ***	(0.03)	-0.29 ***	(0.03)
School (ref: EUC Vest)				
CELF	-0.12 ***	(0.03)	-0.20 ***	(0.03)
Roskilde TS	-0.06	(0.06)	0.21 ***	(0.06)
Herningsholm	-0.12 ***	(0.04)	0.05	(0.04)
Syddansk Erhvervsskole	-0.10 *	(0.05)	0.04	(0.05)
Field of study (ref: construction)				
Food industry	-0.13 ***	(0.04)	0.14 ***	(0.04)
Trades and technique	0.09	(0.06)	-0.03	(0.06)
Mechanics, carriage and logistics	-0.07 *	(0.04)	0.07 *	(0.04)
Technology and communication	0.07 *	(0.04)	-0.02	(0.03)
Start year (ref: 2008)				
2009	0.01	(0.03)	-0.00	(0.03)
2010	0.09 ***	(0.03)	0.07 **	(0.03)
Female	0.06	(0.04)	-0.02	(0.04)
Age	0.05 **	(0.02)	0.00	(0.02)
Age^2	0.00 **	(0.00)	0.00	(0.00)
Ethnicity (ref: Danish)				
Immigrants	0.04	(0.10)	-0.01	(0.09)
Descendants	0.00	(0.08)	0.05	(0.08)
Nuclear family	-0.03	(0.03)	0.04	(0.03)
Fathers age	-0.01 **	(0.00)	-0.00	(0.00)
Mothers age	0.00	(0.00)	0.00	(0.00)
Fathers education (ref: no education)				
Vocational education	-0.07 **	(0.03)	0.10 ***	(0.03)
General upper secondary education	0.06	(0.08)	-0.12	(0.08)
Short/medium cycle higher education	-0.01	(0.05)	-0.03	(0.05)
Long cycle higher education	-0.06	(0.10)	0.11	(0.10)
Mothers education (ref: no education)				
Vocational education	-0.03	(0.03)	0.05 *	(0.03)
General upper secondary education	-0.09	(0.06)	0.04	(0.06)
Short/medium cycle higher education	-0.02	(0.04)	0.08 *	(0.04)
Long cycle higher education	0.02	(0.14)	-0.14	(0.13)
Average family income	-0.01	(0.01)	-0.00	(0.01)
Fathers occupation(ref:employed, low skill)		.		
Employed, medium/high skill	-0.01	(0.04)	0.04	(0.04)
Empl. Other	0.00	(0.03)	0.04	(0.03)
Self-Empl.	0.04	(0.04)	0.01	(0.04)
Unemployed	-0.09	(0.10)	0.16 *	(0.10)
Outside the labour market	0.07	(0.04)	-0.01	(0.04)
Mothers occupation(ref:employed, low skill)				
Employed, medium/high skill	-0.03	(0.04)	0.02	(0.04)
Empl. Other	0.02	(0.03)	0.01	(0.03)
Self-Empl.	-0.16 **	(0.06)	0.08	(0.06)
Unemployed	0.09	(0.08)	-0.02	(0.08)
Outside the labour market	0.00	(0.04)	-0.01	(0.03)
Exam grade 9. grade in written mathematics	-0.03 ***	(0.00)	0.04 ***	(0.00)
Exam grade 9 grade in written danish	0.01	(0.01)	0.01	(0.01)
Intercept	0.252	0.2499	-0.031	0.242
	R^2 = 0.13		R^2 = 0.28	
	N=1497			

Note: Stars indicate statistical significance, *: 10%, **: 5% and ***: 1%. Categories for missing values included. The model is estimated by OLS.

Appendix F. Descriptive Statistics over Explanatory Variables, Clear Cut Experiments

Descriptive Statistics over Explanatory Variables - Clear Cut experiments. Normal track vs. Qualification 1 and 2

	Normal track (N=1223)				*Qualification 1 (N=308)*				*Qualification 2 (N=274)*			
	Mean	*Std*	*Min*	*Max*	*Mean*	*Std*	*Min*	*Max*	*Mean*	*Std*	*Min*	*Max*
School												
EUC Vest	0.32	0.47	0	1	0.18	0.39	0	1	0.32	0.47	0	1
CELF	0.25	0.43	0	1	0.1	0.31	0	1	0.57	0.5	0	1
Roskilde TS	0.06	0.24	0	1	0.28	0.45	0	1	0.09	0.29	0	1
Herningsholm	0.24	0.42	0	1	0.34	0.47	0	1	0	0.06	0	1
Syddansk Erhvervsskole	0.14	0.35	0	1	0.09	0.29	0	1	0.02	0.13	0	1
Field of study												
Construction	0.34	0.48	0	1	0.27	0.45	0	1	0.1	0.3	0	1
Food industry	0.15	0.36	0	1	0.1	0.31	0	1	0.17	0.38	0	1
Trades and technique	0.05	0.22	0	1	0.05	0.22	0	1	0.02	0.15	0	1
Mechanics, carriage and logistics	0.25	0.44	0	1	0.38	0.49	0	1	0.46	0.5	0	1
Technology and communication	0.2	0.4	0	1	0.19	0.4	0	1	0.25	0.43	0	1
Start year												
2008	0.39	0.49	0	1	0.48	0.5	0	1	0.34	0.48	0	1
2009	0.36	0.48	0	1	0.32	0.47	0	1	0.41	0.49	0	1
2010	0.25	0.43	0	1	0.2	0.4	0	1	0.25	0.43	0	1
Female	0.1	0.3	0	1	0.11	0.31	0	1	0.17	0.37	0	1
Age	16.42	3	14	47	15.94	1.37	14	28	15.91	1.29	14	28
Age^2	278.76	157.94	196	2209	255.91	51.41	196	784	254.76	48.34	196	784
Immigrants	0.01	0.12	0	1	0.02	0.13	0	1	0.03	0.16	0	1
Descendants	0.02	0.14	0	1	0.03	0.18	0	1	0.05	0.21	0	1
Nuclear family	0.79	0.41	0	1	0.78	0.41	0	1	0.7	0.46	0	1
Fathers age	44.26	6.12	30	84	42.95	5.54	31	61	43.1	5.98	31	67
Mothers age	41.2	5.27	29	79	40.64	4.79	30	57	40.42	4.71	29	57
Fathers education												
No education	0.33	0.47	0	1	0.34	0.47	0	1	0.36	0.48	0	1
Vocational education	0.51	0.5	0	1	0.52	0.5	0	1	0.53	0.5	0	1
General upper secondary education	0.02	0.14	0	1	0.03	0.17	0	1	0.01	0.12	0	1
Short/medium cycle higher education	0.09	0.29	0	1	0.07	0.26	0	1	0.07	0.25	0	1
Long cycle higher education	0.02	0.14	0	1	0.02	0.15	0	1	0.01	0.09	0	1
Education missing	0.02	0.15	0	1	0.02	0.13	0	1	0.02	0.15	0	1
Mothers education												
No education	0.3	0.46	0	1	0.36	0.48	0	1	0.39	0.49	0	1
Vocational education	0.49	0.5	0	1	0.45	0.5	0	1	0.4	0.49	0	1
General upper secondary education	0.04	0.21	0	1	0.05	0.21	0	1	0.03	0.18	0	1
Short/medium cycle higher education	0.15	0.36	0	1	0.12	0.33	0	1	0.15	0.36	0	1
Long cycle higher education	0.01	0.09	0	1	0.01	0.1	0	1	0.01	0.09	0	1
Education missing	0.01	0.12	0	1	0.01	0.11	0	1	0.01	0.1	0	1
Average family income	3.14	1.91	-3.43	45.55	3.09	1.14	0.95	10.35	2.82	1	-3.58	10.35
Family income missing	0	0	0	0	0	0	0	0	0	0	0	0
Fathers occupation												
Employed, low skill	0.39	0.49	0	1	0.36	0.48	0	1	0.42	0.49	0	1
Employed, medium/high skill	0.15	0.35	0	1	0.12	0.33	0	1	0.12	0.33	0	1
Empl. Other	0.24	0.43	0	1	0.27	0.44	0	1	0.23	0.42	0	1
Self-Empl.	0.1	0.31	0	1	0.14	0.34	0	1	0.07	0.25	0	1
Unemployed	0.01	0.1	0	1	0.02	0.14	0	1	0.03	0.17	0	1
Outside the labour market	0.11	0.31	0	1	0.1	0.3	0	1	0.13	0.33	0	1
Mothers occupation												
Employed, low skill	0.41	0.49	0	1	0.37	0.48	0	1	0.39	0.49	0	1
Employed, medium/high skill	0.2	0.4	0	1	0.17	0.38	0	1	0.15	0.36	0	1
Empl. Other	0.16	0.37	0	1	0.19	0.39	0	1	0.17	0.37	0	1
Self-Empl.	0.04	0.19	0	1	0.06	0.23	0	1	0.03	0.18	0	1
Unemployed	0.02	0.14	0	1	0.02	0.15	0	1	0.02	0.15	0	1
Outside the labour market	0.17	0.37	0	1	0.19	0.39	0	1	0.24	0.43	0	1
Exam grade 9. grade in written mathematics	4.8	3.18	-1.5	12	4.32	3.06	-1.5	12	3.58	3.11	-1.5	12
Missing mathematics grade	0.11	0.31	0	1	0.12	0.33	0	1	0.19	0.4	0	1
Exam grade 9 grade in written danish	3.62	2.64	-3	12	3.51	2.57	-3	10	3.05	2.63	0	12
Missing danish grade	0.12	0.32	0	1	0.14	0.35	0	1	0.23	0.42	0	1

Appendix G. Stratified Cox CR Model – Dropout and Graduation, Construction Program

	Dropout								Graduate							
	(I)		(II)		(III)		(IV)		(I)		(II)		(III)		(IV)	
WAS	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
start year = 2009	0.816***	(0.04)	0.813***	(0.04)	0.812***	(0.04)	0.803***	(0.04)	0.835***	(0.03)	0.824***	(0.03)	0.822***	(0.03)	0.819***	(0.03)
start year= 2010	0.947	(0.04)	0.950	(0.04)	0.954	(0.05)	0.940	(0.04)	0.828***	(0.04)	0.804***	(0.04)	0.792***	(0.03)	0.786***	(0.04)
summer	1.419***	(0.06)	1.410***	(0.06)	1.407***	(0.06)	1.405***	(0.06)	1.027	(0.05)	1.039	(0.05)	1.047	(0.05)	1.015	(0.05)
female	1.365***	(0.08)	1.320***	(0.07)	1.318***	(0.07)	1.309***	(0.07)	1.859***	(0.11)	1.974***	(0.12)	1.992***	(0.12)	1.949***	(0.12)
Nuclear Family at age 15	0.764***	(0.03)	0.804***	(0.03)	0.820***	(0.03)	0.821***	(0.03)	1.357***	(0.05)	1.250***	(0.05)	1.194***	(0.05)	1.189***	(0.05)
Ethnicity (ref: Danish)																
- Immigrant	1.226**	(0.09)	1.114	(0.09)	1.063	(0.09)	1.048	(0.09)	0.653***	(0.05)	0.820*	(0.08)	0.914	(0.09)	0.862	(0.08)
- Descendent	1.428***	(0.13)	1.288*	(0.13)	1.237*	(0.13)	1.273*	(0.13)	0.695***	(0.07)	0.863	(0.10)	0.960	(0.11)	0.945	(0.11)
Age	1.103***	(0.03)	1.093***	(0.03)	1.063*	(0.03)	1.063*	(0.03)	0.998	(0.02)	1.011	(0.02)	1.054*	(0.02)	1.044	(0.02)
Age^2	0.998**	(0.00)	0.999**	(0.00)	0.999*	(0.00)	0.999*	(0.00)	1.000	(0.00)	1.000	(0.00)	1.000	(0.00)	1.000	(0.00)
Father Education (ref. Primary school)																
- Vocational education	-	-	0.892*	(0.04)	0.902*	(0.04)	0.897*	(0.04)	-	-	0.993	(0.04)	0.969	(0.04)	0.969	(0.04)
- General upper secondary education	-	-	0.937	(0.13)	0.964	(0.13)	0.969	(0.13)	-	-	0.956	(0.13)	0.896	(0.11)	0.885	(0.11)
- Short/medium cycle higher education	-	-	0.878	(0.07)	0.887	(0.07)	0.880	(0.07)	-	-	1.076	(0.07)	1.023	(0.07)	1.009	(0.07)
- Long cycle higher education	-	-	0.894	(0.14)	0.902	(0.14)	0.919	(0.14)	-	-	0.850	(0.11)	0.827	(0.10)	0.858	(0.10)
Mother Education (ref. Primary school)																
- Vocational education	-	-	0.907*	(0.04)	0.920	(0.04)	0.923	(0.04)	-	-	1.154***	(0.05)	1.119**	(0.05)	1.113*	(0.05)
- General upper secondary education	-	-	0.959	(0.11)	0.979	(0.11)	0.964	(0.11)	-	-	1.152	(0.11)	1.103	(0.11)	1.080	(0.10)
- Short/medium cycle higher education	-	-	0.930	(0.07)	0.950	(0.07)	0.958	(0.07)	-	-	1.116	(0.07)	1.066	(0.07)	1.063	(0.07)
- Long cycle higher education	-	-	1.108	(0.16)	1.146	(0.17)	1.152	(0.17)	-	-	0.851	(0.14)	0.783	(0.13)	0.778	(0.12)
Father SES (ref. Low skilled)																
- Self-employed	-	-	1.018	(0.08)	1.023	(0.08)	1.022	(0.08)	-	-	1.113	(0.07)	1.094	(0.07)	1.099	(0.07)
- Employee (high & medium skill)	-	-	1.132	(0.08)	1.140	(0.08)	1.131	(0.08)	-	-	0.955	(0.06)	0.954	(0.06)	0.951	(0.06)
- Employee (other)	-	-	1.065	(0.06)	1.066	(0.06)	1.067	(0.06)	-	-	0.910	(0.05)	0.905	(0.05)	0.893	(0.05)
- Unemployed	-	-	1.029	(0.11)	1.031	(0.11)	1.029	(0.11)	-	-	0.833	(0.09)	0.826	(0.09)	0.800*	(0.09)
- Outside labour market	-	-	1.135*	(0.07)	1.128*	(0.07)	1.132*	(0.07)	-	-	0.961	(0.06)	0.975	(0.06)	0.972	(0.06)
Mother SES (ref. Low killed)																
- Self-employed	-	-	0.780*	(0.10)	0.772*	(0.10)	0.782	(0.10)	-	-	1.140	(0.10)	1.148	(0.10)	1.149	(0.10)
- Employee (high & medium skill)	-	-	0.943	(0.07)	0.960	(0.07)	0.971	(0.07)	-	-	1.044	(0.06)	0.997	(0.06)	1.025	(0.06)
- Employee (other)	-	-	1.019	(0.07)	1.026	(0.07)	1.036	(0.07)	-	-	1.023	(0.06)	0.998	(0.06)	1.019	(0.06)
- Unemployed	-	-	1.111	(0.09)	1.091	(0.09)	1.082	(0.09)	-	-	0.973	(0.08)	1.013	(0.08)	0.990	(0.08)
- Outside labour market	-	-	1.188**	(0.06)	1.177**	(0.06)	1.181**	(0.06)	-	-	0.873*	(0.05)	0.879*	(0.05)	0.890*	(0.05)
Family Income	-	-	0.999	(0.01)	1.002	(0.01)	1.002	(0.01)	-	-	1.053***	(0.01)	1.049***	(0.01)	1.042***	(0.01)
GPA	-	-	-	-	0.944***	(0.01)	0.942***	(0.01)	-	-	-	-	1.130***	(0.01)	1.122***	(0.01)
Skole (ref.: 15. KTS (WAS))																
- Randers TS (WAS)	-	-	-	-	-	-	1.487***	(0.14)	-	-	-	-	-	-	1.356**	(0.13)
- Syddansk Ervhervsskole (WAS)	-	-	-	-	-	-	1.002	(0.08)	-	-	-	-	-	-	0.894	(0.07)
- Silkeborg TS (WAS)	-	-	-	-	-	-	1.187	(0.16)	-	-	-	-	-	-	0.959	(0.12)
- EUC Vest (CC)	-	-	-	-	-	-	1.118	(0.08)	-	-	-	-	-	-	0.892	(0.06)
- EUC Nordvest (CC)	-	-	-	-	-	-	1.078	(0.13)	-	-	-	-	-	-	1.109	(0.12)
- Herningsholm Erhvervsskole (CC)	-	-	-	-	-	-	0.996	(0.09)	-	-	-	-	-	-	0.909	(0.07)
- CELF (CC)	-	-	-	-	-	-	0.970	(0.07)	-	-	-	-	-	-	0.370***	(0.03)
- Uddannelsescenter Holstebro (CC)	-	-	-	-	-	-	1.109	(0.11)	-	-	-	-	-	-	1.181	(0.11)
Observations	6843		6843		6843		6843		6843		6843		6843		6843	
Pseudo R-squared	0.007		0.008		0.009		0.010		0.007		0.009		0.012		0.017	
AIC	43463.812		43448.767		43415.153		43398.866		52175.753		52108.712		51922.341		51705.802	
BIC	43532.122		43681.021		43661.068		43699.429		52244.063		52340.965		52168.256		52006.365	

Note: Hazard Ratios; Standard errors in parentheses. Stars indicate statistical significance: *=5%; **=1%; ***=0,1%. Categories for missing values included. Efron method for ties (Cleves et a, 2010: p.151)

Appendix H. Logit – Practical training track students, Construction Program

	(I)		(II)		(III)		(IV)		(V)		(VI)		(VII)	
start year = 2009	-	-	0.567***	(0.02)	0.560***	(0.02)	0.556***	(0.02)	0.533***	(0.02)	0.505***	(0.02)	0.507***	(0.02)
start year= 2010	-	-	0.550***	(0.02)	0.500***	(0.02)	0.494***	(0.02)	0.466***	(0.02)	0.435***	(0.02)	0.442***	(0.02)
summer	-	-	1.782***	(0.06)	1.580***	(0.06)	1.590***	(0.06)	1.613***	(0.06)	1.739***	(0.07)	1.765***	(0.07)
female	-	-	-	-	0.204***	(0.02)	0.205***	(0.02)	0.210***	(0.02)	0.213***	(0.02)	0.216***	(0.02)
Nuclear Family at age 15	-	-	-	-	1.900***	(0.08)	1.766***	(0.08)	1.633***	(0.07)	1.504***	(0.07)	1.522***	(0.07)
Ethnicity (ref: Danish)	-	-	-	-										
- Immigrant	-	-	-	-	0.191***	(0.02)	0.245***	(0.03)	0.303***	(0.04)	0.323***	(0.04)	0.318***	(0.04)
- Descendent	-	-	-	-	0.125***	(0.02)	0.153***	(0.03)	0.193***	(0.03)	0.237***	(0.04)	0.242***	(0.04)
Age	-	-	-	-	1.158***	(0.02)	1.171***	(0.02)	1.188***	(0.02)	1.221***	(0.02)	1.139***	(0.02)
Age^2	-	-	-	-	0.998***	(0.00)	0.998***	(0.00)	0.998***	(0.00)	0.998***	(0.00)	0.999***	(0.00)
Father Education (ref. Primary school)														
- Vocational education	-	-	-	-	-	-	1.243***	(0.05)	1.150***	(0.05)	1.179***	(0.05)	1.188***	(0.05)
- General upper secondary education	-	-	-	-	-	-	0.765	(0.11)	0.674**	(0.10)	0.691*	(0.10)	0.703*	(0.11)
- Short/medium cycle higher education	-	-	-	-	-	-	0.992	(0.07)	0.897	(0.06)	0.894	(0.06)	0.891	(0.07)
- Long cycle higher education	-	-	-	-	-	-	0.612***	(0.08)	0.479***	(0.07)	0.549***	(0.08)	0.532***	(0.08)
Mother Education (ref. Primary school)														
- Vocational education	-	-	-	-	-	-	1.225***	(0.05)	1.125**	(0.05)	1.157**	(0.05)	1.164***	(0.05)
- General upper secondary education	-	-	-	-	-	-	1.321**	(0.13)	1.220	(0.13)	1.277*	(0.14)	1.284*	(0.14)
- Short/medium cycle higher education	-	-	-	-	-	-	1.070	(0.06)	0.970	(0.07)	0.987	(0.07)	0.996	(0.07)
- Long cycle higher education	-	-	-	-	-	-	0.626*	(0.12)	0.523**	(0.10)	0.578**	(0.12)	0.585**	(0.12)
Father SES (ref. Low skilled)														
- Self-employed	-	-	-	-	-	-	-	-	1.452***	(0.09)	1.451***	(0.09)	1.451***	(0.09)
- Employee (high & medium skill)	-	-	-	-	-	-	-	-	0.866*	(0.05)	0.934	(0.06)	0.941	(0.06)
- Employee (other)	-	-	-	-	-	-	-	-	1.008	(0.06)	1.016	(0.06)	1.009	(0.06)
- Unemployed	-	-	-	-	-	-	-	-	0.744*	(0.09)	0.803	(0.10)	0.816	(0.10)
- Outside labour market	-	-	-	-	-	-	-	-	0.859*	(0.06)	0.924	(0.06)	0.919	(0.06)
Mother SES (ref. Low killed)														
- Self-employed	-	-	-	-	-	-	-	-	1.178	(0.11)	1.154	(0.11)	1.139	(0.11)
- Employee (high & medium skill)	-	-	-	-	-	-	-	-	0.976	(0.06)	1.032	(0.06)	1.029	(0.06)
- Employee (other)	-	-	-	-	-	-	-	-	1.199**	(0.07)	1.190**	(0.07)	1.175**	(0.07)
- Unemployed	-	-	-	-	-	-	-	-	0.848	(0.08)	0.849	(0.08)	0.841	(0.08)
- Outside labour market	-	-	-	-	-	-	-	-	0.893	(0.05)	0.907	(0.06)	0.895	(0.06)
Family Income	-	-	-	-	-	-	-	-	1.099***	(0.01)	1.114***	(0.01)	1.116***	(0.01)
Skole (ref.: 15. KTS (WAS))														
101401: KTS	-	-	-	-	-	-	-	-	-	-	0.231***	(0.02)	0.226***	(0.02)
147401: TEC	-	-	-	-	-	-	-	-	-	-	1.187	(0.11)	1.189	(0.11)
219411: Erhvervsskolen Nordsjælland	-	-	-	-	-	-	-	-	-	-	0.587***	(0.05)	0.570***	(0.05)
265416: Roskilde TS	-	-	-	-	-	-	-	-	-	-	0.593***	(0.06)	0.580***	(0.06)
280051: Tradium	-	-	-	-	-	-	-	-	-	-	1.137	(0.12)	1.129	(0.12)
280052: Uddannelsescenter Holstebro	-	-	-	-	-	-	-	-	-	-	1.489**	(0.18)	1.487**	(0.19)
373401: EUC Sjælland	-	-	-	-	-	-	-	-	-	-	0.446***	(0.04)	0.450***	(0.04)
376402: CELF	-	-	-	-	-	-	-	-	-	-	0.311***	(0.05)	0.311***	(0.05)
461452: Syddansk Erhvervsskole	-	-	-	-	-	-	-	-	-	-	0.668***	(0.05)	0.660***	(0.05)
479413: Svendborg Erhvervsskole	-	-	-	-	-	-	-	-	-	-	0.237***	(0.04)	0.234***	(0.04)
537401: EUC Syd	-	-	-	-	-	-	-	-	-	-	0.692***	(0.07)	0.683***	(0.07)
561401: EUC Vest	-	-	-	-	-	-	-	-	-	-	0.901	(0.08)	0.908	(0.08)
657401: Herningsholm Erhvervsskole	-	-	-	-	-	-	-	-	-	-	3.096***	(0.24)	3.118***	(0.25)
743401: Silkeborg Tekniske Skole	-	-	-	-	-	-	-	-	-	-	0.492***	(0.10)	0.504**	(0.11)
779401: Skive Tekniske Skole	-	-	-	-	-	-	-	-	-	-	1.034	(0.14)	1.047	(0.14)
787410: EUC Nordvest	-	-	-	-	-	-	-	-	-	-	1.853***	(0.22)	1.813***	(0.22)
791418: Mercantec	-	-	-	-	-	-	-	-	-	-	1.722***	(0.18)	1.679***	(0.18)
851401: Tech College Aalborg	-	-	-	-	-	-	-	-	-	-	0.510***	(0.04)	0.509***	(0.04)
- GPA	-	-	-	-	-	-	-	-	-	-	-	-	1.060***	(0.01)
Observations	8640		24947		24631		24631		24631		24612		24612	
Pseudo R-squared	0.007		0.026		0.099		0.107		0.118		0.170		0.177	
AIC	8578.345		22287.289		20359.343		20214.095		19990.169		18834.721		18694.668	
BIC	8592.473		22319.787		20448.572		20384.442		20274.080		19264.604		19140.772	

Exponentiated coefficients; Standard errors in parentheses

	Dropout			
	Cox CRM		Fine-Gray CRM	
WAS	0.833*	(0.02)	0.803**	(0.01)
start year = 2009	0.803***	(0.00)	0.896*	(0.01)
start year= 2010	0.940	(0.20)	0.990	(0.82)
summer	1.400***	(0.00)	1.376***	(0.00)
female	1.311***	(0.00)	0.935	(0.24)
Nuclear Family at age 15	0.820***	(0.00)	0.779***	(0.00)
Ethnicity (ref: Danish)				
- Immigrant	1.048	(0.58)	1.100	(0.24)
- Descendent	1.270*	(0.02)	1.269*	(0.01)
Age	1.064*	(0.02)	1.041	(0.15)
Age^2	0.999*	(0.04)	0.999	(0.06)
Father Education (ref. Primary school)				
- Vocational education	0.896*	(0.01)	0.919	(0.06)
- General upper secondary education	0.958	(0.76)	0.964	(0.79)
- Short/medium cycle higher education	0.879	(0.09)	0.882	(0.10)
- Long cycle higher education	0.908	(0.54)	0.954	(0.76)
Mother Education (ref. Primary school)				
- Vocational education	0.924	(0.08)	0.885**	(0.01)
- General upper secondary education	0.962	(0.73)	0.925	(0.49)
- Short/medium cycle higher education	0.959	(0.59)	0.931	(0.35)
- Long cycle higher education	1.144	(0.36)	1.242	(0.14)
Father SES (ref. Low skilled)				
- Self-employed	1.026	(0.74)	0.961	(0.62)
- Employee (high & medium skill)	1.130	(0.09)	1.159*	(0.04)
- Employee (other)	1.066	(0.28)	1.084	(0.17)
- Unemployed	1.024	(0.82)	1.113	(0.26)
- Outside labour market	1.133*	(0.04)	1.113	(0.08)
Mother SES (ref. Low killed)				
- Self-employed	0.777*	(0.05)	0.746*	(0.02)
- Employee (high & medium skill)	0.974	(0.71)	0.953	(0.50)
- Employee (other)	1.036	(0.60)	1.030	(0.66)
- Unemployed	1.081	(0.34)	1.091	(0.27)
- Outside labour market	1.183**	(0.00)	1.208***	(0.00)
Family Income	1.002	(0.91)	0.986	(0.32)
GPA	0.942***	(0.00)	0.897***	(0.00)
Skole (ref.: 15. KTS (WAS))				
- Randers TS (WAS)	1.499***	(0.00)	1.370***	(0.00)
- Syddansk Ervhervsskole (WAS)	1.007	(0.93)	1.068	(0.37)
- Silkeborg TS (WAS)	1.205	(0.17)	1.121	(0.42)
- EUC Vest (CC)	1.121	(0.10)	1.154*	(0.03)
- EUC Nordvest (CC)	1.080	(0.53)	1.036	(0.77)
- Herningsholm Erhvervsskole (CC)	1.001	(0.99)	1.022	(0.80)
- CELF (CC)	0.983	(0.81)	1.350***	(0.00)
- Uddannelsescenter Holstebro (CC)	1.101	(0.32)	0.994	(0.95)
Observations	6843		6843	

Note: (Sub)Hazard Ratios; p-values in parentheses.