Widened Participation and Unequal Access to Higher Education in Denmark, what drives this double pattern?

Fair Admission Conference july 7-8, 2011, Manchester

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Introduction

Widening participation and fair admission in HE has been a long standing issue on the educational agenda in most developed countries. No matter the type of welfare regimes, there is and has been a political consensus on the importance of striving for equal access to education.

While most studies focus on social mobility and access to HE in general (the vertical perspective), this paper analyzes the access to and distribution of students between HE institutions and fields of study, the horizontal perspective.

Some basic things about the danish situation

- From 1952 to 2009, the number of university students have increased from 13.000 to 118.000.
- Educational mobility increased over time, comparing cohorts born in 1962 and 1982, both in terms of upper secondary completion and access to the university level (McIntosh and Munk 2011)

- Admission to university via Grade Point Average (a minor proportion comes in through quota 2)
- No tuition and fee (excl. books, computer)
- The same financial student aid for all, £ 500 pr. month

Two models

The analysis targets the horizontal level of educational outcomes in two ways. We employ register data to examine horizontal educational differences:

1. Explanation of choice of field of university study
2. Explanation of choice of university institution

Field of study might be too rough a category (conflating important differentiations). Ideally, a model would be fruitful in which field of studies were much more detailed, and where these detailed categories would be institution specific. Therefore we have used university institutions as response variable in model 2

Lit review

- Having a 'college going habitus' has a significant effect on HE attendance (Chevalier *et al.* 2009; E. Grodsky and Riegle-Crumb 2010; Walpole 2003).

Horizontal differentiation within HE:

- Massification leads to diversion/maintained qualitative inequalities (EMI). Some find support for this (Astin and Oseguera 2004; Ayalon and Yogev 2005; Becker and Hecken 2009; Davies and Guppy 1997)(Boliver 2011), some don't (Shavit *et al.* 2007).
- (Duru-Bellat *et al.* 2008) stress the importance of differentiating between types of tertiary HE institutions (see also (Goyette and Mullen 2006)).
- Regarding the importance of differing between fields of study within HE, (Reimer and Pollak 2009) (van de Werfhorst *et al.* 2003) finds that only the fields of medicine and law stands out at socially more exclusive. Similarly (Jackson *et al.* 2008) do not find support for the need to differentiate between fields of study in relation to an OED model. All papers have reservations about the use of the 'field of study'-categories, some pertaining to the use of old cohorts, some to the problem that their categorization of 'field of study' might be to coarse, thereby concealing differences that would be revealed using more detailed categorizations (Weeden and Grusky 2005).

Hypotheses – The horizontal level

A. Choice of field of study is stratified by class – first-generation students will aim at field of studies/institutions with an exact, tangible and universal (non-culture specific) curriculum - programmes that are **more applied-oriented** and therefore match students with a strong orientation towards future job possibilities. Other students will go for the **classical programme**

B. Inequality in access is as much about the intensity of competition over study places than it is about field of study and pedagogies used – it is to a large degree institutional. So GPA is important when competing for various places

C. It is expected that mothers play an important role in as primary executors of class-based familial educational strategies.

DATA DESCRIPTION

- Data population: We use register data on all Danish individuals born in 1984 – this population counts 54.734 observations. Due to unobserved educational status in 2008 1.601 observations were dropped and 4.676 observations were dropped due to missing values of explanatory variables. The final sample consists of 48.057 observations. Unknown/missing' categories for parental education and occupation were introduced to reduce the number of missing observations.

- Explanatory Variables: Register variables are used as explanatory variables and they have been re-coded on the basis of a great number of preliminary alternative model specifications. The register variables are based on Statistics Denmark register data from 2000 (where the respondents would be 16 years of age).

- Response Variables: all response variables are constructed from register data for highest completed or ongoing education in 2008. **Hence we model the latest educational decision of the student.** This however means that we look at students that have completed their education and those who are still enrolled, and hence are still liable to drop out or fail to graduate. Two models: 1.Direction of university education (field of study), 2. choice of university.

Highest Completed or Ongoing education of Individuals Born in 1984 (2008)

No. (Pct.)	Highest Competed	Highest Completed or Ongoing
0. Primary Education	14585 (26,6)	11018 (20,1)
1. Upper Secondary Education	21956 (40,1)	5257 (9,6)
2. Vocational Education	12792 (23,4)	16775 (30,6)
3. Short Higher Education	1137 (2,1)	2599 (4,7)
3. Intermediate Higher Education	342 (0,6)	7249 (13,2)
4. Long Higher Education, UNI	1897 (3,5)	9846 (18,0)
. Missing	2025 (3,7)	1990 (3,6)
Sum	54734 (100,0)	54734 (100,0)

University Insititutions

AAU	Aalborg University
AU	Aarhus University
KREA	University type institutions within the creative arts
DTU	Technical University of Denmark
KVL&DFU	Danish Pharmaceutical University & Royal Veterinary and Agricultural University
CBS	Copenhagen Business School
ASB	Aarhus School of Business
KU	Copenhagen University
RUC	Roskilde University
SDU	Odense University
OTHER	Other small institutions

Table 1: Field of study by background characteristics

	Field of study				
(Percentage)	Social science	Humanities	Natural or technical science	Health science	Business studies
Ethnicity					
Non-western	3	3	3	9	6
Gender					
Female students	62	59	40	70	52
Parents highest education					
Primary School	5	4	4	3	6
Gymnasium	2	3	2	2	3
Vocational training	23	22	24	18	33
HE-Business Academy	5	6	7	6	8
HE-University college	37	33	35	31	30
HE-University degree (incl. PhD)	28	32	28	40	20

Table 2: University institution by background characteristics

(Percentage)	AAU	AU	KREA	DTU	KVL	DFU	CBS	ASB	KU	RUC	SDU
Fields of Study											
- Aesthetic/creative studies	-	-	100	-	-	-	-	-	-	-	-
- Humanistic	23	39	-	-	-	-	-	-	-	44	26
- Natural sciences	5	16	-	-	100	100	-	-	14	12	11
- Health studies	-	16	-	-	-	-	-	-	19	-	18
- Social sciences	21	27	-	-	-	-	-	-	28	44	9
- Business studies	16	2	-	-	-	-	100	100	-	-	33
- Technology studies	34	-	-	100	-	-	-	-	-	-	4
Share of applied oriented programmes	51	16	100	100	100	100	100	100	15	0	52
Share of study places that requires a GPA of 9 or greater as condition for admission	6	26	*	0	31	0	6	0	33	0	16
Share of the admitted students in 2005	11	21	N/A	6	3	1	13	6	31	8	14
Residence of student at year 16											
- Copenhagen or Århus	17	36	36	37	27	41	46	38	44	43	9
Gender											
- Female students	43	56	55	24	85	73	51	53	60	62	56
Ethnicity											
- Non-western	3	3	1	4	1	14	7	3	5	3	8
Parents highest education											
- Primary School	6	4	4	2	4	6	5	6	4	4	6
- Gymnasium	2	2	1	2	1	4	3	3	3	3	3
- Vocational training	34	25	16	17	29	23	28	34	17	16	32
- HE-Business Academy	8	6	7	6	6	5	6	10	6	6	10
-HE-University college	33	35	39	35	35	30	33	31	32	38	33
- HE-University degree, incl. Ph.D.-degree	17	29	33	38	26	32	26	16	39	33	17
Mean family income (DKK 1.000.000)											
- Mean income	0,57	0,62	0,63	0,69	0,66	0,62	0,67	0,62	0,65	0,62	0,57
- st dev	0,24	0,27	0,25	0,31	0,28	0,31	0,32	0,27	0,31	0,30	0,28
Localization (city size with capital as largest)	4th	2nd	N/A	1st	1st	1st	1st	2nd	1st	1st	3rd

Table 3: Chosen Field of study among students with comparable high school GPA's from different social groups

Field of study *(Percentage)*	Social Science	Humanistic Studies	Natural or Technical Science	Health Science	Business Studies	Total
GPA from high school 9 or greater						
-Students with academic parents N=577)	18	28	21	23	10	100
-Students with working class parents (N=172)	14	22	20	17	27	100
GPA from high school 8 or less						
-Students with academic parents (N=577)	21	20	22	2	35	100
Students with working class parents (N=172)	20	11	14	4	51	100

- From table 3 one can observe that among students with a GPA of 9 or higher (a relatively high GPA), almost three times as many working class students as academic class students will study business, so these students more **prefer applied programmes**, making sense to them.
- Among students with a mediocre to low GPA of 8 or less, working class student's favours business studies more than academic class students, who on the other hand favours humanities twice as much as working class students.

Relative risk ratios (odds ratios)

- The reported model estimates are relative risk ratios (RRR), which is a generalization of odds ratios to multinomial models. All covariates are included as dummy variables. Thus, RRR is the ratio of relative probability of the outcome in question (compared to the reference outcome) when the dummy variable changes from zero to one.

- An RRR of 2.5 means that if the dummy variable equals one the likelihood of the outcome in question compared to the reference outcome is 2.5 times more likely than if the dummy variable equals zero. More generally, having an RRR<1 implies that the dummy variable in question reduces the likelihood of the outcome while RRR>1 implies a higher likelihood of the outcome, relative to the reference outcome of no university education.

Model 1: Field of study *(Part 1 of 2)*

	HUM	SOC	NAT/TECH	HEALTH	BUSINESS
Female	1.84***	1.61***	1.04	1.16**	1.20***
Non western Immigrant	0.95	1.26	1.02	3.00***	2.78***
Urban (Copenhagen and Aarhus)	1.05	1.17**	1.08	0.91	1.15**
Mothers age	1.04***	1.04***	1.03***	1.03**	1.03***
Fathers age	1.02**	1.00	1.02*	1.02**	1.02***
Nuclear family	1.31***	1.02	1.22*	1.39***	1.03
Family income (100.000 DKK)	0.93	2.10***	1.44*	2.47***	3.11***
Fathers occupation (ref: Unskilled workers)					
- Machine operators	1.13	1.18	1.15	1.25	1.17
- Skilled craft workers	1.27*	1.24	1.17	1.42**	1.32*
- Skilled agricultural/ fishery workers	1.13	1.39	1.61*	1.86***	1.54**
- Sales, service and care work	1.31	1.51*	1.67*	1.38	1.48*
- Clerks	1.69***	1.33	1.95***	1.32	1.39*
- Sales, finance, business, administration	1.62***	1.87***	1.52*	1.58**	2.20***
- Technicians and associate professionals	1.59***	1.32	1.92***	2.05***	1.57***
- Professionals – arts and social sciences	2.59***	2.53***	1.80**	1.88***	2.93***
- Teaching professionals	2.22***	1.95***	2.28***	1.92***	1.69***
- Science professionals	1.80***	1.98***	2.04***	2.84***	1.89***
- Managers	1.13	1.32	1.49*	1.59**	1.70***
- Legislators, senior officials	2.02***	1.94***	1.75**	1.51**	2.41***

Model 1: Field of study *(Part 2 of 2)*

	HUM	SOC	NAT/TECH	HEALTH	BUSINESS
Mothers occupation (ref: Unskilled workers)					
- Machine workers and skilled craft workers	0.89	1.04	0.95	0.60*	1.09
- Skilled agricultural and fishery workers	1.27	1.23	0.77	1.01	1.01
- Sales, service and care work and clerks	1.61**	1.63**	1.25	1.61**	1.53***
- Sales, finance and business administration	1.54*	2.51***	1.20	1.82***	1.85***
- Technicians and associate professionals	1.67***	1.66**	1.13	1.64***	1.26
- Professionals - arts and social sciences	2.66***	3.07***	1.93**	2.21***	1.97***
- Teaching professionals	2.91***	2.32***	1.57*	2.27***	1.68***
- Science professionals	1.77**	2.40***	1.54*	2.80***	1.56**
- Legislators and senior officials, managers	1.96***	2.06***	1.15	1.17	1.59**
Fathers education (ref: Elementary school)					
- High school education	2.12***	1.94***	2.76***	1.72***	2.22***
- Vocational education	1.04	1.04	1.56***	1.19*	1.30***
- Short/medium higher education	1.57***	1.54***	1.95***	2.01***	1.67***
- Long higher education	2.65***	2.64***	3.25***	3.32***	2.13***
Mothers education (ref: Elementary school)					
- High school education	2.77***	2.55***	1.98***	2.65***	1.71***
- Vocational education	1.35***	1.51***	1.32**	1.63***	1.39***
- Short/medium higher education	2.29***	2.45***	2.28***	2.36***	1.62***
- Long higher education	3.88***	4.28***	4.28***	3.78***	1.80***
N	48057				
pseudo R-sq	0.117				
AIC	67689.9				
BIC	69577.6				

Categories for missing parental education and occupation included

* p<0.05, ** p<0.01, *** p<0.001"

Model 1 – field of study

- Non-western: large odds ratios of studying Health and Business programs (note: possible bias in background (missing) data for non-western students).
- Increase in family income gives high odds ratios of studying Business and Health.
- Parents' occupation: students with fathers and mothers in arts+ social science professions have large odds ratios of studying humanistic and social science programs. Students with fathers in science professions have large odds ratios of studying Health programs.
- Parents' education: Except for Business, mothers' education has more effect on HE attendance than fathers' education.

Model 2: University institution *(Part 1 of 2)*

	AAU	AU	KREA	DTU	KVL&DFU	CBS	ASB	KU	RUC	SDU
Female	0.85*	1.45***	1.50**	0.36***	4.18***	1.14*	1.29**	1.73***	1.85***	1.38***
Non western Immigrant	1.26	1.13	0.49	2.50**	3.23***	3.57***	0.90	1.44*	0.88	4.04***
Urban (Copenhagen and Aarhus)	0.49***	1.26***	1.15	1.11	1.06	1.81***	1.61***	1.46***	1.47***	0.19***
Mothers age	1.04***	1.03***	1.02	1.05**	1.03	1.04***	1.02	1.03***	1.05***	1.02*
Fathers age	0.99	1.01	1.06***	1.04**	1.03*	1.02**	1.02	1.02***	1.01	1.02*
Nuclear family	1.39**	1.57***	1.83*	1.37	1.35	0.83	1.68**	0.94	1.02	0.96
Family income (100.000 DKK)	0.98	1.27	1.04	2.74***	2.78***	4.55***	2.21***	2.16***	1.54*	2.00***
Fathers occupation (ref: Unskilled workers)										
- Machine operators	1.45*	1.16	1.32	0.58	1.33	1.03	1.44	1.03	1.06	1.11
- Skilled craft workers	1.48**	1.17	1.03	2.73**	1.55	1.24	1.55*	1.21	1.06	1.18
- Skilled agricultural/ fishery workers	2.22***	1.89***	1.81	1.38	2.78**	1.55	2.52***	0.79	0.65	0.99
- Sales, service and care work	1.45	1.24	2.14	1.69	1.63	1.51	2.29**	2.06***	1.55	0.65
- Clerks	1.36	1.41	0.50	2.30	1.75	1.28	1.13	2.10***	1.71	1.40
- Sales, finance, business, administration	1.77**	1.64***	1.41	2.39*	1.12	2.34***	2.71***	1.97***	2.05**	1.34
- Technicians and associate professionals	1.81***	1.12	2.18	3.80***	2.52**	1.71**	2.07**	1.81***	2.22**	1.32
- Professionals – arts and social sciences	2.35***	2.12***	2.52*	3.61**	1.70	3.37***	3.31***	2.46***	2.29**	1.99***
- Teaching professionals	2.15***	1.97***	3.15**	2.87**	2.07*	1.84**	1.90*	2.21***	2.11**	1.57**
- Science professionals	2.14***	1.75***	2.56*	5.41***	2.03*	2.21***	1.57	2.56***	2.02**	1.64**
- Managers	1.31	1.44*	2.85*	2.78*	1.81	2.00***	1.72	1.38	1.17	1.04
- Legislators, senior officials	2.11***	1.64***	1.91	2.94**	2.02*	2.35***	2.90***	1.99***	2.48***	1.46*

Model 2: University institution *(Part 2 of 2)*

	AAU	AU	KREA	DTU	KVL&DFU	CBS	ASB	KU	RUC	SDU
Mothers occupation (ref: Unskilled workers)										
- Machine workers and skilled craft workers	0.87	1.46	0.91	0.91	0.87	1.09	1.01	0.43***	0.85	0.98
- Skilled agricultural and fishery workers	0.94	1.40*	2.71	0.95	0.98	0.96	1.32	0.81	1.79	0.94
- Sales, service and care work and clerks	1.51**	1.87***	3.79*	1.74	1.41	1.69**	1.87**	1.14	2.28*	1.31
- Sales, finance and business administration	1.44	1.94***	3.87*	2.19	0.76	2.24***	2.39***	1.58**	2.02	1.71**
- Technicians and associate professionals	1.15	1.87***	4.36*	2.00	1.09	1.67**	1.21	1.12	2.22*	1.54*
- Professionals - arts and social sciences	1.93**	2.46***	6.42**	3.01**	2.00	2.74***	1.67	2.13***	5.77***	1.31
- Teaching professionals	1.27	3.21***	7.38**	2.56*	1.52	2.20***	1.97*	1.84***	3.66***	1.57*
- Science professionals	1.60*	2.40***	4.72*	2.98**	2.31*	1.97**	1.82	1.76***	2.81**	1.75*
- Legislators and senior officials, managers	1.35	2.06***	3.36	1.77	1.19	2.01**	1.50	1.36	2.36*	1.08
Fathers education (ref: Elementary school)										
- High school education	1.24	2.12***	3.13**	1.48	1.68	2.21***	2.19***	2.56***	2.03***	1.95***
- Vocational education	1.14	1.33**	1.42	0.91	1.31	1.29*	1.21	1.18	0.77	1.18
- Short/medium higher education	1.57***	1.91***	1.81*	1.88**	1.53*	1.56***	1.71***	1.80***	1.38	1.76***
- Long higher education	2.01***	3.50***	3.43***	2.80***	2.32***	2.07***	2.05***	3.33***	2.22***	2.31***
Mothers education (ref: Elementary school)										
- High school education	2.21***	2.12***	2.44*	2.88***	1.80	2.00***	1.37	2.69***	4.33***	2.16***
- Vocational education	1.52***	1.43***	0.99	1.66*	1.24	1.62***	1.21	1.35***	1.86**	1.46***
- Short/medium higher education	2.28***	2.10***	1.85*	2.03**	2.11***	1.79***	1.57**	2.48***	4.07***	1.85***
- Long higher education	2.56***	3.39***	3.76***	2.91***	3.91***	2.26***	1.23	4.90***	5.97***	2.02***
N	49662									
pseudo R-sq	0.111									
AIC	89474.1									
BIC	93642.6									

Categories for missing parental education and occupation included

* p<0.05, ** p<0.01, *** p<0.001"

Model 2 – university institution

- Non-western: large odds ratios of studying DFU and CBS. Increase in family income: students more likely to enter business schools (especially CBS), DTU and DFU/KVL.
- Parents' occupation: students with science professional fathers: large odds ratios of studying at DTU, but students with other social backgrounds also attend DTU.
- Fathers in primary sector= large odds ratios of attending AAU, KVL, ASB.
- Having mothers in art and teaching professions yields high odds ratios of attending artistic institutions or RUC. This is probably the cultural middle class.
- Parents' education: Mothers' education has consistently more effect on HE attendance than fathers' education. Large odds ratios of studying at KU or RUC when mothers are academics.

Two oppositions

- We cannot view the differentiation processes in the Danish university field as a question of a division between mass and elite universities
- A. a 'classical' non-vocational profile university group, but incl. law and medicine, that is the liberal arts universities and creative institutions with students from homes where the transmission of academic and cultural capital is the primary mechanism of reproduction.
- B. a vocational applied-oriented profile university group, incl. utility oriented programmes like pharmacy and business studies with students from homes where education is valued as important because it grants access to solid, well paid and well-respected jobs.

SUM UP

- This paper shows that within the university level there are degrees of social selectivity by institution and field of study
- It seems that mothers education are more important relative to fathers education
- When differing between fields of studies, Business and Health studies stands out implying more educational mobility, but we get more nuanced picture when using institutions as the explained variable

- [Our results somehow supports the effectively maintained inequality (EMI) hypothesis.]

Fair admission?

- We argue that a genuine widening participation in university education would require changed access patterns for some of the most selective institutions as well as it would require that some of the students from highly educated homes would be channelled towards off-centre applied-oriented university institutions.
- This could lead one to favour a change in the admission criteria from pure GPA, to perhaps a more varied admission system, hoping that working class students would fare better if admission criteria where based on applications, meetings, etc.