High Educ (2011) 61:261–275
DOI 10.1007/s10734-010-9376-9

Differentiation and social selectivity in German higher education

Steffen Schindler · David Reimer

Published online: 17 October 2010

Abstract In this paper we investigate social selectivity in access to higher education in Germany and, unlike most previous studies, explicitly devote attention to semi-tertiary institutions such as the so-called universities of cooperative education. Drawing on rational choice models of educational decisions we seek to understand which factors influence upper secondary graduates from different social backgrounds in their choices of diverse tertiary institutions in Germany. We find that scholastic performance, expected job security, study duration, monetary costs and preferences for study content considerably contribute to the creation of socially selective choice patterns of post-secondary careers. The characteristics of semi-tertiary institutions—such as universities of cooperative education that combine firm-based training with tertiary education—constitute a potential alternative that could reduce inequities in access to higher learning.

Keywords Higher education · Differentiation · Social inequality · Social class

Introduction

Germany, just as most other OECD countries, experienced considerable expansion of higher education throughout the last 50 years, moving from an elite system towards mass higher education (e.g. Trow 2005). The expansion of higher education has been accompanied by institutional differentiation of various kinds (e.g. Huismann 1995; Teichler 1988). In this context, the German higher education system can be considered to be of a *binary* type: In addition to the academically oriented *universities* a second tier of more vocationally oriented *universities of applied sciences* (*Fachhochschulen*) was established

S. Schindler (✉)
University of Mannheim, Mannheim Centre for European Social Research (MZES), Mannheim, Germany
e-mail: Steffen.Schindler@mzes.uni-mannheim.de

D. Reimer
Aarhus University, School of Education, Copenhagen, Denmark
e-mail: dare@dpu.dk

in the 1970s. While most of the literature on inequality in access to German higher education has focussed on the divide between universities and universities of applied sciences on the one hand and vocational training on the other (Becker and Hecken 2009; Hillmert and Jacob 2003; Mayer et al. 2007; Reimer and Pollak 2010), another hybrid institution, the *university of cooperative education* (*Berufsakademie*), that combines features of the German vocational training system with tertiary level schooling, has largely escaped the notice of most researchers so far (but see: Trautwein et al. 2006). In this paper we investigate educational stratification in access to different post-secondary destinations in Germany and, unlike most previous studies, also devote attention to semi-tertiary institutions such as the university of cooperative education. Drawing on rational choice models we seek to understand in which way institutional differentiation impacts social inequality in the choice of post-secondary careers. We particularly focus on the specific characteristics of different institutions and the way they influence educational decisions of students from varying social backgrounds. This enables us to explore the potential of different tertiary institutions to reduce social inequality in access to higher education.

The remainder of this paper is structured as follows. First, we provide a brief characterization of the different post-secondary educational alternatives in Germany. In the following section, we formulate theoretical expectations about socially selective attendance patterns to the different post-secondary options as a result of their specific characteristics. After giving an overview of our data and variables we present descriptive and multivariate analyzes depicting the pattern of social stratification across different post-secondary institutions. We summarize our results in the last section.

Background: tertiary education in Germany

One of the most central features of the German education system is that students are allocated to different schooling tracks at a relatively early age. After 4th grade at the age of 10 (in some federal states 6th grade/age 12) students are allocated to three different secondary education tracks. Typically, only one of them, the *Gymnasium*, provides access to the upper secondary degree (*Abitur*), which is the prerequisite for access to tertiary education.[1] In addition to the *Abitur*, ca. 13% of all students reach eligibility for tertiary education by obtaining a *Fachhochschulreife* (restricted *Abitur*). This restricted upper secondary degree allows for access to universities of applied sciences only and can be obtained by leaving the *Gymnasium* 1 year earlier and through the attendance of special vocational-type upper secondary schools or evening-school type of programs. Overall, in 2007, 47% of a birth cohort obtained an upper secondary certificate and were thus eligible for higher education (Statistisches Bundesamt 2008a), of which about 70% entered tertiary education (e.g. Heine et al. 2008).

Among all post-secondary alternatives the traditional *university* is the most prestigious one and offers the most advantageous labour market rewards (Müller et al. 2002). At the same time it can be characterized as the academically most demanding institutional alternative. Obtaining a degree from a traditional university takes relatively long: Prior to the Bologna reforms the average duration of study at universities was between 5–6 years. Until the recent introduction of tuition fees in most federal states, attending a university or any other higher education institution has been free of charge. At present, more than two-

[1] Is also possible to obtain an *Abitur* at so-called comprehensive schools but only a minority of students (ca. 5% in the year 2007, cf. Statistisches Bundesamt 2008c, d) obtain their *Abitur* at these schools.

thirds of all higher education students in Germany attend university (Statistisches Bundesamt 2008b). *Universities of applied sciences* (*Fachhochschulen*) are much more vocationally oriented than traditional universities and stress the applicability of knowledge. They offer a much narrower range of fields of study, such as engineering or business studies. The average length of study is less than 5 years. Since universities of applied sciences are somewhat less demanding and more practically oriented, dropout rates are slightly below those of traditional universities (Heublein et al. 2002, 2005). Furthermore, labour market rewards are lower in comparison to universities (Müller et al. 2002). Currently, almost 30% of all enrolled higher education students study at this institution (Statistisches Bundesamt 2008b). Both within the group of universities and within the universities of applied sciences there is no clear-cut prestige hierarchy of institutions such as present in the United States or the United Kingdom.

Under the label *semi-tertiary institutions* we subsume two kinds of institutions: *Universities of cooperative education* (*Berufsakademien*) and *universities of administration* (*Verwaltungshochschulen*). Both have in common that they are situated in-between tertiary and non-tertiary education. Together they account for about 3% of the total student body in higher education (cf. Statistisches Bundesamt 2008b). The fact that the share of the student body is smaller compared to the other university types is partly due to the much shorter study times. It should also be noted that the universities of cooperative education are more prevalent in some German states than in others. However, due to the problem of low *N* we decided to not disaggregate the analyses presented in this study by region. In our data an average of ca. 6% of all students chose these institutions as first post-secondary choice (cf. Table 2).

In both cases of semi-tertiary institutions the student agrees on a contract with a specific employer who is responsible for the in-firm part of a dual training.[2] At both of the above mentioned university types students spend a nearly equal amount of time at the tertiary institution (school) and a sponsoring training organization (in-firm). The most distinctive feature of semi-tertiary institutions is that they provide a salary to the student. Universities of cooperative education offer programmes in engineering, technology, business studies and social work. Universities of administration are restricted to the training of civil servants for public administration and police functions. At both institutions the length of study is 3 years. It is yet unclear how much labour market prospects differ for graduates from the semi-tertiary institutions compared to the more established university types. As regards labour market rewards for universities of cooperative education, Hillmert and Kröhnert (2003) found that graduates from this institution lag behind graduates from the more established university alternatives. Graduates from universities of administration are at least classified into the same salary grade as graduates from universities of applied sciences within the public sector. However, transition into employment is very smooth for graduates of semi-tertiary institutions given that the sponsoring organization has an interest in retaining them.

Finally, about one quarter of upper secondary graduates typically enters some *non-tertiary* post-secondary destination (e.g. Reimer and Pollak 2010). Among those, about two-thirds take up an apprenticeship in the dual system with a contract between employer and apprentice and a small salary. A smaller proportion of these students enters school-based vocational training (for example in the health sector), which usually requires the payment of some tuition fee without the provision of any salary. Both vocational training

[2] In the case of universities of cooperative education this is usually a private firm, in the case of universities of administration this is the state/public administration.

alternatives can be characterized as less academically demanding than any of the higher education programmes and labour market rewards can clearly be situated below tertiary education. However, the training duration is much shorter, ranging from 2 to 3 years.

Theoretical expectations

As outlined above, each post-secondary institution offers a specific configuration of study-costs, benefits and academic demands. Socially selective decision patterns related to these institutions can be described with a simple rational choice formula for educational decisions that has been proposed by Erikson and Jonsson (1996): $U = p^*B - C$. A student will pick the alternative that promises the highest utility (U); and this utility is a function of the benefits (B) associated with the alternative, the probability (p) that these benefits will be reaped and the costs (C) associated with it. A central tenet of the theory is that the evaluation of these factors varies systematically by social origin, which in turn produces unequal attendance patterns across post-secondary institutions.

In the next section, we describe in more detail how costs, benefits and success probabilities are reflected in considerations of students from different social backgrounds.

Benefits

A prime concern for the choice of a post-secondary institution is the expected benefit of a given educational pathway. In this context, relative risk aversion theory (Boudon 1974; Breen and Goldthorpe 1997) assumes that the desire to avoid social demotion has a strong impact on educational choices. *Status maintenance* considerations should cause upper class students to enter those institutions that facilitate access to higher status positions. Hence, they should prefer traditional universities to universities of applied sciences and semi-tertiary institutions, or more generally, tertiary institutions over non-tertiary institutions. For students from lower classes, however, the choice of a non-tertiary alternative will be sufficient in most cases to attain a position at the level of their parents. Furthermore, lower class students should see more benefits in educational tracks that lead directly into stable employment, since they cannot rely on parental support for long periods of job search or unemployment, as their upper class counterparts can. We thus expect that students from lower social backgrounds adapt a more risk-averse educational strategy and attach more weight to *job security* considerations. Especially non-tertiary tracks and semi-tertiary institutions should be considered as providing the smoothest job transitions, since training and occupation are already integrated. Conversely, the most courses of study offered at university provide a much less occupation-specific education. Hence, school-to-work transitions might be perceived as much more insecure. Another relevant dimension of benefits that should be valued differently according to the students' social background might be connected to the reproduction of cultural capital. If a student was socialized in an academic environment, it is likely that she will value higher education in and of itself and feel more comfortable with the abstract *academic culture*. A working class student, however, might see more 'practical' educational tracks as more beneficial. It follows that students from the working classes should be more inclined to abstain from tertiary-level education. If they do enter higher education, they might lean more towards the *practically oriented* institutions, such as universities of applied sciences, whereas students with academically educated parents should be more eager to study at traditional universities, which are considered most prestigious in academic terms.

Success probabilities

The benefit of an educational choice can be reaped only if the educational track can be completed successfully. The evaluation of the probability of success depends on two factors. On the one hand, the level of academic requirements should vary across post-secondary institutions, and on the other hand, students from different social backgrounds should differ in the assessment of their potential to meet these requirements. Regarding the latter factor, students from more privileged backgrounds should, on average, do better in school due to their parents' cultural resources (e.g. Boudon 1974). Second, they should be more familiar with the demands in higher education than their lower class peers, who might overestimate the level of academic requirements of tertiary institutions. In sum, working class students should be less optimistic about their prospects to succeed in higher education and abstain more often from tertiary level institutions. If they decide to enrol in higher education anyway, they should be more attracted by the universities of applied sciences, which are generally considered as being less demanding. Semi-tertiary institutions, however, especially the universities of cooperative education, are very selective with respect to students' previous academic performance, since firms are making significant investments in the selected students. Thus, one could expect that semi-tertiary institutions constitute particularly beneficial options for students from lower backgrounds with high academic aptitude.

Costs

The various post-secondary alternatives are also associated with different kinds of costs. Since working class students might be lacking parental financial support, they should appreciate those educational tracks more that are not connected to high costs for tuition or subsistence. Especially the non-tertiary or semi-tertiary options fulfill these requirements by providing a salary, whereas the tertiary institutions pose the highest financial burden. Also, the duration of study constitutes a cost factor that can create social selectivity in access to post-secondary institutions. Especially long study periods without any proper income should appear discouraging for lower class students and lead them to opt for shorter non-tertiary post-secondary tracks. Within the tertiary system semi-tertiary institutions constitute the option with the shortest duration. Their duration of study is not significantly longer compared to the non-tertiary tracks. The longest study time has to be invested at traditional universities, which might deter working class students from enrolling there.

In sum these decisions factors should contribute to socially selective decision behaviour in the choice of post-secondary institutions. It should be acknowledged, however, that the impact of individual decisions can be reduced if structural conditions limit the room for choices. This is the case for the type of upper secondary degree. Restricted upper secondary degrees (*Fachhochschulreife*), for example, grant access to institutions below university level only. Students from lower classes are more likely to obtain such a restricted degree, and are hence more likely to be excluded from access to traditional universities (cf. Müller et al. 2009). Another dimension of upper secondary differentiation is the distinction between traditional schools with a general-education profile and schools with a vocational profile. Education at vocationally oriented upper secondary schools focuses on a specific field, such as business or technology. Students at these schools are more likely to enter applied post-secondary tracks—although they are legally entitled to chose between the whole set of tracks. Also, vocationally oriented upper secondary schools particularly attract students from lower classes (Maaz 2006; Maaz et al. 2004). We thus

expect pronounced effects of these structural conditions for social selectivities in access to post-secondary institutions.

Data, methods and analytical strategy

Data

For our analyses, we consider upper secondary graduates that received their *Abitur* degree in the 1990s. We pooled three datasets based on large-scale upper secondary school leaver mail surveys, collected in 1990, 1994 and 1999 by the German Higher Education Information System (HIS). The data sets come from stratified, random samples of students with entrance qualifications to higher education in Germany. Students in the surveys were interviewed in two waves: half a year and three and a half years after graduation. Our analyses draw on the second wave, which includes retrospective data on the educational career in half-year steps. To reduce heterogeneity, we exclude individuals who were older than 30 when they obtained their entrance qualification. Also, we restrict our sample to students without any vocational training career prior to upper secondary education. We do this to only compare students with each other that make their *first* post-secondary transition. We correct for sample distortions and panel mortality by applying different weights.[3]

Variables

The dependent variable is coded as first post-secondary education decision. We distinguish four post-secondary destinations: *university*, *university of applied sciences*, *semi-tertiary institutions* and *non-tertiary education*. Those who did not choose any of these alternatives within our observation period are coded into *no further education*. Our central independent variable, the student's *social background*, is a composite measure of parental class and parental education. We start with a 3-category version of EGP class based on father's occupation[4] and distinguish between working class, intermediate classes and service classes (e.g. Jackson et al. 2007). Then, intermediate and service classes are further subdivided according to whether at least one parent achieved a higher education degree.[5]

Scholastic *performance* is measured by the grade point average (GPA) in the upper secondary degree.[6] The German grade scale has been z-standardized within datasets and federal states for the sake of better comparability. The scale has also been reversed, so that high values denote better performance.

Perceptions of benefits and costs attached to different post-secondary alternatives are not explicitly measured in the HIS datasets. However, one big advantage of these data is the repeated implementation of several standard instruments across surveys from different

[3] First, a population weight that was delivered by the data providers accounts for sampling distortions in marginal distributions; second, a panel weight adjusts for selective dropouts between the first wave and our analytical sample; and third, a dataset weight for all analyses that are based on the pooled dataset is applied in order to assign equal weight to observations coming from different datasets. For the analyses we combined the three weights into a single composite weighting factor.

[4] In case this information was missing, it has been replaced by mother's class.

[5] The working class has not been divided according to parental education since only less than 5 per cent in this category possess a higher education degree.

[6] For about one per cent of the cases, information on grades was missing. In this case, values have been imputed by a regression-based imputation procedure.

Table 1 Theoretical concepts underlying educational decisions and indicators

Decision factor	Component	Indicator
Academic demands	P	GPA
Ability selection	*(primary effect)*	GPA
Status maintenance	B	Wish to achieve a leading position *(6 point scale)* Wish to achieve high (occupational) status *(6 point scale)*
Secure job transition	B	Wish for a secure job *(6 point scale)*
Practical relevance	B	Interest in practical (applied) work *(6 point scale)* Interest in academic work *(6 point scale)*
Duration	C	Wish for a short study/training period *(6 point scale)*
Financial burden	C	Wish for quick financial independence *(6 point scale)*
Structural factors		
Secondary pathways		General upper secondary degree (vs. restricted degree) General upper secondary school (vs. vocational school)

years. One of these instruments is an item list of motivational aspects that underlie the post-secondary educational choices, which can be used to approximate the theoretical concepts. For our analyses, we consider a selection of motives from the first waves, where the graduates had to indicate on a scale from zero to five how much the respective motive influenced their post-secondary plans.[7] Even though the items are related to the specific choices that students had in mind right after graduation, we assume that they reflect attitudes that are more or less stable until the first educational choice is made. Table 1 summarizes the theoretical concepts as well as the indicators we use.[8]

The *status maintenance* motive is approximated by two items: the wish to achieve a leading position and the wish to achieve a high occupational status. It should be acknowledged that this is a weak measure of the concept of status maintenance since the question measures status at an absolute level rather than the risk of social demotion, and a reference point to the parents' occupational position is missing. Considerations of *job security* are measured by an item indicating the wish for a secure job. Differences in the preferences for educational tracks with *practical relevance or academic orientation* are approximated by two items indicating both the interest in practical work and academic work. Perceived costs associated with the *duration* of study are captured by an item indicating the wish for a short training period. Similarly, monetary *cost* pressures are indicated by the wish for quick financial independence.

Institutional features of the upper secondary degree are expected to be both correlated with socially selective participation patterns and with differential postsecondary choice behaviour. Hence, we add the type of upper secondary degree as explanatory variables by including a dummy variable indicating general vs. restricted degrees as well as a dummy variable distinguishing between general (*allgemeinbildende Gymnasien*) and vocationally oriented upper secondary schools (*berufliche Gymnasien*) as degree awarding institutions. Finally, we control for gender and age at upper secondary graduation.

[7] The exact wording was: *"Please indicate how relevant the following reasons and motives were for the choice of your post-secondary career path"*.

[8] About 6–7% of the respondents have missing data on at least one motive item. These missing data have been imputed by a regression-based imputation procedure.

Table 2 Descriptives by post-secondary destination

	University	University of applied sciences	Semi-tertiary	Vocational training	No further education	Total
Distributions						
Dataset 1990	54.21	7.19	5.63	32.28	0.68	100.00
Dataset 1994	48.03	9.44	5.24	36.58	0.71	100.00
Dataset 1999	46.96	12.20	6.32	33.76	0.76	100.00
All	49.73	9.61	5.73	34.21	0.72	100.00
Mean values						
GPA	0.31	−0.13	0.10	−0.45	−0.76	−0.01
General degree	0.99	0.70	0.92	0.77	0.64	0.88
General school	0.92	0.61	0.75	0.68	0.54	0.80
Male	0.50	0.56	0.49	0.38	0.66	0.47
Age	19.53	19.57	19.50	19.47	19.81	19.51
Financial independ.	1.84	2.44	3.54	3.02	3.02	2.41
Short train. duration	0.50	1.17	1.94	1.23	0.73	0.90
Secure job	3.27	3.70	4.26	3.91	3.24	3.59
Practical work	2.40	3.26	2.89	3.14	3.23	2.77
Academic work	2.95	2.41	1.77	1.48	1.78	2.32
Leading position	2.67	3.12	3.47	2.94	2.60	2.85
High employm. status	2.54	2.80	2.95	2.55	2.19	2.59

Weighted data. Sample sizes of the unweighted datasets: $N(1990) = 12{,}335$; $N(1994) = 9{,}544$; $N(1999) = 6{,}486$

Results

Descriptives

Table 2 reports the descriptive statistics of our variables of interest by post-secondary destinations. Apart from a shift from university to universities of applied sciences, the pattern of enrolment is more or less stable across surveys. About half of the graduates opt for the traditional universities, about 10% attend the universities of applied sciences,[9] about 6% choose one of the semi-tertiary options and about one-third decides to take up training in a non-tertiary track at first. Less than 1% has not started any type of post-secondary education within 3 and a half years after graduation.

Traditional universities, but also the semi-tertiary institutions attract (or select) graduates with a GPA mean that is above the total average, whereas there is a clear negative selection into vocational education or out of education. Traditional universities and semi-tertiary institutions have the highest shares of students with general upper secondary degrees, whereas all the other institutions attract higher shares of students with restricted degrees or from vocational schools. Universities of applied sciences take in more males than females, whereas vocational training is more common among females. Two-thirds of

[9] This figure is smaller than the 20% that are usually reported by official statistics since we exclude students that receive their *Abitur* after vocational training, which is a very common pathway into universities of applied sciences.

those who are leaving the education system after upper secondary graduation are male. As regards the motivations for educational choices, a number of interesting findings emerge that are in line with our expectations. Financial considerations play an important role for students at semi-tertiary institutions, in the vocational track and for those who leave education. Students at semi-tertiary institutions and in vocational training have the highest average scores on the wish for a short training period. Also, the wish for a secure job is most pronounced among students at these two institutions that follow the dual-system concept. Practical work is appreciated most by students at universities of applied sciences, in the vocational track and outside the education system; students at semi-tertiary institutions are a bit above average. Conversely, academic work is appreciated the most among students at traditional universities. Only our two measures of status maintenance do not show the expected pattern: university students seem not to put much value on high status or leading positions. It is rather the students at semi-tertiary institutions and the universities of applied sciences who reveal the most ambitious motivations in this respect.

Table 3 gives an overview of bivariate relationships between social background and institutional participation rates on the one hand and between social background and the explanatory variables on the other hand. Students from working classes are underrepresented at traditional universities, but overrepresented in all other institutions, especially in those outside tertiary education. Interestingly, the differences in attendance patterns are more pronounced between students from non-academic and academic backgrounds than between students from intermediate and salariat classes. Graduates from academic families are strongly overrepresented at traditional universities and strongly underrepresented in the vocational training track. As regards the explanatory variables, some expected patterns clearly emerge. Working class graduates show the lowest average performance levels, whereas children from academic background display above average grades, both in the intermediate and in the salariat classes. As expected, the wish for quick financial independence, a short training period and a secure job are most pronounced among working class students, whereas they are least pronounced for students from academically educated salariat classes. Small background effects can also be observed for the evaluation of practical work. However, stronger effects are connected to the item of academic work, which shows a clear correlation with academic background. In contrast to our expectations, aiming for a leading position or a high status is very pronounced for working classes—even more than for the salariat classes.

Explaining class differentials

In the following analyses, we apply a non-linear decomposition method to estimate the relative contribution of specific variables in creating class differentials in the institutional attendance rates. For the decomposition analyses we employ a technique developed by Fairlie (2005).[10] The rationale behind it is that differences in participation rates between social classes can be decomposed into differences in the distributions of single explanatory variables and differences in the effects of these variables on participation in a given institution. By means of counterfactual manipulation, it is possible to assess the impact of

[10] At this point, we want to abstain from a more technical description of the method. Interested readers are referred to Fairlie (2005).

Table 3 Descriptive statistics by social origin

	Working class	Intermed./ no tertiary	Intermed./ tertiary	Salariat/ no tertiary	Salariat/ tertiary	All
Distributions						
University	34.38	41.25	58.99	45.68	67.92	49.73
Univ. of Appl. Science	11.83	9.15	11.20	9.84	7.80	9.61
Semi-tertiary	6.47	7.50	4.96	6.34	3.45	5.73
Vocational training	46.38	41.23	24.44	37.54	20.25	34.21
No further education	0.94	0.88	0.42	0.59	0.59	0.72
Total	100.00	100.00	100.00	100.00	100.00	100.00
Mean values						
GPA	−0.27	−0.13	0.14	−0.12	0.29	−0.01
General degree	0.79	0.85	0.94	0.88	0.96	0.88
General school	0.67	0.75	0.88	0.79	0.90	0.80
Male	0.46	0.46	0.44	0.49	0.48	0.47
Age	19.55	19.52	19.24	19.60	19.52	19.51
Financial independ	2.83	2.51	2.40	2.33	2.06	2.41
Short train. duration	1.01	0.94	0.88	0.90	0.79	0.90
Secure job	3.82	3.62	3.62	3.56	3.40	3.59
Practical work	2.90	2.78	2.84	2.78	2.63	2.77
Academic work	2.12	2.12	2.55	2.15	2.66	2.32
Leading position	2.94	2.84	2.70	2.93	2.80	2.85
High employm. status	2.69	2.51	2.64	2.58	2.59	2.59

Weighted data

single variables in the creation of class differentials in participation rates. In the following section, the dependent variables will always be the differences in participation rates between students from salariat classes with higher education and working classes, measured in percentage points. We conduct the decomposition procedure for four specifications of the dependent variable, each of which represents a different combination of post-secondary education alternatives. The dividing lines in the combinations of educational options correspond to specific characteristics of the institutions that are related to the decision factors discussed in the theoretical section. In contrast to an ordinary multinomial regression model in which one would differentiate between all available post-secondary options with respect to a reference category, our chosen method allows us to better estimate the overall impact and magnitude of the chosen theoretical parameters in explaining inequality in the outcome variable. That way, we are able to test the strength of a given factor with reference to the adequate choice set. For example, financial aspects should show the strongest effect in generating class differentials when the institutions which are providing a salary (semi-tertiary institutions and vocational training) are contrasted against those associated with the highest costs (universities and universities of applied science). In order to test our hypothesized mechanisms with regard to *educational* alternatives only, we exclude the marginal category 'no further education'. The results of the decomposition analyses for each contrast are displayed in Table 4. The coefficients can be interpreted as percentage points. They describe the share of the class gap in

Table 4 Estimates from non-linear decomposition analyses

	Model 1 University vs. Univ. of appl. Sci. Semi-tertiary Voc. training	Model 2 University Univ. of appl. Sci. vs. Semi-tertiary Voc. training	Model 3 University Semi-tertiary vs. Univ. of appl. Sci. Voc. training	Model 4 University Univ. of appl. Sci. Semi-tertiary vs. Voc. training
% salariat class	68/32	76/24	72/28	80/20
% working class	35/65	47/53	41/59	53/47
Participation gap	33.61	29.51	30.55	26.46
GPA	3.18***	3.41***	4.50***	4.55***
Financial independ.	4.20***	5.13***	2.69***	3.75***
Short train. duration	1.80***	1.10***	0.96***	0.51***
Secure job	1.29***	1.52***	0.90***	1.12***
Practical work	1.22***	0.57***	1.26***	0.60***
Academic work	4.50***	4.57***	3.84***	4.06***
Leading position	0.54***	0.48***	0.36***	0.30***
High empl. Status	−0.24***	−0.36***	−0.23***	−0.33***
General degree	3.60***	1.60***	4.96***	2.63***
General school	1.87***	1.66***	1.51***	1.03***
Male	0.12***	0.23***	0.13***	0.26***
Age	−0.11***	−0.02	−0.06***	0.01
Total explained (as % of Gap)	21.97*** (65.37)	19.88*** (67.35)	20.81*** (68.10)	18.50*** (69.92)
N salariat class	8,181	8,181	8,181	8,181
N working class	4,760	4,760	4,760	4,760

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$, significance levels based on standard errors approximated by delta-method; results based on 1,000 replications with random variable ordering and a pooled estimation of effect coefficients in the logit regressions, controlling for social class; weighted data

participation rates that can be attributed to class-specific differences in the distribution of the respective variable. Model 1 opposes universities to all other institutions and thus divides the traditional academic pathway from the less established options for upper secondary graduates. Model 2 contrasts universities and universities of applied sciences with semi-tertiary institutions and vocational training. Hence this model draws the dividing line between firm-sponsored training and general education. By contrasting universities and semi-tertiary institutions with universities of applied sciences and vocational training Model 3 separates the academically selective or demanding institutions from the less selective ones. Finally, Model 4 represents the divide between the three tertiary institutions and vocational training.

A look at the participation rates reveals class gaps that range from 34 percentage points (university vs. rest) to 26 percentage points (vocational training vs. rest). However, according to our theoretical expectations, the contribution of specific variables to these gaps should be more or less accentuated, based on the combination of institutions. Starting with *performance*, the results generally confirm our expectations. Although grades do matter for all sets of combinations, their contribution is strongest in Models 3 and 4. This can be related to more demanding requirements as well as to the greater selectivity in the

admission procedures at universities and universities of cooperative education. The wish for *financial independence* is most influential when we compare semi-tertiary institutions and vocational training with the two remaining tertiary institutions. This result corresponds to our prediction with regard to the influence of costs: post-secondary institutions are set apart by whether or not they provide their students with a salary. Even if we contrast vocational training with the three tertiary level institutions (Model 4), there is still a strong influence of financial considerations. This reflects the fact that semi-tertiary institutions are still marginal in Germany if compared to the other two tertiary institutions. Thus, their ability to reduce overall social background effects is limited.

The wish for a *short training duration* has its biggest impact for the contrast between universities vs. the rest (Model 1). The comparatively long duration of university studies seems to constitute an obstacle for working classes. However, the shorter training periods of the other two higher education institutions help to reduce the class gap in tertiary level participation, which can be deducted by the smaller contribution of this item in Models 2–4. If we consider the item which is related to a *secure job transition*, we find the strongest effect in Model 2, which draws the dividing line between the institutions that follow the 'dual system' concept and those institutions where training is not organized in connection with employers. This confirms our expectations according to which working class students perceive the two dual system alternatives as a more secure option. The item *interest in practical work* shows the strongest contribution in Model 3. This is somewhat surprising since we expected especially the semi-tertiary institutions to attract the practically interested students from the working classes. But if we consider the differences in the contribution of the item from Model 3 to Model 2, it appears that especially the universities of applied sciences seem to be perceived as practically oriented institutions by working class students. *Interest in academic work* explains between 3.8 and 4.6 percentage points of the class gap. The biggest impact can be located in Model 2, which is intuitive since universities and universities of applied sciences are perceived as the traditional academic institutions. But even if the semi-tertiary institutions are grouped together with the other tertiary institutions, the explanatory contribution of the item remains at more than 4 percentage points. This high contribution of the 'taste for academic education' in the creation of class differentials in the access to higher education is quite impressive. Our two status measures do not contribute substantially to the explanation of the class gap. The *high status* item rather seems to widen than explain the gap (as the negative signs indicate). The wish for a *leading position* contributes between a third and a half percentage point across all selected combinations of the dependent variable. The small explanatory power of these two variables is not very surprising given the bivariate results reported in Tables 2 and 3.

As expected, relatively high contributions to the explanation of the class gap can be found for the variables that are related to the *type of upper secondary degree*. The strongest effect can be located in Model 3. Because working class students obtain restricted upper secondary degrees more often than their salariat class counterparts do, they cannot enter traditional universities at the same rate for formal reasons. However, there seem to be similar effects (though not due to formal reasons) in the admission process to semi-tertiary institutions. In addition, the *type of upper secondary school* attended has a substantive impact on the transition behaviour in all models. In Model 3, the two items for restricted degrees and vocational schools explain together more than 6 percentage points of the class gap. This clearly shows that socially selective processes prior to the attainment of the upper secondary degree (such as the choice of schools or degree programs) have considerable impact on further educational trajectories.

Across all specifications of the dependent variable, we are able to explain between 65 and 70% of the class gap. This is a rather impressive result, given that many of the utilized variables are imperfect approximations of our theoretical concepts.

Summary and discussion

In this paper we tried to identify the factors responsible for creating class differentials in access to diversified post-secondary institutions in the German higher education system. In contrast to most previous analyses on access to higher education in Germany, which focus on access to the major university types and vocational training, we also devoted attention to semi-tertiary institutions. Drawing on a sociological rational choice framework (e.g. Breen and Goldthorpe 1997; Erikson and Jonsson 1996), we identified scholastic performance as well as status maintenance, expected job security, study duration, monetary costs and preferences for study content, as possible factors which motivate the choice of a tertiary, semi-tertiary or non-tertiary alternative. Our results illustrated that these factors are indeed related to the choice of post-secondary alternatives. Moreover, the application of a non-linear decomposition method enabled us to identify the contribution of the selected factors in explaining class gaps in participation across selected combinations of institutions. Students from different social backgrounds seem to perceive and respond to the particular incentive structures of post-secondary alternatives. For working class students universities are to some extent avoided due to the long duration of studies whereas the universities of applied sciences are attractive because of their focus on practical application. Semi-tertiary as well as vocational training alternatives attract less privileged social strata due to the provision of salary. Thus, the fact that semi-tertiary institutions can provide salaries and offer short study programmes at the tertiary level seem to attract students with monetary constraints into the tertiary system. These students might otherwise have opted for non-tertiary training in the vocational sector. We could also show that social inequality is largest if we regard access to the traditional full universities. Hence, institutional differentiation comes along with differentiation of social selectivity. Another interesting finding from this study is that a substantial part of the social selection into different post-secondary institutions can be linked to previous qualifications. Students with restricted entrance certificates and those attending vocationally oriented upper secondary tracks enter university less often.

Overall, this study stops short of being able to evaluate whether this differentiation enhances or decreases social inequality in access to tertiary education. On the one hand, social groups that were strongly underrepresented in the academic system in the past might benefit from the availability of tertiary level institutions that are designed to remove perceived (cost) obstacles. On the other hand, this kind of institutional differentiation could create new lines of stratification because students from different social backgrounds are diverted into different university types. However, based on our analyses the semi-tertiary institutions rather appear as institutions that divert students from the vocational system into the tertiary system—and not away from traditional universities. If this is the case, institutional differentiation and the establishment of semi-tertiary education can contribute to a lowering of social inequalities in access to higher education. Ultimately, the consequences of the establishment of new tertiary alternatives for social inequality as a whole very much depend on the labour market opportunities for graduates. As far as we know, graduates from semi-tertiary institutions do not lag much behind those from the other tertiary institutions even though there is need for more research. Finally, these institutions are yet

too small in terms of student intake to substantially change the pattern of social stratification in access to higher education in Germany. But the current restructuring of the German tertiary system induced by the Bologna reforms might provide an opportunity to consider an expansion of these institutions.

References

Becker, R., & Hecken, A. E. (2009). Higher education or vocational training?: An empirical test of the rational action model of educational choices suggested by Breen and Goldthorpe and Esser. *Acta Sociologica, 52*(1), 25–45.

Boudon, R. (1974). *Education, opportunity and social inequality*. New York: Wiley.

Breen, R., & Goldthorpe, J. H. (1997). Explaining educational differentials—towards a formal rational action theory. *Rationality and Society, 9*(3), 275–305.

Erikson, R., & Jonsson, J. O. (1996). Explaining class inequality in education: the Swedish test case. In R. Erikson & J. O. Jonsson (Eds.), *Can education be equalized? The Swedish case in comparative perspective* (pp. 1–63). Boulder: Westview Press.

Fairlie, R. W. (2005). An extension of the Blinder-Oaxaca decomposition technique to logit and probit models. *Journal of Economic and Social Measurement, 30*(4), 305–316.

Heine, C., Spangenberg, H., & Willich, J. (2008). *Studienberechtigte 2006 ein halbes Jahr nach Schulabschluss*. Hannover: HIS.

Heublein, U., Schmelzer, R., & Sommer, D. (2005). *Studienabbruchstudie 2005*. Hannover: HIS.

Heublein, U., Schmelzer, R., Sommer, D., & Spangenberg, H. (2002). Studienabbruchstudie 2002. *HIS Kurzinformation*, 2002.

Hillmert, S., & Jacob, M. (2003). Social inequality in higher education. Is vocational training a pathway leading to or away from University? *European Sociological Review, 19*(3), 319–334.

Hillmert, S., & Kröhnert, S. (2003). Differenzierung und Erfolg tertiärer Ausbildungen: die Berufsakademie im Vergleich. *Zeitschrift für Personalforschung, 17*(2), 195–214.

Huismann, J. (1995). *Differentiation, diversity, and dependency in higher education: A theoretical and empirical analysis*. Utrecht: Lemma.

Jackson, M., Erikson, R., Goldthorpe, J. H., & Yaish, M. (2007). Primary and secondary effects in class differentials in educational attainment: The transition to A-level courses in England and Wales. *Acta Sociologica, 50*(3), 211–229.

Maaz, K. (2006). *Soziale Herkunft und Hochschulzugang. Effekte institutioneller Öffnung im Bildungssystem*. Wiesbaden: Verlag für Sozialwissenschaften.

Maaz, K., Chang, P.-H., & Köller, O. (2004). Führt institutionelle Vielfalt zur Öffnung im Bildungssystem? Sozialer Hintergrund und kognitive Grundfähigkeit der Schülerschaft an allgemein bildenden und beruflichen Gymnasien. In O. Köller, R. Watermann, U. Trautwwein, & O. Lüdtke (Eds.), *Wege zur Hochschulreife in Baden-Württemberg. TOSCA—Eine Untersuchung an allgemein bildenden und beruflichen Gymnasien* (pp. 13–28). Opladen: Leske und Budrich.

Mayer, K. U., Müller, W., & Pollak, R. (2007). Germany: institutional change and inequalities of access in higher education. In Y. Shavit, R. Arum, & A. Gamoran (Eds.), *Stratification in higher education. A comparative study* (pp. 240–265). Stanford: Stanford University Press.

Müller, W., Brauns, H., & Steinmann, S. (2002). Expansion und Erträge tertiärer Bildung in Deutschland, Frankreich und im Vereinigten Königreich. *Berliner Journal für Soziologie, 12*(1), 37–62.

Müller, W., Pollak, R., Reimer, D., & Schindler, S. (2009). Hochschulbildung und soziale Ungleichheit. In R. Becker (Ed.), *Lehrbuch der Bildungssoziologie: Fragestellungen, Theorien und empirische Befunde* (pp. 281–320). Wiesbaden: Verlag für Sozialwissenschaften.

Reimer, D., & Pollak, R. (2010). Educational expansion and its consequences for vertical and horizontal inequalities in access to higher education in West Germany. *European Sociological Review, 26*(4), 415–430.

Statistisches Bundesamt. (2008a). *Bildung und Kultur: Nichtmonetäre hochschulstatistische Kennzahlen 1980–2007*. Wiesbaden: Statistisches Bundesamt.

Statistisches Bundesamt. (2008b). *Bildung und Kultur: Studierende an Hochschulen Wintersemester 2007/2008*. Wiesbaden: Statistisches Bundesamt.

Statistisches Bundesamt. (2008c). *Fachserie 11/Reihe 1: Bildung und Kultur—Allgemeinbildende Schulen*. Wiesbaden: Statistisches Bundesamt.

Statistisches Bundesamt. (2008d). *Fachserie 11/Reihe 2: Bildung und Kultur—Berufliche Schulen*. Wiesbaden: Statistisches Bundesamt.

Teichler, U. (1988). *Changing patterns of the higher education system*. London: Jessica Kingsley Publishers.

Trautwein, U., Maaz, K., Lüdtke, O., Nagy, G., Husemann, N., Watermann, R., et al. (2006). Studieren an der Berufsakademie oder an der Universität, Fachhochschule oder Pädagogischen Hochschule? *Zeitschrift für Erziehungswissenschaft, 9*(3), 393–412.

Trow, M. (2005). Reflections on the transition from elite to mass to universal access: forms and phases of higher education in modern societies since WWII. In P. G. Altbach & J. J. F. Forest (Eds.), *International handbook of higher education. Part one: Global themes and contemporary challenges* (pp. 243–280). Dordrecht: Springer.