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The Impact of Academic Preparedness of Immigrant Students on Completion of Commercial Vocational Education and Training

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Preface

We analyse the impact of academic preparedness on completion probabilities in commercial vocational education and training among immigrant students in Denmark. Utilizing high quality longitudinal register data, we show that better academic preparedness increases completion probabilities of the 2-year basic course, and, partly indirectly through its effect on grades obtained during the basic course, also affects completion of the full 4-year programme. While raising academic preparedness is quite effective to improve basic course completion, while it is not as closely related to full programme completion. Raising grades seems to matter most at the lower end of the form 9 grade distribution. Yet, increasing initial academic preparedness of students from the lowest to the highest level would by itself increase the full programme completion rate to only 16 per cent. Even with augmented academic preparedness, there are still other strong forces causing dropout before completing the programme. Additional results show that Math skills, rather than skills in Danish, affect completion rates.

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Key words: dropout, immigrant education, vocational education and training
JEL codes: I21, J15.

Contents

1. Introduction

In Denmark, there is great political awareness on matters relating to student retention and progression to completion in vocational education and training (VET) as a key to achieving major political goals. Increasing completion rates in VET is perceived as one of the main inclusion mechanisms for achieving the policy objective of having at least 95 per cent of a youth cohort complete a youth educational programme at the upper secondary level by 2015.

Drop-out rates from VET programmes are considerably higher than from other youth educational programmes and have been increasing from 40 to 50% between 2000-2008[1]. Among all VET students, immigrant students are a particularly vulnerable group with drop-out rates considerably higher than average.

Also, unlike dropouts from other programmes, only 30% of VET dropouts continue in another education within two years[2]. Thus, VET dropouts are at a high risk of not completing a youth educational programme at the upper secondary level at all, which makes them more vulnerable to unemployment and labour-market marginalisation.

Using data from administrative registers on entire student cohorts, this study investigates the role of academic preparedness as measured by grades from school-leaving exit exams in form 9 on completion probabilities of the full 4-year CVET programme, and of the 2-year basic course. We focus our analysis on immigrant students, since their dropping-out rates are particularly high. Furthermore, we restrict our analysis on the CVET programme, which is the VET programme that is by far the most popular among immigrant students[3], and which is the only CVET programme, for which we have exam data available for the 2-year basic course (which we use in section 4.4.).

The goal of this paper is to provide a better understanding of the impact of cognitive skills in dropping out of CVET for immigrant students. Our analysis contributes to the existing (Danish) literature on immigrants' VET completion by providing a far more comprehensive analysis than the existing research: first, we investigate the role of academic preparedness (measured by form 9 grades) in a study with explicit focus on immigrant students in *commercial* VET; second, as a novelty, we also consider the role of academic preparedness on grades obtained during CVET basic programme, and their impact on enrolment into and completion of the main course.

To anticipate our main results, we show that better academic preparedness as measure by form 9 exam grades increases completion probabilities of the 4-year CVET programme, in particular through its impact on basic course outcomes (completion and achievement). Raising academic preparedness is quite effective to improve basic course completion, while it is not as closely related to full programme completion. Raising grades matters most at the lower end of the form 9 grade

[1] In general upper secondary schools' or vocational upper secondary schools' drop-out rates have been stable at a much lower level (20%); Danish Ministry of Education (2010), p. 73, table 6.4.

[2] Danish Ministry of Education (2010), p. 76, table 6.7.

[3] 45% of VET students with an immigrant background choosing the commercial line (Kolodziejczyk & Hummelgaard 2011), p. 39, table 3.8.

distribution. Thus, to maximise efficacy of policies aimed at reducing drop-out rates, they should be targeted at those who leave lower secondary school with very poor results. Yet, we cannot rule out the possibility that part of this result may be due to selection on unobservables into CVET. Moreover, we find that Math skills rather than Danish skills seem to be crucial for increasing completion probabilities.

The paper proceeds as follows. Section 2 briefly outlines the Danish VET system and the commercial line in particular, and gives an overview of the related literature. Section 3 presents the data and method, and section 4 offers results. Section 5 concludes.

2. The Danish VET system and related literature

The Danish VET system is an integral part of the overall youth education, and as such, is primarily targeted at young people (16+)[4]. Approximately 30% of a youth cohort choose to enrol in a VET programme[5].

Vocational education and training in Denmark is structured according to the dual principle meaning that periods in school alternate with periods of training in an enterprise. The commercial vocational education and training programme typically starts with a basic course of study of up to 2 years of duration at an upper secondary school for commercial training (hereafter: commercial college)[6]. The basic course is made up of several entryways with each leading to a range of specialisations in the main course.

The basic course is followed by the main course, which primarily consists of training in an enterprise. To enrol into the main course of study and complete the education, the students need a training contract (internship) with an enterprise. If the students do not succeed in obtaining a training contract, they may in some of the programmes continue in school-based practical training[7].

The greatest challenge for the VET system is its high drop-out rates. Overall, approximately two thirds of the students complete the basic course and of those who enrol in the main course, about 75% complete, which results in an overall completion rate of 50%[8]. Overall VET completion rates are even lower for immigrants (40%). Reasons for dropping out can be a range of different circumstances such as difficulties of obtaining internship training contract with a firm and academic failure. In this paper, we investigate whether better academic preparedness upon enrolment in VET programmes might help more students complete.

The existing research builds upon the literature of education production functions (Hanushek 1986). In this literature, inputs into education production are related to outputs from production. Inputs are typically individual level inputs (student's socioeconomic background, ethnicity, gender and ability) and school inputs (school resources, learning environment). Typical outputs from schooling are completion, grades and test scores.

Previous research on the topic of dropouts from dual vocational training is quite scarce. This is probably partly due to the fact that this special kind of training is mainly provided outside the US, in German-speaking countries (Switzerland, Germany, Austria), but also in Denmark and the Netherlands. Two of the few existing studies are Bessey & Backes-Gellner (2007) and Coneus, Gernandt & Saam (2009). Using a German dataset, Bessey & Backes-Gellner present empirical evidence on premature terminations of apprenticeship contracts in Germany. Coneus et al. (2009)

[4] However, the average age of trainees in VET is 22, and the VET system also offers a wide range of possibilities for adults (25+).

[5] Kolodziejczyk & Hummelgaard (2011), Tb. 3.1.

[6] Other VET programmes typically have a shorter basic course.

[7] During the period of our analyses, there was a possibility for school-based practical training in some CVET main courses.

[8] Danish Ministry of Education (2010), p. 72.

analyse the determinants of dropout from secondary and vocational education in Germany using data from the Socio-Economic Panel from 2000 to 2007. They find that both better school grades and higher non-cognitive skills reduce the risk to become an educational dropout.

More generally, dropout from secondary education, in particular from high school, has been examined at length in the education literature. A substantial literature exists, particularly for the US that seeks to identify the factors associated with student dropout. Generally, studies confirm that a family background characterised by a low socioeconomic background is strongly associated with dropping out (Rumberger 1983, 2011; Adelman 1999, 2006; Bailey & Alfonso 2005; Cabrera et al. 2005).

The school environment is another factor associated with dropping out that has been studied in the literature. In particular, Wehlage & Rutter (1987) argued that although educators have little control over a dropout's background characteristics, they might be able to alter student experiences in school that might contribute to dropping out. They find that both student level and school level factors are related to dropping out.

A substantial part of the literature stresses that cognitive skills have an important role in completion probabilities in education. Eckstein & Wolpin (1999) examine high school dropping out in the US using a structural dynamic choice framework. In a recent paper, Foley, Gallipoli & Green (2009) use a large, rich Canadian micro-level dataset to examine the channels through which family socio-economic status and unobservable characteristics affect children's decisions to drop out of high school. They both find that cognitive ability has a substantial impact on dropping out. Cognitive skills are also important at the college and university level. Stratton, O'Toole & Wetzel (2008) use data from the Beginning Postsecondary Survey (BPS-90) and show that students with low GPA are more likely to drop out. Evidence on university dropout from the UK suggests that academic ability has a significant positive influence on the likelihood that a student will successfully complete university (e.g. Johnes & Taylor 1989, 1990; Johnes 1990; Smith & Naylor 2001).

In a Danish context, Colding (2006) shows that differences in socioeconomic backgrounds between Danes and immigrants can explain some, but far from all of the gap in drop-out rates from vocational upper secondary education. Jensen & Jørgensen (2005) argue that inadequate Danish language proficiency, inadequate academic preparedness from school, institutional features at vocational schools and discrimination in the labour market are important reasons why children of immigrants are unable to meet the educational standards and find an apprenticeship.

Three recent analyses of completion rates in commercial colleges in Denmark (EVA 2009; Larsen & Jensen 2010; Kolodziejczyk & Hummelgaard 2012) estimate dropout from the CVET basic course. Only Kolodziejczyk & Hummelgaard present separate results for immigrant students. They all find that better academic preparedness as measured by grades in the school exit exams in form 9 has a positive impact on basic course completion probabilities.

The present analysis contributes to the existing (Danish) literature on immigrants' VET completion in various ways. First, we investigate the role of academic preparedness (measured by form 9 grades) in a study with explicit focus on immigrant students in *commercial* VET. Second, as a novelty, we also consider the role of academic preparedness on grades obtained during the CVET

basic programme, and their impact on enrolment into and completion of the main course. We further consider heterogeneous effects for boys and girls. Moreover, we consider the effects of measurable school resources on completion rates, and we analyse the impact of academic preparedness on subsequent career choices of non-completers (drop out vs. stop out). Consequently, this paper is far more comprehensive than the existing research.

3. Data source and definitions

3.1 Data

We use longitudinal student level data from administrative registers. We follow full cohorts of immigrant students who left lower secondary school between 2002 and 2005 and enrolled in commercial vocational education and training (CVET). We restrict the dataset to the four cohorts who complete form 9 in 2002-2005, because (i) 2002 is the first year where student level grade information from school leaving examinations is available, and (ii) the youngest of the four cohorts (completed form 9 in 2005) has time to: attend form 10 (complete by summer 2006), begin and complete basic course (by summer 2008), start the main course immediately after, and complete the main course by summer 2010, our last year of data.[9] Thus, compared to *all* students who ever enrol in CVET, our sample is limited to students who are fresh out of lower secondary education, and for most of them this is the first youth education programme they enrol in[10]. Thus, the cohorts who enter our estimations are quite young. This has the advantage that we get updated information on recent cohorts, but the disadvantage is that some of the students will not have progressed sufficiently through their educational career for us to observe their final outcomes.[11]

Our estimation sample contains roughly 3,400 immigrant students who were enrolled in one of 39 commercial colleges. In addition to measures of academic achievement, the dataset contains rich demographic and socioeconomic (SES) measures for the students and their families that allow us to control for differences in students' individual and family background.

3.2 Variables

3.2.1 Outcomes

In our analysis, we generally consider drop out in a narrow sense: students, who have initially enrolled in CVET and who have not completed either the basic course of CVET or the full 4-year CVET programme by the last year of data. More precisely, students are only considered as completers, if they complete this specific programme (CVET). Given our approach, the outcome analysed is identical to not completing CVET by the last year of data (2010). One implication, and advantage, of this is that students who leave CVET, but return at a later point are only defined to be dropouts if they did not complete by 2010.

While having students complete the full 4-year programme is a primary goal for policy makers, many students consider completing the basic course a stepping stone for entering the labour market or for enrolling in general upper secondary education programmes. From that perspective,

[9] We include cohort dummies in the regressions to take account of that the younger cohorts had shorter time to complete than the older cohorts.

[10] In Denmark, it is not peculiar to start more than one youth education programme.

[11] This is valid in particular for the final outcome: completion of the full CVET programme. Yet, only 2% are still enrolled by our last year of data. While the problem of not observing final outcomes for all students seems to be limited, we repeated our main analysis using a slightly different definition of completion (including still enrolled students) as a robustness check. The results are similar to the results of our main specification.

completing basic education becomes an educational goal in its own right, and studying the effect of initial skills on completion probabilities of basic programme is relevant as well.

Thus, we define two main outcomes:

(i) completing the full 4-year programme, where a non-completer is a person who initially enrolled in CVET (basic course) but does not complete the full commercial programme (i.e. basic and main course of the commercial programme)

(ii) completing the initial 2-year school-based basic course, where a dropout is a person who initially enrolled in CVET (basic course) but does not complete the basic course of CVET by our last year of data.[12]

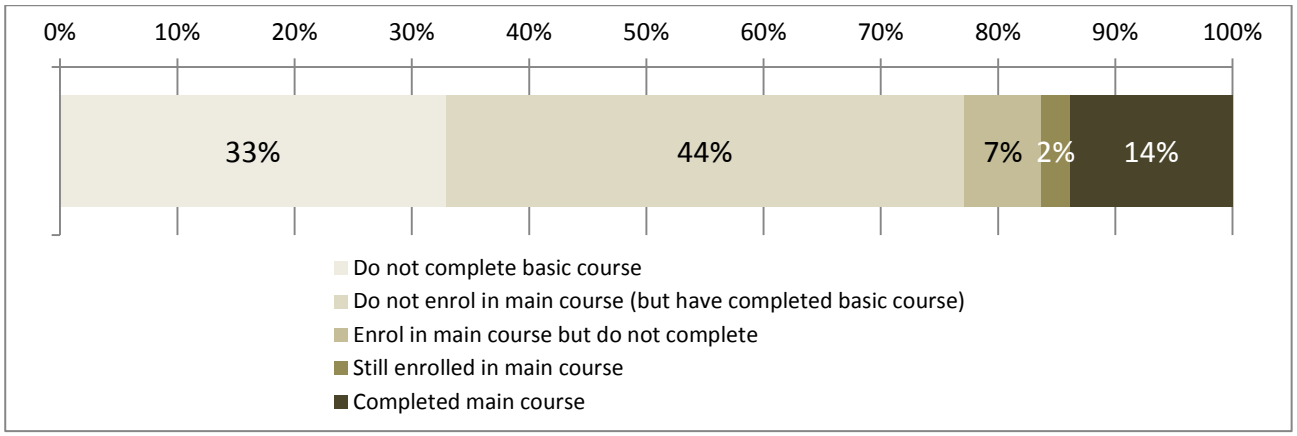
In an additional analysis, we also investigate initial enrolment into the main programme.

As mentioned above, our study focuses on a narrow definition of drop out. We do not consider a broader range of possible criteria of success for students who initially enrol in CVET. Other definitions of success might be more relevant from a broader societal perspective, e.g. *enrolling in/completing another education after dropping out of CVET* or even *not becoming unemployed/in-active after dropping out from CVET*. We consider such alternatives in section 4.6.1.

Figure 3.1 shows the outcomes observed in our sample of roughly 3,400 immigrant students of the four form 9 cohorts who started in CVET between 2002 and 2005. Of the students, who initially enrol in CVET, 33% do not complete the 2-year basic course. 44% complete the basic course, but do not continue into the commercial line main course. 7% enrol in the main course, but do not complete. 14% have completed the full 4-year programme, while another 2% are still enrolled in the main course by our last year of data. Thus, while there is a high drop-out rate already during the 2-year basic course, the largest dropout occurs during the transition from the basic course to the main course. These high drop-out rates may be due to other factors than academic failure, e.g. the fact that some students tend to regard basic course completion as a stepping stone to enrolment in general upper secondary education or directly to employment as suggested in Newinsight (2009). Another important factor is the lack of training contracts in particular for immigrant students: only 30-35% of immigrant students, who enrol in CVET, obtain a training contract (Kolodziejczyk & Hummelgaard 2012).

[12] This definition is similar to the one used in Larsen & Jensen (2010), while the definition used in Kolodziejczyk & Hummelgaard (2011) is broader (there, a completer is a student having completed *any* youth education programme, not necessarily the one he or she initially enrolled in). Thus, our completion rates tend to be lower than those reported in Kolodziejczyk & Hummelgaard.

Figure 3.1: Educational outcomes of immigrant basic course enrolees in CVET



Our drop-out rates are higher than the ones reported for the full sample of CVET students (Danes and immigrants) in Larsen & Jensen (2010). They find that 14% do not complete the basic course, while 39% do complete, but do not continue into the main course[13]. 5% drop out of the main programme, while 42% complete the main programme (or are still enrolled in the last year of data)[14]. Thus, while the dropout in our immigrant sample is higher at all stages of the programme, the most substantial difference is observed for completing the basic course, where only 67% of immigrants complete compared to 86% of the full sample. Kolodziejczyk & Hummelgaard (2012) find that 27% of immigrant students in CVET do not complete the basic course (Tb. 5.6). This is slightly lower than in our sample which might be due to the fact that switching to another VET basic course (and completing it) is not registered as dropout in Kolodziejczyk & Hummelgaard. They find that 34% of those who complete enrol in the main course (Tb. 5.11), which is in line with our results.[15]

3.2.2 Variable of interest

Academic preparedness is approximated using grades from the national school exit exams in form 9 for Danish and Math. The results from the school exit exam are normally considered comparable across schools. We create an outcome for Danish grades, where the one-dimensional composite measure for Danish is calculated as the simple mean of the pupils' three grades given for oral Danish, written Danish and spelling. The measure for Math is the exam grade for written math. The grade scale in our sample period was a 13-point numerical grading scale. The possible grades are 00, 03, 5, 6, 7, 8, 9, 10, 11 and 13; where 6 is the lowest passing grade, and 8 represents average performance.

Figure 3.2 shows the distribution of form 9 exam grades of the students in our CVET immigrant sample. 8% of students who have completed form 9 enter without having sat the (at that time

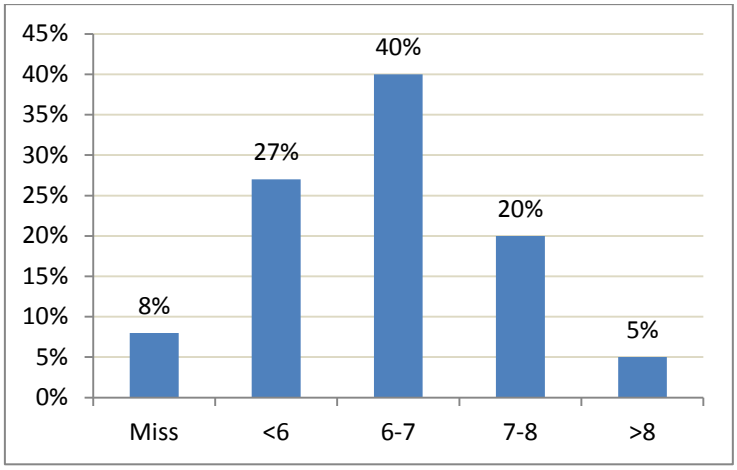
[13] Newinsight (2009) also analyses dropout during the transition from the basic to the main course for the pooled sample of Danish and immigrant students in CVET. They find that 40% of basic course completers continue into the main course within one year, which is in line with the results in Larsen & Jensen (2010).

[14] When we calculate completion rates for the full sample (Danes and immigrants) in our data, the pattern is similar to Larsen & Jensen (2010): 19% do not complete the basic course, 39% do not continue into the main course, 6% drop out during main course, while 36% have completed the main course or are still enrolled.

[15] We find that 67% complete the basic course and 23% enrol in the main course (= 34% of 67%).

voluntary) form 9 exams in Danish and Math.[16] 27% enter with an average grade below 6, while the largest group of students (40%) has a grade average between 6 and 7. 20% of students are in our next-highest category of 7-8, while only 5% of students have an average grade of 8 or above. Thus, our sample of immigrant CVET enrolees is clearly below average with respect to the overall cognitive skill distribution at the end of compulsory schooling.

Figure 3.2: Academic preparedness of basic course enrolees: distribution of mean form 9 exam grades



3.2.3 Controls

We include selected individual characteristics to control for differences in the choice of college and the completion probabilities. Individual level characteristics were chosen based on studies that have shown that students who have stronger academic records and who come from higher SES families are more likely to graduate. As measures of SES, we include parental education, income and labour market status. Other individual level controls include indicators for gender, country of origin, immigrant generation, family structure (lives with both parents) and family size (number of children). We also include a dummy indicating attendance of the optional form 10. Additionally, we include form 9 cohort indicators to capture unobserved cohort effects and to control for the fact that older cohorts have had more time to complete by our last year of data. We further include commercial college fixed effects to control for both school quality and selection into different commercial colleges.

[16] We assume that those who chose not to sit the exam are mainly at the lower tail of the skill distribution.

Table 3.1: Descriptive statistics

			Subsample											
			Full program non-completers			Full program completers			Basic course non-completers			Basic course completers		
	Exam grades		Freq.	Percent	Cum.	Freq.	Percent	Cum.	Freq.	Percent	Cum.	Freq.	Percent	Cum.
	Missing	(0/1)	256	8,8	8,8	30	6,4	6,4	125	11,3	11,3	161	7,1	7,1
	´<6	(0/1)	824	28,3	37,1	98	20,8	27,1	354	32,1	43,4	568	25,0	32,0
	´6-7	(0/1)	1135	39,0	76,1	224	47,5	74,6	413	37,4	80,8	946	41,6	73,6
	´7-8	(0/1)	569	19,6	95,7	92	19,5	94,1	180	16,3	97,1	481	21,1	94,7
	´>8	(0/1)	125	4,3	100,0	28	5,9	100,0	32	2,9	100,0	121	5,3	100,0
	Variable		# obs	Mean	SD	# obs	Mean	SD	# obs	Mean	SD	# obs	Mean	SD
	Male	(0/1)	2909	0,52	0,50	472	0,49	0,50	1104	0,59	0,49	2277	0,48	0,50
	2-parent family	(0/1)	2909	0,67	0,47	472	0,71	0,46	1104	0,64	0,48	2277	0,69	0,46
	Attended form 10	(0/1)	2909	0,60	0,49	472	0,56	0,50	1104	0,61	0,49	2277	0,58	0,49
	# children: 1-2	(0/1)	2909	0,41	0,49	472	0,50	0,50	1104	0,41	0,49	2277	0,43	0,50
	# children: 3-4	(0/1)	2909	0,44	0,50	472	0,42	0,49	1104	0,44	0,50	2277	0,43	0,50
	# children: 5+	(0/1)	2909	0,15	0,36	472	0,08	0,27	1104	0,16	0,36	2277	0,13	0,34
Mother's education	Compulsory	(0/1)	2145	0,57	0,49	366	0,51	0,50	799	0,58	0,49	1712	0,56	0,50
	High school	(0/1)	2145	0,13	0,33	366	0,12	0,33	799	0,14	0,35	1712	0,12	0,33
	Vocational education	(0/1)	2145	0,20	0,40	366	0,29	0,45	799	0,19	0,39	1712	0,23	0,42
	Tertiary education	(0/1)	2145	0,10	0,29	366	0,08	0,28	799	0,10	0,30	1712	0,09	0,29
Father's education	Compulsory	(0/1)	2121	0,48	0,50	342	0,42	0,49	780	0,51	0,50	1683	0,45	0,50
	High school	(0/1)	2121	0,08	0,28	342	0,08	0,27	780	0,10	0,29	1683	0,08	0,27
	Vocational education	(0/1)	2121	0,27	0,45	342	0,34	0,47	780	0,25	0,43	1683	0,30	0,46
	Tertiary education	(0/1)	2121	0,17	0,37	342	0,17	0,38	780	0,15	0,35	1683	0,17	0,38
	Mother's income (in DKK, 1996=100)		2758	107960	52501	450	118400	50892	1045	106101	48827	2163	111030	53974
	Father's income (in DKK, 1996=100)		2477	135094	80417	396	145342	82302	927	134487	84816	1946	137468	78731
Mother's labour market status	Self-employed	(0/1)	2758	0,02	0,15	450	0,01	0,11	1045	0,02	0,14	2163	0,02	0,15
	Wage earner: basis-top level	(0/1)	2758	0,10	0,30	450	0,15	0,36	1045	0,10	0,30	2163	0,11	0,32
	Other wage earners	(0/1)	2758	0,19	0,39	450	0,24	0,43	1045	0,17	0,38	2163	0,21	0,41
	Social transfers	(0/1)	2758	0,53	0,50	450	0,46	0,50	1045	0,56	0,50	2163	0,50	0,50
	Others	(0/1)	2758	0,15	0,36	450	0,14	0,35	1045	0,15	0,35	2163	0,15	0,36
Father's labour market status	Self-employed	(0/1)	2477	0,12	0,32	396	0,11	0,31	927	0,13	0,34	1946	0,11	0,31
	Wage earner: basis-top level	(0/1)	2477	0,17	0,38	396	0,20	0,40	927	0,14	0,35	1946	0,19	0,39
	Other wage earners	(0/1)	2477	0,18	0,38	396	0,22	0,42	927	0,18	0,39	1946	0,19	0,39
	Social transfers	(0/1)	2477	0,44	0,50	396	0,38	0,49	927	0,46	0,50	1946	0,42	0,49
	Others	(0/1)	2477	0,09	0,29	396	0,08	0,28	927	0,08	0,28	1946	0,09	0,29
	Second generation immigrant	(0/1)	2909	0,46	0,50	472	0,45	0,50	1104	0,46	0,50	2277	0,46	0,50
Country of origin	Turkey	(0/1)	2909	0,29	0,45	472	0,28	0,45	1104	0,29	0,45	2277	0,29	0,45
	Lebanon	(0/1)	2909	0,09	0,29	472	0,07	0,25	1104	0,11	0,32	2277	0,08	0,27
	Pakistan	(0/1)	2909	0,08	0,27	472	0,05	0,22	1104	0,05	0,22	2277	0,09	0,28
	Former Yugoslavia	(0/1)	2909	0,06	0,24	472	0,10	0,30	1104	0,06	0,23	2277	0,07	0,25
	Bosnia	(0/1)	2909	0,06	0,25	472	0,16	0,37	1104	0,04	0,20	2277	0,09	0,29
	Other countries	(0/1)	2909	0,41	0,49	472	0,34	0,47	1104	0,44	0,50	2277	0,38	0,49

Grades from basic course (CVET). As a novelty, we consider grades from exams taken during the basic course of CVET. We use this information in section 4.4 to show that grades from basic course are less noisy predictors for main course outcomes than academic preparedness as measured by form 9 exam grades.

Missing values are handled by including missing value flags for each right-hand side variable. Table 3.1 offers descriptive statistics for the main estimation sample. The main sample is divided

into subsamples for the two main outcomes: completers and non-completers of the full 4-year CVET programme (left); and completers and non-completers of the 2-year basic course (right).[17]

The descriptives show that, generally, completers (both of the full programme and the basic course) enter CVET with better academic preparedness as measured by form 9 grades, a greater share is female and has not attended the optional form 10[18]. Furthermore, completers tend to have a more favourable family background: more often, they live in two-parent families, have fewer siblings, and have parents who less often are low educated and more often have completed a VET themselves. Also, parents of completers have higher income, are more often wage earners and less often permanently inactive in the labour market and thus less often dependent on social transfer payments (e.g. incapacity benefit, social security or other income transfers). These differences between completers and non-completers tend to be stronger with respect to full programme completion than for basic course completion. Overall, completers both tend to be better academically prepared upon enrolment into CVET, and they tend to come from more well-resourced homes (with better educated parents, with stronger labour-market attachment and higher wages) than non-completers.

About 45% of the sample are second generation immigrants. First and second generation immigrants are equally distributed among completers and non-completers. Almost 30% of the students have origins in Turkey, and they are equally divided among completers and non-completers. Bosnians have the highest share of completers (70% for both outcomes), while students originating from Lebanon have the lowest share of completers (40% for both outcomes). Pakistanis have a rather high share of completers of the basic programme (63%), but much fewer complete the full 4-year programme[19].

[17] Table A1 in the appendix also shows results for two other subsamples: those who complete the basic course, but do not continue into the main programme, and those who enrol into the main programme, but do not complete.

[18] Note that this is so, even though the aim with form 10 attendance is to help students get better prepared prior to enrolling in youth education. Yet, negative selection into form 10 seems to override any positive learning effect of form 10.

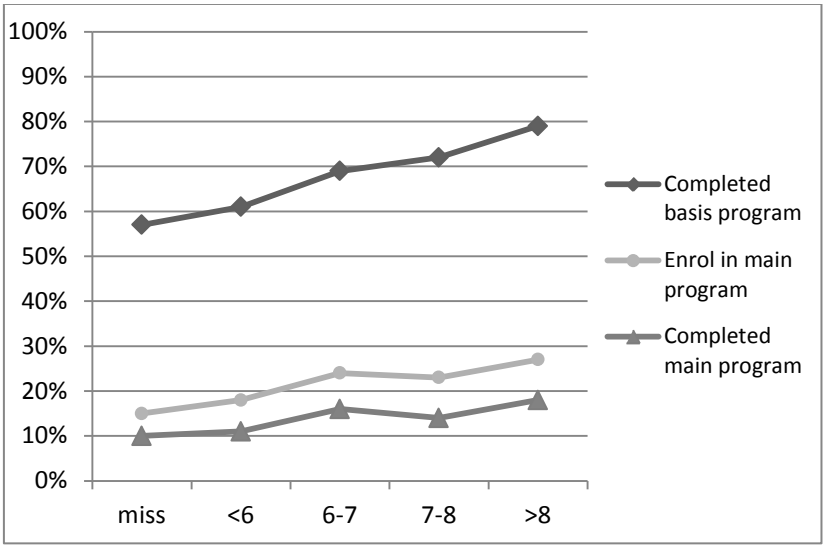
[19] A rather high percentage of Pakistanis who initially enrol into VET tend to drop out and enrol in a general upper secondary education programme (Kolodziejczyk & Hummelgaard 2011, p. 46, tb. 3.12).

4. Results

4.1 Descriptive results

Figure 4.1 shows completion rates by average form 9 exam grades in Danish and Math for immigrant students. Completion rates vary between 57-79% in the basic course and between 10-18% for the main course. While the general impression is that completion rates increase with academic preparedness for both basic course and full programme completion, this tendency seems to be more prevalent for basic course completion. Also, enrolment probabilities in the main course are increasing with academic preparedness.

Figure 4.1: Completion and enrolment rates by form 9 exam grades



4.2 Empirical approach

The central focus of this work is the impact of academic preparedness on completion probabilities in commercial vocational education and training. More specifically, we analyse both completion of the full four year programme and completion of the first part of the programme, i.e. the school-based basic course. Concentrating on drop-out behaviour at specific points of the educational programme permits a more accurate characterisation of the impact of academic preparedness and helps design retention programmes.

This study uses a binary outcome (*completion*) to measure student success. This binary outcome takes the value of unity if any of the aforementioned outcomes are observed (i.e. completion of the full four-year commercial programme or the initial two-year basic programme), and zero otherwise.

The outcome *completion* may be thought of as being the result of a latent process in which a student compares the marginal benefits to the marginal costs of completing CVET. In this case, let the

continuous latent variable, y_{ij}, which represents the value student *i*, enrolled in commercial college *j*, receives from the decision to complete, be specified as:

$$y_{ij}^{*} = \alpha_0 + \alpha_1 AP_{ij} + \mathbf{X}_{ij}\beta + \boldsymbol{Z}_j\gamma + \varepsilon_{ij}$$
$$y_{ij} = 1(y_{ij}^{*} > 0)$$

where $1(\cdot)$ is an indicator function equal to one if the enclosed statement is true, i.e. the student completed and zero otherwise.

The corresponding linear completion probability model is given by:

$$P\left[y_{ij} = 1 \middle| AP, X, Z\right] = \alpha_0 + \alpha_1 AP_{ij} + \mathbf{X}_{ij}\beta + \boldsymbol{Z}_j\gamma + \varepsilon_{ij}$$

where *AP* is the measure of student academic preparedness (average form 9 grades in Danish and Math) and matrix **X** is a vector of exogenous individual student and family characteristics that are thought to influence completion probabilities (e.g. gender, family structure, ethnicity, parental education), while **Z** are commercial college fixed effects that take account of both selection into different colleges and school quality, and ε_{ij} is the residual[20]. Standard errors are corrected for clustering at the school level (commercial college). All regression results presented in the main section are estimated as linear probability models. We have also estimated by logistic regression, and the results are very similar.

Selection issues Even though we control for selection into different commercial schools and student background, our estimated form 9 grade coefficients could still be biased, if selection into CVET rather that into general upper secondary education or other lines of VET is based not only on grades, but also on student motivation. To see this, imagine that highly motivated students with average form 9 grades choose to enrol into general upper secondary education, while students with similar form 9 grades, but less taste and motivation for education choose to enrol in (C)VET. Imagine further that all students with poor form 9 grades enrol in (C)VET. Thus, when we estimate the impact of increasing form 9 grades in our sample, we would underestimate the impact at medium/higher levels of the grade distribution, because the positive impact of higher grades would be partly offset by a negative impact from lower motivation.

4.3 Main results

The raw correlation between exam grades and completion rates in Figure 4.1 shows that students with higher exam grades are more likely to complete. However, to estimate the isolated impact of better academic preparedness on completion probabilities, we need to take account of the fact that not only are completers better prepared, they also have a more favourable individual and family background, which might help them complete (Table 3.1). In order to isolate the impact of academic preparedness on completion probabilities, we run regressions that take account of differences in students' socioeconomic and ethnic background and school (commercial college) fixed effects.

[20] Moreover, a set of indicators of the form 9 cohort is included in order to take account of that younger cohorts have less time to complete before our last year of data.

4.3.1 Completion of the full 4-year CVET programme

We begin by presenting the results from a regression that estimates the impact of the average grade in the core subjects Danish and Math from school exit exams in form 9 on completion of the full CVET programme (contingent on having enrolled in basic course). As the reference category, the lowest grade level (below 6) is chosen. The estimation results for exam grades are shown in Table 4.1. A full results table for both full programme completion and completion of the basic course is provided in the appendix (Table A2). Generally, only few controls are significant. Male students are less likely to complete – in particular the basic course. Students living with both parents, students whose father have some tertiary education and who are not self-employed (compared to average wage earners) are more likely to complete the basic course, while students in large families (5 or more children) are less likely to complete the main course. Students with Turkish, Bosnian and in particular Pakistani origin are more likely than students from *other countries*[21]to complete the basic course. Students from Yugoslavia and in particular Bosnia are more likely to complete the full 4-year programme.

Column (1) in Table 4.1 displays differences with respect to the reference category, while column (3) shows the calculated effects of a marginal increase of form 9 grades to the adjacent (upper) category. Thus, for column (3) we have calculated step-by-step improvements from the estimates in column (1), i.e. the differences in predicted completion probabilities of raising academic preparedness marginally from one grade level to the next. Such improvements may be more feasible to achieve than large improvements in students' academic preparedness, and may therefore be more relevant for policy design.

Table 4.1: Effect of exam grades on full programme completion

	Coef	*se*	*One-step*
Grade missing	-0.001	(0.024)	-
Grade < 6	*Ref.*		0.001
Grade 6 - 7	0.049***	(0.015)	0.049***
Grade 7 - 8	0.021	(0.018)	-0.028(*)
Grade > 8	0.056(*)	(0.031)	0.037
N		3350	
adj. R^2		0.045	

*Standard errors in parentheses (*) p<.10, * p<.05, ** p<.01, *** p<.001. All controls included.*

The results show that there is no significant difference on completion of the full CVET programme, whether students have not taken the form 9 exam or when they have, but only have very poor average grades (<6).

Yet, students who have exam grades between 6 and 7, i.e. slightly higher marks than the lowest (non-pass) category[22, 23], have a 4.9 percentage points higher probability to complete than students

[21] I.e. other than Turkey, Lebanon, Pakistan, Yugoslavia and Bosnia.

[22] Note that there is no pass grade for the exam. You cannot *fail* the exam, just get very poor grades, but in other exams in the Danish education system, the pass grade is 6.

with the poorest grades. The size of the effect is large compared to a completion rate of only 11% in the subsample of students with the poorest grades (see Figure 3.1).

The only other (marginally) significant estimate in column (1) is for the highest score category (>8). Increasing exam grades from the poorest to the highest level[24] is related to a rise in completion rates of 5.6 percentage points. Yet, the major part of this effect is realized by raising grades marginally from the very bottom (<6) to the adjacent level 6-7 (right column). Thus, the most important locus to increase completion of the full CVET programme is at the very bottom of the skill distribution by making poor prepared students increase their academic skills marginally to a minimum level which helps them complete.

To sum up, the most effective improvement in prior academic skills with respect to raising full programme completion rates is a local increase from the very bottom of the skill distribution to a minimum level which helps students complete. This suggests that for initiatives for increasing completion rates to be effective, they should be targeted at those with the weakest skills prior to enrolment.[25] However, while raising grades marginally from the very bottom has a substantial percentual impact on completion, absolute completion probabilities remain low. Thus, while better academic preparedness seems to help, there is no indication that it will boost completion rates to acceptable levels. Other factors may be at work, e.g. the fact that some students tend to regard basic course completion as a stepping stone to enrolment in general upper secondary education or directly to employment (Newinsight 2009) or difficulties to get a practice placement. The latter is particularly acute for immigrant students enrolled in CVET. Results in Kolodziejczyk & Hummelgaard (2012) show that only 30-35% of immigrant students, who enrolled in CVET, obtain an internship.[26]

4.3.2 Completion of 2-year basic course

While having students complete the full 4-year vocational commercial programme is a primary goal for policy makers, many students consider completing basic course as a stepping stone for entering the labour market or for continuing in general upper secondary education. From that perspective, completing the basic course becomes an educational goal in its own right, and studying the effect of initial academic preparedness on completion probabilities of the basic course is relevant.

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[23] Note that the only prerequisite for enrolling in vocational training is that the student has completed form 9 (and even this is not strictly mandatory). There is no requirement of having sat or passed the exit exam in order to enrol.

[24] This is not the highest level in the grade scale, but the highest level with a certain number of observations in our sample of immigrant CVET students. 4% of immigrant students who start in CVET have exam grades at or above 8, of these, 3 out of 4 have grades between 8 and 8.5. Thus, only 1% have grades above 8.5.

[25] EVA (2009) find that higher grades increase completion in the lower part of the grade distribution in their full sample of students, but decrease completion in the upper part. When we replicate our results for the full sample of students (i.e. immigrants and Danes), we also find evidence of a U-shaped relationship. Thus, the fact that we fail to find a U-shaped relationship in our immigrant-only sample is probably due to the fact that the exam grade distribution of our sample is shifted substantially to the left from the total sample.

[26] The corresponding number for Danish students is 60%.

Table 4.2: Effect of exam grades on basic course completion

	Coef	*se*	*One-step*
Grade missing	-0.071*	(0.031)	-
Grade < 6	*Ref.*		0.071*
Grade 6 - 7	0.082***	(0.020)	0.082***
Grade 7 - 8	0.108***	(0.024)	0.026
Grade > 8	0.164***	(0.041)	0.056
N		3336	
adj. R^2		0.091	

*Standard errors in parentheses (*) p<.10, * p<.05, ** p<.01, *** p<.001. All controls included.*

We therefore estimate the effect of average grades from the school exit exams in form 9 on completion of the 2-year basic course (contingent on having started basic education in commercial college). As before, the lowest form 9 grade level (< 6) is chosen as the reference category. The regressions results are shown in Table 4.2.[27] As in Table 4.1, column (1) displays differences with respect to the reference category, while column (3) shows the marginal effects of an increase of exam grades to the adjacent (upper) category.

The results indicate that there is a significant advantage for students who have taken the exam, albeit with poor grades, compared to students who have not taken the exam. Students who have taken the exam with poor results (<6), have a completion probability that is 7.1 percentage points higher than for students who have not sat the exam. This is contrary to the results for completing the full CVET programme where no such advantage was detected. Furthermore, increasing initial skills from the lowest level to the next (i.e. from <6 to 6-7) increases completion probabilities by further 8.2 percentage points.

While increases from the reference category over and above the 7-threshold further increases completion probabilities, additional gains are smaller and not significant than at the bottom of the grade distribution. Raising initial skills one category from 6-7 to 7-8 does not significantly alter completion probabilities, column (3) – from this level, it takes a two-category increase to significantly affect completion rates: increasing exam grades from 6-7 to 8 or above, increases completion rates by another 8.2 percentage points. This increase is statistically significant.[28]

The general impression is that academic preparedness matters more for completing the basic course than for completing the full CVET programme, and while the strongest impact is at the bottom, they continue to matter higher up the skill distribution. The predicted difference in completion rates for the basic course between not taking the exam and taking the exam with above-average grades (>8) is 24 percentage points, while the same difference for the full programme is only 6 percentage

[27] Full results are in the appendix, Tb. A2.

[28] Kolodziejczyk & Hummelgaard (2011) choose not to use the 2002 cohort due to data quality issues for the exam grades. However, when we rerun our regression without the 2002 cohort we find very similar results.

points. While exam grades matter for completion of the full programme mainly when very poor grades are lifted to a minimum level, for basic course completion exam grades also matter at the top and at the very bottom (i.e. between not taking the exam and taking the exam with poor results). Still, the impact is largest at the lower end of the grade distribution. Yet, we cannot rule out the possibility that part of this result may be due to selection on unobservables into CVET (see section 4.2).

To sum up, one conclusion to draw from the analysis of the main outcomes is that raising academic preparedness is quite effective to improve basic course completion, while it is not as closely related to full programme completion. Still, the fact that form 9 exam grades are important for completing the basic course is an interesting and relevant result, since completing the basic course is (by some) considered a separate step in the educational career, which students use as a stepping stone to continue into general upper secondary education or employment. Yet, while academic preparedness markedly affects basic course completion, when considering completion of the entire programme, *other forces seem to be at work*. While the procentual impact of increasing academic preparedness at the bottom of the skill distribution is important (a 5 percentage-points, or 40% off an average completion rate of only 11%, increase of the total completion rate), the completion rate even for students with above average initial skills is still very low – suggesting that factors other than initial skills, SES and commercial college fixed effects are important. Yet, our inability to properly link academic skills to full programme completion probabilities could also be due to weak signalling rather than to the inexistence of such effects. We investigate along these lines in the following section.

4.4 Weak signalling

Another reason why we might find effects of exam grades on basic course completion, but not on completion of the full programme may be that the "signal" of form 9 exam grades as measure of academic preparedness, while being a relevant indicator of students' skills upon entering and progressing through basic education, gets weaker over time as the student progresses through his/her educational career. Thus, the signal from form 9 exam grades probably becomes more noisy the further the students' progress through vocational education, which could contribute to the explanation of why we find a significant effect of initial skills on basic course completion, but only to a much lesser extent on full programme completion.

To investigate this issue we consider grades obtained during the basic course as a channel through which initial academic preparedness as measured by form 9 grades might affect outcomes after the basic course. Our prior is that grades obtained during the basic course probably are a better signal of students' vocational-specific skills than form 9 grades and thus they might be more relevant for predicting main programme outcomes. In particular, students who have not been able to secure a training contract with a firm before completing the basic course, will need to include their basic course grades in applications for a training contract.

Therefore, in the following analysis, we use grade data from the CVET basic course for our cohorts of students to explore the role of basic course grades as a channel through which initial academic preparedness may influence main programme outcomes.

Yet, even if achievement and grades in the basic course are affected by form 9 exam grades, this relation is probably not deterministic. I.e. while students with better exam grades on average complete basic course with better grades than those who entered with poor initial skills, there will be a lot of variation.

We proceed with this analysis in two steps: first, we explore the relation between form 9 exam grades and grades obtained during the CVET basic course; and second, we investigate, whether basic course grades affect main programme outcomes.

4.4.1 Form 9 exam grades as predictors for CVET basic course grades

To investigate the channels by which form 9 grades influence main course completion and initial enrolment in the main course, we analyse the relation between form 9 grades and grades obtained during the basic course. Table 4.3 shows results of a regression of basic course grades on form 9 exam grades for students, who completed the basic course. Overall, students with better form 9 grades tend to do better in the basic course, too. Students, who have a form 9 grade level between 6-7 score 0.69 grade points better during the basic course than students with poorer grades (however, they do only 0.5 grade point better than students who have not sat the exam). Above this level, an incremental increase of one category in the form 9 exam is related to roughly a 0.5 grade point increase of the basic course grade average.

Table 4.3: Impact of form 9 exam grades on CVET basic course grades

	Coef	*se*	*One-step*
Grade missing	0.149	(0.108)	-
Grade < 6	*Ref.*		-0.149
Grade 6 - 7	0.687***	(0.064)	0. 687***
Grade 7 - 8	1.123***	(0.077)	0.436***
Grade > 8	1.647***	(0.124)	0.524***
N		2215	
adj. R^2		0.205	

*Standard errors in parentheses (*) p<.10, * p<.05, ** p<.01, *** p<.001. All controls included.*

Yet, an auxiliary regression without controls included shows that while form 9 grades are significant predictors of basic course grades, their variation explains only 17% of the total variation in basic course grades. Thus, they are noisy predictors of skills obtained during the basic course and this may be the reason why they are weak predictors of main course outcomes. Thus, if skills obtained during the basic course are more important for main course outcomes than initial academic preparedness (form 9 grades), they will be better predictors of enrolment into and completion of the main course.

4.4.2 Basic course grades as predictors for main course completion

Table *4.4* compares the impact of basic course grades (col. 1) and form 9 grades (col. 3) on main course completion for students who have completed the basic course. While form 9 grades are only significantly related to completion at one margin at the lower end of the grade distribution (<6 vs. 6-7 is related to an increase in the completion rate of 5.3 percentage points), grades from basic course show significant impacts on completion probabilities all through the grade distribution. The relation is particularly strong in the middle of the grade distribution: raising average basic course grades from 6-7 to 7-8 is related to a 7.4 percentage points increase in main course completion probabilities.

Thus, as we expected, grades from basic course seem to be much more closely related to main course completion than form 9 grades. However, form 9 grades are indirectly related to main course completion through their influence on grades obtained during the basic course.

Table 4.4: Effects of basic course grades vs. form 9 exam grades on main course completion (only basic course completers)

		Coef	*se*	*Coef*	*se*
CVET basic course	Grade: <6	*Reference*			
	Grade: 6 - 7	0.061**	(0.023)		
	Grade: 7-8	0.135***	(0.023)		
	Grade: >8	0.174***	(0.027)		
Form 9 exit exam	Grade: missing			0.036	(0.037)
	Grade: <6			*Reference*	
	Grade: 6 - 7			0.053*	(0.022)
	Grade: 7 - 8			0.010	(0.026)
	Grade: > 8			0.046	(0.042)
	N	2277		2277	
	adj. R^2	0.076		0.055	

*Standard errors in parentheses (*) p<.10, * p<.05, ** p<.01, *** p<.001. All controls included.*

Note: There is no missing grade category for CVET basic course grades, since our subsample of basic course completers must have passed the basic course to complete.

4.4.3 Do the grades from basic course affect main course completion by increasing initial enrolment or by increasing completion probabilities of those enrolled?

In Table 4.4 we saw that grades obtained during the basic course are strongly related to main course completion probabilities. Yet, since the largest dropout occurs during the transition from the basic to the main course, while those who enrol often also tend to complete, we investigated whether basic course grades increase completion by increasing enrolment probabilities or by increasing completion probabilities for those who enrol (or both). We find that both with respect to enrolment and completion, form 9 grades are only related to main course enrolment for the academically poor

prepared, while the impact from basic course grades is sizable and significant (c.f. Tables A3 & A4 in the appendix).

As mentioned above, basic course grades may be particularly important for main course enrolment probabilities for students who have not been able to secure a training contract with a firm before completing the basic course. Yet, also these students need to obtain a training contract to be able to enrol in the main programme and, when applying for one, they need to include their basic course grades in the application. Thus, since basic course grades may matter for the chance to get a training contract, they also matter for whether students are allowed to enrol in the main course. Our results are in line with those found in Helland & Støren (2006) for immigrant students in Norway, who find that grades have a marked effect on the probability of obtaining an apprenticeship, which generally is a crucial prerequisite for being allowed into the main course.

To sum up, while form 9 grades have a marked impact on the completion probabilities of the basic course and a somewhat fuzzy impact on the *grades* obtained during the basic course, grades obtained during the basic course are much better predictors of post-basic course outcomes. Those with better grades from the basic course have a higher probability both to initially enrol into and to complete the main course than those who perform poorly during the basic course. By contrast, form 9 grades appear mainly to have an indirect impact on main course outcomes through their influence on basic course grades.

4.5 Robustness

4.5.1 Gender differences

While the purpose of this research is to better understand the effect of academic preparedness on outcomes of commercial college students with an immigration background, we recognise that commercial college students are heterogeneous. We therefore conduct separate analyses for males and females.

Table 4.5 presents descriptives on completion rates and form 9 grades by gender. While completion rates for the full programme are not much higher for females than for males (15% vs. 13%), females have much higher completion rates for the basic course (72% vs. 63%). These higher completion rates for girls cannot be explained by our measure of academic preparedness, since form 9 exam grades for male students are slightly higher on average due to a higher share of female students who enrol in CVET being low achievers in form 9 exams (30% vs. 24%).

When we consider the distribution of basic course completion rates by form 9 exam grades, the completion rates for females rise sharply by about 10% points from *exam grade missing* to the lowest exam grade level (<6) , and again by about 10% points from the lowest to the next lowest level (6-7). For exam grades above 6, completion rates are stagnant. For males, completion rates start at the same low level as for females, and rise moderately, but steadily, over the exam grade distribution, until they reach the same level as for females at grades above 8. However, the sluggish rise at the lower end of the male grade distribution results in lower male completion rates for most of the grade distribution. Full programme completion rates are similar for males and females except for grades between 6 and 7, where females have higher completion rates (19% vs.14%).

Table 4.5: Descriptive statistics. Completion rates and exam grades by gender

			Males			
Outcome	***Miss.***	***<6***	***6-7***	***7-8***	***>8***	All
Complete basic course	57%	54%	64%	69%	79%	63%
Complete full programme	11%	11%	14%	15%	17%	13%
			Females			
Complete basic course	56%	67%	76%	77%	79%	72%
Complete full programme	9%	11%	19%	13%	19%	15%
Distribution exam grades	***Miss.***	***<6***	***6-7***	***7-8***	***>8***	Mean
Males	8%	24%	42%	21%	5%	6.46
Females	8%	30%	39%	18%	4%	6.33

Table 4.6 presents results from separate regressions of our main outcomes for males and females. Results for full programme completion (upper panel) suggest that the significant estimates in the full sample (Table 4.1 & 4.2) are mainly driven by the impact of exam grades on completion for females. The impact on boys is smaller and not significant.

By contrast, results for basic course completion (Table 4.6, lower panel) suggest that exam grades are important for males and females alike. Yet, the locus of the main impact differs by gender: for males, there is no difference in completion probabilities for those who have not taken the exit exam and those who have, but with poor results (<6), while for females, there seems to be a significant advantage of having sat the exam – even with bad results. This result may be due to selection, if girls, who do not sit the exam, are drawn more heavily from the lowest tail of the ability distribution than boys who choose not to sit the exam. Yet, while there is no additional increase in completion rates for females once their grades exceed a certain minimum level (grade average above 6-7), males seem to continue to profit from increasing exam grades.

Thus, by gender results suggest that while the impact of exam grades on completing the full programme is generally weak, the positive impact that is found in the full sample is mainly due to its more pronounced impact on females' rather than on males' completion probabilities. Yet, with respect to basic course completion, there is a significant impact on both boys' and girls' completion rates. While the impact for girls is concentrated at the very bottom of the grade distribution (from "no exam" up to 6-7), boys continue to profit from higher grades all the way up to the highest grade category.

Table 4.6: By gender results for completing the full programme and the basic course

	Full programme completion			
	Males		Females	
	Coef	se	Coef	se
Grade missing	0.009	(0.033)	-0.016	(0.036)
Grade 6 - 7	0.026	(0.021)	0.075***	(0.022)
Grade 7 - 8	0.024	(0.025)	0.006	(0.027)
Grade > 8	0.034	(0.042)	0.084(*)	(0.048)
N	1755		1626	
adj. R^2	0.037		0.061	
	Basic course completion			
	Males		Females	
	Coef	se	Coef	se
Grade missing	-0.005	(0.046)	-0.123**	(0.044)
Grade 6 - 7	0.075*	(0.030)	0.082**	(0.027)
Grade 7 - 8	0.120***	(0.035)	0.088**	(0.034)
Grade > 8	0.176**	(0.058)	0.092	(0.059)
N	1755		1626	
adj. R^2	0.095		0.083	

*Standard errors in parentheses (*) p<.10, * p<.05, ** p<.01, *** p<.001. All controls included.*

4.5.2 Attended form 10?

Since students, who have attended the elective form 10, have had the opportunity to improve their skills before enrolling in CVET compared to what is measured at form 9 exams, we run the main regressions separately for those who have and who have not attended form 10.

Table 4.7 displays results for completing the full CVET and for completing the basic course. As we would expect, while there is a tendency for exam grades to matter for both student groups (at least for basic course completion), grades matter clearly more for students, who did not attend form 10 before enrolling in CVET[29], and thus entered with the skill level as measured by form 9 exams.

[29] To investigate further along this line, we ran a regression including the grades from students' elective exams at the end of form 10 (both with and without conditioning on grades from form 9), but form 10 exam results were not better predictors of CVET outcomes than form 9 exam grades.

Table 4.7: Results for completing the full programme and the basic course by form 10 attendance

	Full programme completion					
	All		No form 10		Attended form 10	
	Coef	se	Coef	se	Coef	se
Grade missing	-0.001	(0.024)	-0.043	(0.045)	0.001	(0.029)
Grade 6 - 7	0.049***	(0.015)	0.086**	(0.026)	0.024	(0.019)
Grade 7 - 8	0.021	(0.018)	0.015	(0.029)	0.023	(0.024)
Grade > 8	0.056(*)	(0.031)	0.083(*)	(0.043)	0.046	(0.048)
N	3350		1384		1991	
adj. R^2	0.045		0.064		0.047	
	Basic course completion					
	All		No form 10		Attended form 10	
	Coef	se	Coef	se	Coef	se
Grade missing	-0.071*	(0.031)	-0.111*	(0.056)	-0.058	(0.040)
Grade 6 - 7	0.082***	(0.020)	0.097**	(0.033)	0.077**	(0.026)
Grade 7 - 8	0.108***	(0.024)	0.130***	(0.036)	0.076*	(0.033)
Grade > 8	0.164***	(0.041)	0.202***	(0.055)	0.124(*)	(0.065)
N	3350		1384		1991	
adj. R^2	0.091		0.113		0.078	

*Standard errors in parentheses (*) p<.10, * p<.05, ** p<.01, *** p<.001. All controls included.*

4.5.3 What counts: skills in Danish or mathematics?

In the main analyses, we use combined grades in Danish and mathematics in the form 9 exams as our measure of academic preparedness. In this section, we relax the assumption that Danish and Math skills are equally important for CVET completion probabilities. We include Danish and math grades respectively in separate regressions and reestimate our main specifications. Table 4.8 offers three sets of results: first using Danish grades only, second using math grades only and last, we enter both Danish and math grades, but as separate variables.

Table 4.8: Separate impacts from Danish and Math grades for completing the full programme and the basic course

		Full programme	*Basic programme*	*Full programme*	*Basic programme*	*Full programme*	*Basic programme*
Danish	Grade missing	0.006	-0.070*			0.031	0.006
		(0.024)	(0.031)			(0.033)	(0.044)
	Grade 6-7	0.033(*)	0.039(*)			0.024	0.014
		(0.017)	(0.023)			(0.017)	(0.023)
	Grade 7-8	0.032(*)	0.060*			0.015	0.013
		(0.019)	(0.025)			(0.019)	(0.026)
	Grade >8	0.001	0.091**			-0.022	0.024
		(0.026)	(0.035)			(0.028)	(0.036)
Math	Grade missing			-0.001	-0.048(*)	-0.014	-0.046
				(0.021)	(0.028)	(0.031)	(0.040)
	Grade 6-7			0.043**	0.119***	0.043**	0.117***
				(0.016)	(0.021)	(0.016)	(0.021)
	Grade 7-8			0.038*	0.109***	0.039*	0.105***
				(0.017)	(0.023)	(0.018)	(0.024)
	Grade >8			0.054*	0.181***	0.060*	0.175***
				(0.023)	(0.031)	(0.024)	(0.032)
	N	3381	3381	3381	3381	3381	3381
	adj. R^2	0.046	0.083	0.048	0.098	0.049	0.097

*Standard errors in parentheses (*) p<.10, * p<.05, ** p<.01, *** p<.001. All controls included.*

The results suggest that the impact of Math grades on completion probabilities is stronger than the impact of grades in Danish. When Danish grades are entered as the only measure of academic preparedness (col. 1 & 2), they are (marginally) significant. Yet, when Math grades are added as measure of preparedness, Danish grades are no longer significant (col 5&6).[30] Note that the results for Math are quite similar to the results for the main specification using the combined measure for Danish and Math (section 4.3).

Thus, our results suggest that Math skills rather than skills in Danish influence students' probability to complete.

4.6 Additional analyses

4.6.1 Dropout versus stop out

In this section, we investigate, whether academic preparedness is related to long-term drop-out or short-term stop-out decisions. In our analysis, we consider two samples of students: (i) students who leave without completing the basic course, and (ii) students who leave after having completed the basic course, i.e. they do not enrol in the main course. We subdivide the stop-out decision into two outcomes: work and inactivity (i.e. neither work nor education). Thus, the analysis considers three possible exit routes from CVET for each student: i) reenrolment into (another) education, ii) stopping out for a job, and iii) stopping out into inactivity. We measure these outcomes one year after the student discontinued his/her CVET-education.

[30] The correlation between Danish and Math grades in the sample is only 0.37, thus, multicollinearity is not a major concern.

We use a multinomial probit model in order to estimate a model with three discrete outcomes (e.g. Greene 2011). This model is an alternative to the more established multinomial logit model.[31] The three outcomes considered are the three exit routes from the set of the three post-CVET choices discussed previously. Our variable of main interest is our previously used measure of form 9 exam grades (average for Danish and Math). The set of controls includes student and family characteristics (gender, family structure, ethnicity, parental education) and commercial college fixed effects. We first present descriptive results, and then continue with regression analyses.

Descriptive results. One year after dropping out of the CVET basic course, 51% of immigrant students are in employment and another 18% are inactive, thus making stop out (employment or unemployment/inactive) the most frequent alternative (Table 4.9). Only 31% former CVET students are enrolled in another education after one year.[32]

When we compare these groups by their average form 9 exam grades, we see that the group re-enrolling in education by far has the highest exam grade average (Table 4.9), followed by those in employment. The inactive have the lowest grades.

Table 4.9: Descriptives – exit routes from CVET without completing

		Per cent	Exam grades
Dropout	Education	31	6.77
Stop out	Employment	51	6.41
	Inactive	18	6.31
No. obs.		1,157	

The simple statistics show that those with the highest academic preparedness choose to continue in the education system after dropping out of CVET, indicating that higher grades are positively related to dropping out vs. stopping out. To test whether these results hold up once student background and commercial college fixed effects are taken into account, we conduct a series of regressions.

Regressions. Figure 4.2 shows the average predicted probabilities for the three outcomes by exam grades from multinomial probit models for the decision of continuing in (another) education (drop out) or leaving education for either employment or inactivity (stop out) one year after leaving CVET. Full results can be seen in the appendix (Table A5).

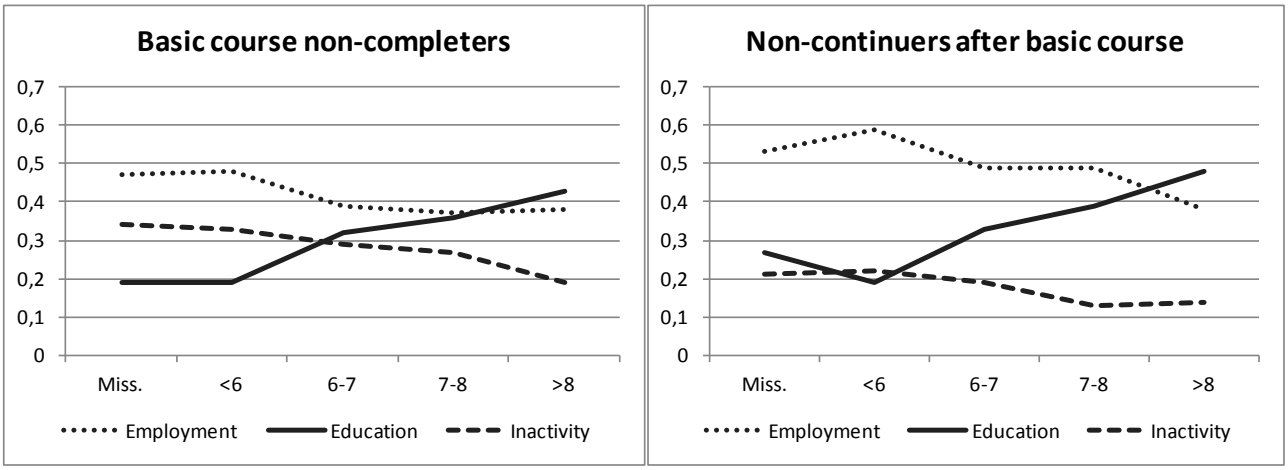
31 The main advantage of the multinomial probit is that the multinomial probit is not dependent on the independence of irrelevant alternatives (IIA) assumption.

32 According to Kolodziejczyk & Hummelgaard (2011), it is quite common for immigrant students to enrol in general upper secondary education after completing the basic course. Among immigrant students who initially enrolled in CVET between 2003-2007, about 30% did so, partly due to a lack of training contracts.

At the left hand side, results for basic course non-completers are shown (Figure 4.2). The results suggest that higher form 9 grades consistently increase the probability of being re-enrolled in education one year after quitting basic course, while decreasing the probability of both stopout to employment and stopout to inactivity. In other terms: higher form 9 grades generally increase the probability to return to education, and decrease the probability for stopout to employment or inactivity. Reenrolment varies from being the least probable outcome for basic course non-completers with missing form 9 exam grades or very low grades (19%) to being the most probable outcome for those with high grades (43%).

Thus, higher exam grades do not only increase the likelihood of students completing the basic course (see section 4.3.2), they also increase the likelihood of reenrolment in education for those who leave the CVET basic course, which further stresses the overall importance of academic preparedness for students educational career.

Figure 4.2: Average predicted probabilities for the three exit routes after leaving CVET



At the right-hand side of Figure 4.2, results for those who completed the basic programme, but did not enrol into the main course, are shown. First, note that the predicted probabilities for reenrolling in education are similar to those of basic course non-completers. Second, as before, both employment and inactivity probabilities decrease with higher exam grades, but the level is different: generally, there is a tendency that the probability of stopping out to employment is higher for those who complete the basic course (but do not continue), and the probability of inactivity is lower compared to basic course non-completers. Thus, while non-continuers with low academic preparedness tend to find employment after completing the basic course, those with high academic preparedness are at least as likely to return to education as they are to start working.

These results lend support to the "stepping stone" hypothesis put forward earlier. It seems that academically stronger students to a higher degree use the basic course as a stepping stone for enrolling in general upper secondary education, while academically weaker students tend to exit into employment at higher rates. Moreover, our results suggest that the destination depends on initial academic preparedness.

4.6.2 School resources

In the main analysis above, we included school (college) fixed effects to control for differences in school quality and selection into schools. In this section, we investigate the nature of the differences in school quality in more detail. Hanushek, Lavy & Hitomi (2008) suggest that school quality is important for dropout in primary school. We include measures of school quality in our regressions to consider the impact of school resources on basic course completion.

We present a mainly descriptive analysis of the correlation between exam grades and school resources as a measure of school quality and completion. It is essential to recognise the descriptive nature of these results. In particular, the number of schools is small, making it difficult to estimate statistically significant correlations of school level variables.

Institutional variables for the participating subset of commercial colleges were drawn from the OECD's International Survey of Upper Secondary Schools (ISUSS)[33], which contains information on admission and career guidance practices, faculty, resources (ICT), enrolment and finances. From these data, a file of commercial colleges' characteristics for those 39 out of 66 institutions who returned the questionnaire was created and then merged with the student characteristics file using the institution identifier.

In this analysis, we restrict the dataset to the two oldest cohorts, i.e. form 9 students of 2002 and 2003, because our school questionnaire data are from the autumn of 2001, and will thus not be a good proxy for the school environment of the older cohorts[34]. We only consider completion of the basic course, since the main course is not primarily school-based training and school resources are therefore unlikely to affect completion rates.

As measures of school quality, we use information on: the percentage of the class periods that had to be cancelled because of the absence of the assigned teacher (`Pct_cancelled`); the percentage of the class periods that had to be cancelled *or covered by somebody else* because of the absence of the assigned teacher (`Teach_absence`); percentage of teachers who are fully qualified (`Fully_qual_pct`); the intensity and diversity of career counselling at the school (`Career_councel`); the percentage of students in the final school grade/year who received individual career counselling (`Indiv_councel`); college size: number of CVET students ('000) – (`College size`); percentage of part-time teachers (`Parttime`); percentage of students in college on academic track (`Academic_track`); diversity in professional development activities for the school's teachers (`Prof_developm`), diversity in computer-related activities in students' assignments (`Comp_div`). These factors are, at least in principle, under the control of the college or state policy makers. Table 4.10 provides descriptives of the school resource measures.

[33] OECD (2004).

[34] Actually, we have rerun the regressions with all four cohorts, but – as expected – the results were even less significant than for the two oldest cohorts alone. Only the estimate of the professional development of teachers is significant in these regressions.

Table 4.10: Descriptives for school resources

Variable	Obs	Mean	Std. Dev.	Min	Max
Pct_cancelled(%)	749	3.46729	2.106918	0	10
Teach_absence(%)	749	7.694259	3.835345	0	20
Fully_qual_pct(%)	844	78.65166	23.70933	11.33333	100
Career_councel(index)	851	-.149271	1.078625	-2.214696	1.657736
Indiv_councel(%)	498	94.72892	12.20947	10	100
College size('000)	807	.4422119	.2553509	.068	1.242
Parttime(%)	780	17.84784	11.33803	0	44.11765
Academic_track(%)	807	63.23887	8.416485	40.78624	76.22378
Prof_developm(index)	851	.2656088	.8796405	-5.48244	.9285554
Comp_div(index)	851	.0111508	1.030331	-2.358572	1.587874

Table 4.11 presents regression results. The first set of results is from a series of regressions including each single school resource without any controls (empty models), the second series adds average exam grades and controls.[35] The third set of results is from one common regression where all school resources are included at once.

Overall, only few school resources are significantly related to completion. Yet, the results suggest that higher intensity and diversity of career counselling and greater diversity in professional development activities for the school's teachers are significantly related to higher completion probabilities. This holds in all three sets of results.

[35] In addition to the set of controls used in the main analysis, we add two measures of the student body composition that might influence completion probabilities. We add the percentage of students with an immigration background and the average length of education of the student's parents at the specific college attended.

Table 4.11: School resources and completion probabilities

	Separate regressions for each school resource measure				Joint regression	
	Coef	se	Coef	se	Coef	se
Pct_cancelled	0.000	(0.008)	0.002	(0.008)	0.020	(0.012)
Teach_absence	-0.002	(0.005)	-0.002	(0.005)	**-0.018***	(0.007)
Fully_qual_pct	0.001	(0.001)	0.001	(0.001)	-0.000	(0.001)
Career_councel	**0.035***	(0.018)	**0.035****	(0.014)	**0.051*****	(0.014)
Indiv_councel	-0.001	(0.002)	-0.000	(0.002)	0.001	(0.002)
College size	-0.076	(0.052)	-0.071	(0.052)	**-0.284*****	(0.083)
Parttime	-0.002	(0.001)	-0.002	(0.001)	-0.002	(0.002)
Academic_track	0.001	(0.002)	0.001	(0.001)	-0.003	(0.003)
Prof_developm	**0.039***	(0.019)	**0.041***	(0.018)	**0.094*****	(0.024)
Comp_div	**0.049****	(0.017)	**0.043***	(0.020)	0.001	(0.021)
Controls?	No		Yes		Yes	

Note: Controls include form 9 exam grades, student and family controls as included in the main regressions in chapter 4.3 and the percentage of students with an immigration background and the average length of education of the student's parents at the specific college attended. Standard errors in parentheses (*) p<.10, * p<.05, ** p<.01, *** p<.001.

A greater diversity of computer-related activities as regular part of students' assignments shows a positive relationship with completion probabilities when included separately (i.e. without other school resource measures. However, the diversity of computer-related activities seems to be correlated with other school resource measures and is insignificant and virtually zero once other school resources are included.

Moreover, teacher absence and college size (i.e. the number of CVET students) are significantly related to completion probabilities only when all school resources are entered at once. More class periods that had to be cancelled or covered by somebody else because of the absence of the assigned teacher are related to lower completion rates, as is a larger college size.

5. Summary and conclusion

This study analyses the impact of academic preparedness upon enrolment in CVET on completion probabilities among immigrant students in Denmark. Utilising high quality longitudinal register data, we show that better academic preparedness increases the chances to complete the CVET basic course, and, partly indirectly through its effect on grades obtained during the basic course, also affects completion of the full CVET programme. Yet, in spite of the positive impact on full programme completion rates, increasing academic preparedness of CVET students will not suffice to lift completion rates to acceptable levels. Other factors, presumably the fact that many students have other plans once the basic course is completed (like work or enrolling in upper secondary education) or the difficulty to provide training contracts for all students who want to enrol in the main programme, may contribute to hindering higher full programme completion rates. The difficulty to land a training contract is particularly acute for immigrant students enrolled in CVET (Kolodziejczyk & Hummelgaard 2012).

Further analyses show that the positive impact on full programme completion is mainly due to its impact on females' rather than on males' completion probabilities. Yet, with respect to basic course completion, there is a significant impact on both boys' and girls' completion rates. While the impact for females is concentrated at the very bottom of the grade distribution, males continue to profit from higher grades.

Furthermore, we show that the impact of form 9 exam grades is strongest for students who enter CVET after grade 9, i.e. without attending (the elective) form 10. We also find that it is mainly exam grades in Math, rather than grades in Danish, that matter for completion probabilities. Moreover, we find that better academic preparedness is not only important for completing CVET, but is also increasing for the probability of staying within the education system for CVET dropouts.

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Dansk sammenfatning

Betydningen af folkeskolekarakterer for gennemførelse af en merkantil erhvervsuddannelse blandt elever med indvandrerbaggrund

AKF har undersøgt, hvilken betydning indvandrerelevernes karakterer fra grundskolen har for, om de gennemfører en handelsskoleuddannelse. Undersøgelsen er baseret på danske registerdata.

Undersøgelsen viser:

- Unge indvandrere med høje karakterer fra grundskolen fuldfører i højere grad grundforløbet på merkantiluddannelsen. De får også bedre karakterer.
- Selv mindre forbedringer af de unges grundskolekarakterer har en betydning for, om de gennemfører grundforløbet på handelsskolen. Det gælder både for de bogligt svage og de bogligt stærke elever.
- Gode karakterer fra grundforløbet øger sandsynligheden for, at de unge gennemfører hovedforløbet.
- Grundforløbet bruges ofte som afsæt for videre uddannelse for de bogligt stærke elever og til beskæftigelse for de bogligt svage elever.
- Det er muligt for handelsskolerne at sikre også bogligt svage elever fra grundskolen gode karakterer på grundforløbet.

Karakterenes betydning for grundforløbet på handelsskolerne

De bogligt stærke unge indvandrere fra grundskolen får bedre karakterer i grundforløbet. Deres karaktergennemsnit er halvandet karakterpoint højere end de bogligt svageste (efter den gamle karakterskala). Grundskolekaraktererne forklarer dog kun 17% af den variation, der er for grundforløbets karakterer. Derved er der gode muligheder for, at handelsskolerne kan sikre også fagligt svagt funderede elever gode karakterer på grundforløbet.

Unge med højere karakterer fra grundskolen fuldfører endvidere grundforløbet oftere end unge med lave karakterer. De bogligt stærkeste drenge har 18 procentpoint højere gennemførelse end de bogligt svageste.

Selv med mindre løft af grundskolekaraktererne har de unge større sandsynlighed for at gennemføre grundforløbet. For pigerenes vedkommende har det dog kun betydning, når de bliver løftet fra meget lave karakterer til lidt bedre karakterer. Så øges sandsynligheden for, at de gennemfører, med 8 procentpoint. De bogligt stærkere piger har ikke større sandsynlighed for at gennemføre, hvis de får endnu bedre karakterer.

Hvis drengenes karakterer bliver løftet, har de 8 procentpoint større sandsynlighed for at gennemføre grundforløbet, uanset fra hvilket niveau på karakterskalaen de bliver løftet.

Blandt de unge indvandrere, der afbryder en handelsskoleuddannelse, kommer en del af de unge med svage boglige forudsætninger fra grundskolen i beskæftigelse efter grundforløbet, mens de

bogligt stærke i højere grad fortsætter på en almen gymnasial uddannelse. Således fortsætter 50% af de bogligt stærke unge i videre uddannelse, mod kun 20-30% af de unge med svage forudsætninger. Omvendt er det 50-60% af unge med svage forudsætninger, der kommer i beskæftigelse, mens 40% af de bogligt stærke unge går den vej.

Karakterernes betydning for hovedforløbet

Karaktererne fra grundforløbet spiller en stor rolle for, om de unge indvandrere gennemfører hovedforløbet på de merkantile uddannelser og dermed hele uddannelsen. Blandt eleverne med de højeste karakterer er sandsynligheden for at gennemføre hovedforløbet 17 procentpoint større end blandt elever med lave karakterer. Derimod har karaktererne for grundskolen kun mindre direkte betydning for, om hovedforløbet gennemføres. Blandt de bogligt stærkeste piger fra grundskolen er der således kun 8 procentpoint flere, der gennemfører hele den merkantile uddannelse sammenlignet med de bogligt svageste piger. For drengene er tallet kun 3 procentpoint og ikke statistisk sikkert.

Samlet set er det kun 16% af indvandrereleverne, der gennemfører hele den merkantile uddannelse. Ud over dårligere grundskolekundskaber og især lave karakterer på grundforløbet viser en anden AKF-rapport, at det store frafald blandt indvandreelever også skyldes, at de ikke får en praktikplads.

For at få flere unge til at gennemføre hele den merkantile uddannelse, er det en god idé at hjælpe dem med at løfte deres karakterer både i grundskolen og på handelsskolernes grundforløb. Ved at styrke undervisningen på handelsskolerne er der gode muligheder for at kompensere for dårlige grundskolekundskaber, da undersøgelsen viser, at det også er muligt at sikre bogligt svage elever fra grundskolen gode karakterer efter grundforløbet. Dette har igen betydning for, at de gennemfører hele uddannelsen.

Appendix

Table A1: Descriptive statistics for four subsamples

			Subsample											
			Basic course non-completers			**Transition dropouts**			**Main course non-completers**			**Full program completers**		
	Exam grades		Freq.	Percent	Cum.	Freq.	Percent	Cum.	Freq.	Percent	Cum.	Freq.	Percent	Cum.
	Missing	(0/1)	125	11,3	11,3	117	7,5	7,5	14	5,8	5,8	30	6,4	6,4
	´<6	(0/1)	354	32,1	43,4	409	26,1	33,6	61	25,4	31,3	98	20,8	27,1
	´6-7	(0/1)	413	37,4	80,8	626	40,0	73,6	96	40,0	71,3	224	47,5	74,6
	´7-8	(0/1)	180	16,3	97,1	333	21,3	94,9	56	23,3	94,6	92	19,5	94,1
	´>8	(0/1)	32	2,9	100,0	80	5,1	100,0	13	5,4	100,0	28	5,9	100,0
	Variable		# obs	Mean	SD	# obs	Mean	SD	# obs	Mean	SD	# obs	Mean	SD
	Male	(0/1)	1104	0,59	0,49	1565	0,49	0,50	240	0,47	0,50	472	0,49	0,50
	2-parent family	(0/1)	1104	0,64	0,48	1565	0,69	0,46	240	0,70	0,46	472	0,71	0,46
	Attended form 10	(0/1)	1104	0,61	0,49	1565	0,59	0,49	240	0,59	0,49	472	0,56	0,50
	# children: 1-2	(0/1)	1104	0,41	0,49	1565	0,41	0,49	240	0,43	0,50	472	0,50	0,50
	# children: 3-4	(0/1)	1104	0,44	0,50	1565	0,44	0,50	240	0,43	0,50	472	0,42	0,49
	# children: 5+	(0/1)	1104	0,16	0,36	1565	0,15	0,36	240	0,15	0,35	472	0,08	0,27
Mother's education	Compulsory	(0/1)	799	0,58	0,49	1159	0,57	0,49	187	0,54	0,50	366	0,51	0,50
	High school	(0/1)	799	0,14	0,35	1159	0,13	0,33	187	0,09	0,29	366	0,12	0,33
	Vocational education	(0/1)	799	0,19	0,39	1159	0,20	0,40	187	0,28	0,45	366	0,29	0,45
	Tertiary education	(0/1)	799	0,10	0,30	1159	0,10	0,30	187	0,09	0,28	366	0,08	0,28
Father's education	Compulsory	(0/1)	780	0,51	0,50	1156	0,46	0,50	185	0,46	0,50	342	0,42	0,49
	High school	(0/1)	780	0,10	0,29	1156	0,08	0,28	185	0,05	0,22	342	0,08	0,27
	Vocational education	(0/1)	780	0,25	0,43	1156	0,29	0,45	185	0,29	0,45	342	0,34	0,47
	Tertiary education	(0/1)	780	0,15	0,35	1156	0,17	0,38	185	0,20	0,40	342	0,17	0,38
	Mother's income (in DKK, 1996=100)		1045	106101	48827	1484	108244	55657	229	114599	46952	450	118400	50892
	Father's income (in DKK, 1996=100)		927	134487	84816	1343	135603	77358	207	134507	80015	396	145342	82302
Mother's labour market status	Self-employed	(0/1)	1045	0,02	0,14	1484	0,03	0,16	229	0,02	0,15	450	0,01	0,11
	Wage earner: basis-top level	(0/1)	1045	0,10	0,30	1484	0,10	0,30	229	0,12	0,33	450	0,15	0,36
	Other wage earners	(0/1)	1045	0,17	0,38	1484	0,20	0,40	229	0,20	0,40	450	0,24	0,43
	Social transfers	(0/1)	1045	0,56	0,50	1484	0,52	0,50	229	0,50	0,50	450	0,46	0,50
	Others	(0/1)	1045	0,15	0,35	1484	0,16	0,36	229	0,16	0,36	450	0,14	0,35
Father's labour market status	Self-employed	(0/1)	927	0,13	0,34	1343	0,11	0,32	207	0,08	0,27	396	0,11	0,31
	Wage earner: basis-top level	(0/1)	927	0,14	0,35	1343	0,18	0,39	207	0,21	0,41	396	0,20	0,40
	Other wage earners	(0/1)	927	0,18	0,39	1343	0,18	0,38	207	0,15	0,36	396	0,22	0,42
	Social transfers	(0/1)	927	0,46	0,50	1343	0,43	0,50	207	0,44	0,50	396	0,38	0,49
	Others	(0/1)	927	0,08	0,28	1343	0,09	0,29	207	0,11	0,32	396	0,08	0,28
	Second generation immigrant	(0/1)	1104	0,46	0,50	1565	0,46	0,50	240	0,47	0,50	472	0,45	0,50
Country of origin	Turkey	(0/1)	1104	0,29	0,45	1565	0,29	0,45	240	0,31	0,46	472	0,28	0,45
	Lebanon	(0/1)	1104	0,11	0,32	1565	0,08	0,27	240	0,10	0,29	472	0,07	0,25
	Pakistan	(0/1)	1104	0,05	0,22	1565	0,10	0,30	240	0,08	0,26	472	0,05	0,22
	Former Yugoslavia	(0/1)	1104	0,06	0,23	1565	0,06	0,24	240	0,08	0,27	472	0,10	0,30
	Bosnia	(0/1)	1104	0,04	0,20	1565	0,07	0,26	240	0,10	0,30	472	0,16	0,37
	Other countries	(0/1)	1104	0,44	0,50	1565	0,40	0,49	240	0,34	0,48	472	0,34	0,47

Table A2: Full results table for main outcomes

		Full programme completion		**Basic course completion**	
		coef	*se*	*coef*	*se*
Form 9 exam	Grade missing	-0.001	(0.024)	-0.071*	(0.031)
	Grade <6	*Ref.*		*Ref.*	
	Grade 6-7	0.049***	(0.015)	0.082***	(0.020)
	Grade 7-8	0.021	(0.018)	0.108***	(0.024)
	Grade >8	0.056(*)	(0.031)	0.164***	(0.041)
	Male	-0.020(*)	(0.012)	-0.098***	(0.016)
	2-parent family	0.025	(0.018)	0.057*	(0.024)
	Attended form 10	-0.017	(0.013)	-0.025	(0.017)
	# children: 3-4	-0.019	(0.014)	-0.011	(0.018)
	# children: 5+	-0.052**	(0.020)	0.005	(0.026)
Mother's education	High school	0.011	(0.022)	-0.021	(0.029)
	Vocational education	0.021	(0.019)	0.031	(0.025)
	Tertiary education	-0.014	(0.025)	0.001	(0.033)
Father's education	High school	0.005	(0.027)	-0.004	(0.036)
	Vocational education	0.004	(0.018)	0.035	(0.023)
	Tertiary education	0.007	(0.021)	0.065*	(0.028)
	Mother's income (in million DKK)	0.174	(0.155)	0.343(*)	(0.205)
	Father's income (in million DKK)	-0.035	(0.104)	-0.193	(0.137)
Mother's labour market status	Self-employed	-0.065	(0.046)	0.061	(0.061)
	Wage earner: basic-top level	*Ref.*		*Ref.*	
	Other wage earners	-0.004	(0.024)	0.021	(0.032)
	Social transfers	-0.019	(0.025)	0.012	(0.033)
	Others	-0.016	(0.029)	0.019	(0.039)
Father's labour market status	Self-employed	0.017	(0.026)	-0.083*	(0.034)
	Wage earner: basic-top level	*Ref.*		*Ref.*	
	Other wage earners	0.018	(0.022)	-0.043	(0.029)
	Social transfers	-0.020	(0.023)	-0.037	(0.030)
	Others	0.010	(0.030)	0.004	(0.039)
	Second gen. immigrant	0.017	(0.016)	0.006	(0.021)
Country of origin	Turkey	-0.002	(0.019)	0.043(*)	(0.026)
	Lebanon	0.010	(0.024)	-0.043	(0.031)
	Pakistan	-0.006	(0.027)	0.152***	(0.036)
	Former Yugoslavia	0.068*	(0.027)	0.038	(0.036)
	Bosnia	0.137***	(0.027)	0.089*	(0.035)
	N	3381		3381	
	Adj. R^2	0.049		0.091	

*Standard errors in parentheses (*) p<.10, * p<.05, ** p<.01, *** p<.001. Missing value flags, cohort dummies and commercial college fixed effects included.*

Table A3: Effects of basic course grades vs. form 9 exam grades on main course enrolment (for basic course completers)

		Coef	*se*	*Coef*	*se*
CVET basic course	Grade: <6	*Reference*			
	Grade: 6 - 7	0.044(*)	(0.026)		
	Grade: 7-8	0.128***	(0.027)		
	Grade: >8	0.156***	(0.030)		
Form 9 exit exam	Grade: missing			0.019	(0.041)
	Grade: <6			*Reference*	
	Grade: 6 - 7			0.055*	(0.025)
	Grade: 7 - 8			0.028	(0.030)
	Grade: > 8			0.069	(0.047)
	N	2277		2277	
	adj. R^2	0. 085		0. 071	

*Standard errors in parentheses (*) p<.10, * p<.05, ** p<.01, *** p<.001. All controls included.*

Note: There is no missing grade category for CVET basic course grades, since our subsample of basic course completers must have passed the basic course to complete.

Table A4: Impact of basic course grades vs. form 9 exam grades on main course completion

		Coef	*se*	*Coef*	*se*
CVET basic course	Grade: <6	*Reference*			
	Grade: 6 - 7	0.139*	(0.057)		
	Grade: 7-8	0.179**	(0.055)		
	Grade: >8	0.236***	(0.060)		
Form 9 exit exam	Grade: missing			0.099	(0.090)
	Grade: <6			*Reference*	
	Grade: 6 - 7			0.026	(0.050)
	Grade: 7 - 8			-0.041	(0.060)
	Grade: > 8			-0.036	(0.091)
	N	2277		2277	
	adj. R^2	0. 069		0. 045	

*Standard errors in parentheses (*) p<.10, * p<.05, ** p<.01, *** p<.001. All controls included.*

Note: There is no missing grade category for CVET basic course grades, since our subsample of basic course completers must have passed the basic course to complete.

Table A5: Multinomial probit results for dropout vs. stopout

		Basic course non-completers				**Full programme non-completers**			
		Employment vs. education		*Inactivity vs. education*		*Employment vs. education*		*Inactivity vs. education*	
		coef	*se*	*coef*	*se*	*coef*	*se*	*coef*	*se*
Form 9 exam	Grade missing	-0.013	(0.237)	-0.006	(0.247)	-0.390	(0.247)	-0.328	(0.281)
	Grade <6	*Ref.*		*Ref.*		*Ref.*		*Ref.*	
	Grade 6-7	-0.589***	(0.169)	-0.542**	(0.175)	-0.616***	(0.156)	-0.574***	(0.155)
	Grade 7-8	-0.747***	(0.192)	-0.691***	(0.163)	-0.770***	(0.163)	-0.995***	(0.179)
	Grade >8	-0.851*	(0.353)	-1.102*	(0.462)	-1.182***	(0.183)	-1.133***	(0.284)
	Male	0.258*	(0.125)	0.200	(0.135)	0.290*	(0.129)	-0.085	(0.106)
	2-parent family	-0.207	(0.209)	-0.329	(0.208)	0.214	(0.195)	-0.228	(0.155)
	Attended form 10	-0.119	(0.132)	-0.161	(0.147)	0.067	(0.148)	-0.144	(0.115)
	# children: 3-4	0.058	(0.157)	-0.180	(0.180)	-0.077	(0.126)	-0.072	(0.150)
	# children: 5+	-0.289	(0.254)	-0.506*	(0.228)	-0.382*	(0.162)	0.043	(0.178)
Mother's education	High school	-0.653**	(0.223)	-0.578*	(0.255)	-0.273	(0.205)	-0.794***	(0.240)
	Vocational education	0.234	(0.230)	0.327	(0.249)	-0.075	(0.160)	0.093	(0.231)
	Tertiary education	-0.071	(0.221)	0.491*	(0.200)	-0.497*	(0.225)	0.019	(0.223)
Father's education	High school	0.135	(0.353)	0.663*	(0.317)	-0.399	(0.257)	-0.299	(0.267)
	Vocational education	-0.044	(0.184)	-0.316	(0.201)	-0.419**	(0.137)	-0.528**	(0.192)
	Tertiary education	-0.108	(0.257)	-0.060	(0.208)	-0.185	(0.181)	-0.196	(0.229)
	Mother's income (in million DKK)	0.091	(1.565)	0.000	(2.173)	0.915	(1.452)	-0.103	(1.851)
	Father's income (in million DKK)	0.777	(0.949)	0.154	(1.102)	1.919	(1.055)	0.826	(1.020)
Mother's labour market status	Self-employed	0.674	(0.722)	-0.201	(0.620)	0.212	(0.428)	0.363	(0.421)
	Wage earner: basic-top level	*Ref.*		*Ref.*		*Ref.*		*Ref.*	
	Other wage earners	0.136	(0.241)	-0.001	(0.208)	0.307	(0.204)	0.033	(0.267)
	Social transfers	0.257	(0.377)	0.180	(0.274)	-0.176	(0.227)	-0.329	(0.278)
	Others	0.412	(0.389)	-0.052	(0.326)	-0.140	(0.269)	-0.004	(0.321)
Father's labour market status	Self-employed	-0.416	(0.251)	0.053	(0.288)	-0.104	(0.279)	0.531*	(0.232)
	Wage earner: basic-top level	*Ref.*		*Ref.*		*Ref.*		*Ref.*	
	Other wage earners	-0.230	(0.249)	0.021	(0.268)	0.078	(0.225)	-0.053	(0.253)
	Social transfers	-0.088	(0.281)	0.217	(0.299)	0.416	(0.266)	0.891***	(0.205)
	Others	-0.119	(0.308)	0.286	(0.271)	0.479	(0.339)	0.929***	(0.281)
	Second gen. immigrant	0.050	(0.169)	-0.163	(0.175)	-0.284*	(0.128)	-0.011	(0.149)
Country of origin	Turkey	0.299	(0.265)	-0.154	(0.210)	0.171	(0.143)	0.530*	(0.214)
	Lebanon	-0.111	(0.223)	-0.138	(0.261)	0.223	(0.269)	0.568	(0.304)
	Pakistan	-0.100	(0.330)	-0.021	(0.357)	0.412*	(0.208)	0.802***	(0.174)
	Former Yugoslavia	0.358	(0.335)	0.279	(0.321)	0.910**	(0.286)	0.681	(0.383)
	Bosnia	-0.257	(0.386)	-0.215	(0.291)	0.148	(0.215)	0.564*	(0.257)
	N	971				1247			

*Standard errors in parentheses * p<.05, ** p<.01, *** p<.001. Missing value flags, cohort dummies and commercial college fixed effects included.*

The Impact of Academic Preparedness of Immigrant Students on Completion of Commercial Vocational Education and Training

This study provides new evidence on the impact of academic preparedness on completion probabilities in commercial vocational education and training among immigrant students in Denmark. Using a longitudinal dataset retrieved from administrative registers we find that better academic preparedness increases completion probabilities of the two-year basic course, and to a minor degree, partly indirectly through its effect on grades obtained during the basic course, affects completion of the full four-year programme. While raising academic preparedness matters for improving basic course completion, it is not as closely related to full programme completion. Raising grades seems to matter most at the lower end of the form 9 grade distribution. Yet, increasing initial academic preparedness of students from the lowest to the highest level would by itself increase the full programme completion rate to only 16 per cent. Even with augmented academic preparedness, there are still other strong forces causing dropout before completing the programme. Additional results show that Math skills, rather than skills in Danish, affect completion rates.

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