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Strength, Sources, and Temporal Development of Primary Effects of Families´ Social Status on Secondary School Choice

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ABSTRACT

We analyze the relative importance of primary and secondary effects of both parents' educational and occupational status on whether an upper or a less ambitious secondary school track is chosen after primary school in Germany. We compare standardized test scores, parents' achievement beliefs, and teachers' marks as conceptually different indicators for children's academic competencies with respect to how completely they capture the strength and temporal development of primary effects. We found all measures, but in particular the teachers' evaluations, to be strongly affected by the children's social origin. Furthermore, teachers' marks had the strongest effect on educational decisions, explained status differences in this respect to the largest extent, and proved to be the best single indicator for primary effects. However, each of the other measures and the children's competency development in the past exert significant additional effects on the educational decision. The failure to take the full set of competency measures into account leads to a substantial underestimation of primary effects. Taking the cumulative effect of all competency indicators into account, we found 50 percent of the initially significant net-effects of the mothers' education and 70 percent of the effects of their social class to be attributable to primary effects.

Keywords: Academic Competencies; Educational Decision; Primary Effects; Rational-Choice Theory; Secondary Effects.

1. INTRODUCTION

According to Boudon (1974), the total effect of the families' social status on children's educational attainment can be divided into primary and secondary effects. Primary effects are those effects of the parents' position in the status hierarchy which, because of being differently endowed with resources beneficial for learning, cause differences in the children's academic competencies. These differences are expected to strongly affect the selected school careers and, in doing so, to lead to inequality in educational outcomes. Additionally, the families' social status is expected to influence the decision between educational careers, independent from the children's academic competencies. These secondary effects are due to status differences in the costs and educational returns expected in the case of different educational investments (Boudon 1974:29).

Contemporary rational-choice theory (RCT) has elaborated Boudon's approach and assumes that primary effects are due to the informational function of academic competencies about the children's prospects for successfully completing differently ambitious school careers (Breen and Goldthorpe 1997; Erikson and Jonsson 1996; Esser 2000:266ff.). Accordingly, differences in academic abilities cause an analog differentiation in the subjective probability of educational success in the future. When forming beliefs about how likely a particular child will be able to successfully complete more or less ambitious school tracks, different sources of information may be used. Families may rely on the teachers' evaluations, on their own subjective achievement beliefs, on knowledge about their children's abilities, not captured by any performance measure of school subjects, or on the students' temporal development with respect to all of these competency indicators. Which or which combination of these different information sources are actually relevant when families are making educational decisions and which most comprehensively captures primary effects of social origin, remains unspecified within RCT. It is thus an open question which competence indicator or set of indicators needs to be utilized in order to exhaustively capture primary effects.

Several studies found evidence that parents' occupational and educational status affects children's academic competencies, operationalized as either standardized test scores (e.g. Esping-Andersen 2004; Feinstein 2003; Ricciuti 2004) or as grade-point averages (e.g. Björklund, Lindahl, and Sund 2003). Furthermore, both competence indicators exert

strong effects on children's educational attainment (e.g. Alexander and Entwisle 2001; Evans and Schwab 1995; Light and Strayer 2000; Nguyen and Taylor 2003). It has, however, not been analyzed which of these two competency measures or actually the actors' achievement beliefs represents the more exhaustive operationalization of primary effects. It remains also untested whether the temporal development of the children's competencies, as measured by each of these three indicators, are additionally relevant predictors for primary effects. In particular, it is a completely open question whether a single indicator is sufficient to fully capture primary effects, or whether an exhaustive operationalization may actually require multiple competency measures. In the latter case, the strength of primary effects found in previous studies, where without exception only one competency measure has been used, would inevitably be underestimated.

It is important to gain insights about the relative importance of primary and secondary effects as two different processes leading to social inequality in educational outcomes. This knowledge allows judging the relative effectiveness of policy measures for reducing inequality in educational opportunity by means of either reducing status differences in school achievement or by assimilation of other decision-relevant factors. Only few studies have provided quantitative estimates for the relative importance of primary and secondary effects on educational outcomes (Erikson 2007; Erikson et al. 2005; Jackson et al. in press). In these studies, utilizing locally restricted samples from England, Wales, and Sweden, primary effects were estimated to be responsible for between 50 and 75 percent of the total effect of the fathers' social class on children's educational attainment. Furthermore, either examination results or test scores have been utilized as competency indicators, and examination results proved to be the more exhaustive measure for primary effects. It remained *firstly* untested whether the cumulative effects of both competency measures would have led to higher estimates for primary effects. *Secondly*, no evidence has been provided for whether taking the families' achievement beliefs and the children's competency development over time into account would provide a more comprehensive account of the strength of primary effects. *Thirdly*, although empirical evidence suggests that both parents' educational (e.g., Sieben, Huinink, and de Graaf 2001) as well as occupational (e.g., Kalmijn 1994) status exert net-effects on children's educational outcomes, the available studies have only taken the fathers' class position into account

when analyzing the relative strength of primary and secondary effects. However, the relative weight of primary and secondary effects may substantially vary with respect to the fathers' and mothers' educational and occupational status.

In the present study, we utilize data from the Mannheim Educational Panel Study (MEPS) about the decision between secondary school tracks after primary school in Germany. We *firstly* compare how strongly children's standardized test results, the parents' achievement beliefs, and the teachers' grades are differentiated according to the fathers' and mothers' educational as well as occupational status. It is shown furthermore whether the strength of these status effects increase or decrease over time. *Secondly*, it is tested which of the analyzed competency measures explains educational decisions and the direct effects of the parents status characteristics hereon to the largest degree. *Thirdly*, we analyzed whether using multiple indicators for the children's academic competencies and including their temporal development as well leads to a more exhaustive estimate of primary effects. *Fourthly*, we provide numerical estimates for the percentage of direct effects of the parents' educational and occupational status on educational decision, which can be attributed to the operation of primary effects.

2. THEORETICAL FRAMEWORK

Contemporary rational-choice theory (RCT) has elaborated Boudon's approach and assumes that inequality of educational opportunity is the aggregated result of instrumentally rational decisions between educational options (Breen and Goldthorpe 1997; Erikson and Jonsson 1996; Esser 2000:266ff.). The determinants of these decisions are the costs and returns the actors associate with realizing different educational credentials, as well as the probability of successfully being able to do so. Secondary effects of families' social background are expected to result because of structurally induced differences in the costs and benefits of education and by how likely educational credentials are expected to satisfy the families' motive of status maintenance (Breen and Goldthorpe 1997). Although RCT has been criticized for not explaining how primary effects work (Nash 2003), the theory integrates the consequences of these effects for educational decisions systematically into the decision-theoretical framework: Differences in the academic competencies according to the children's social origin causes analog

differentiations in the subjective probability of educational success. Because of lower-class families' restricted access to cultural, economic, and social resources, their children's academic abilities and consequently their success probabilities are, on average, poorer than the one of offspring with a more advantaged class background (Esping-Andersen 2004).

Children's academic competencies are expected to affect educational decisions because the actors regard them as diagnostic for the prospects of school success in future. However, which source of competency information the families rely on when forming success expectations, and which competency measure researchers should use to operationalize primary effects, remains unspecified within RCT. *Firstly*, it is plausible to assume that the grade points the children receive in school is the best accessible information basis in this respect. Furthermore, teachers' grades may be regarded as a particularly trustworthy information source for predicting the children's future school success, since teachers continuously observe their academic performance and can be regarded as experts for judging academic competencies. *Secondly*, parents' perception of their children's school performance may, nevertheless, deviate from the teachers' judgments, because of insufficient information or wishful thinking. Despite of probably being less in agreement with the real competencies, parents may strongly rely on their own achievement beliefs when making educational decisions. *Thirdly*, parents may observe children's characteristics in everyday interactions, for instance different analytical skills or quickness in comprehension, they assume to be relevant for school success. These aspects are probably not exhaustively captured by either the teachers' or the parents' evaluations of the students' performance in school subjects. *Fourthly*, the families may well observe and take into account not only the level of their children's academic abilities, but the strength and direction of their competency development. From the perspective of RCT, assuming actors to utilize the most diagnostic information, the extrapolation of the children's development in the past is a particularly appropriate basis for reaching an accurate prediction of their future performance. *Fifthly*, rational actors may utilize the complete set of available information and integrate them, as suggested by information-integration theory (Anderson 1981), in an additive but weighted way to arrive at a summary judgment of their children's academic prospects in future.

3. PREVIOUS RESEARCH

Research has found composite indices of families' socioeconomic status to exert substantial effects on children's academic competencies (e.g., Downey, von Hippel, and Broh 2004). Using more differentiated indicators for the families status has provided evidence for the mothers' (e.g., Ricciuti 2004) and both parents' (Veenstra and Kuyper 2004) educational status, as well as the fathers' (Cheung and Andersen 2003) and both parents' (Feinstein 2003) occupational status to be relevant determinants for children's competencies. Several studies have shown that these effects of the parents' educational and occupational status are found in the case of standardized test scores (e.g. Esping-Andersen 2004; Feinstein 2003; Ricciuti 2004) as well as grade-point averages (e.g. Björklund et al. 2003). Only very restricted evidence is, however, available for whether all four aspects of families' social status exert independent effects on children's school related abilities. Using multilevel models, a study with data from the Netherlands has shown that both the fathers' and the mothers' educational status had significant net-effects on children's results in a verbal comprehension test (Veenstra and Kuyper 2004). This was the case when simultaneously the breadwinners' occupational status has been controlled, which, however, did not additionally affect the children's competencies. Inconsistent with this result, it has been shown in a recent study with PISA-data that the mothers' and the fathers' educational degrees as well as both parents' values on the International Socioeconomic Index (ISEI) exert net-effects on the children's test scores in reading, mathematics, and science (Marks, Cresswell, and Ainley 2006). No evidence is available for which of the possible competency measures are more strongly differentiated by the parents' social status and can therefore be regarded as the more exhaustive indicator for primary effects.

Several studies analyzed with longitudinal data the temporal development of how strongly children's competencies prove to be differentiated by families' status characteristics. These studies have shown that the competency differences between children with lower and higher status background are increasing with age. It has been tested with data from the Beginning School Study over the period between the first and the eighth grade how the tested competencies of children from high and low

socioeconomic background develop (Alexander and Entwisle 1996). Over the seven-year period, the disadvantage of children from lower SES families, compared with those with a more favorable family background, was substantially becoming greater. Similarly, data from the NELS proved that having more educated and more wealthy parents leads to a significantly stronger gain in tested mathematics competencies in the time between the eighth and the tenth as well as between the tenth and the twelfth grade (Swanson and Schneider 1999). Another study with data from the British Cohort Survey has shown that, between the age of 22 months and 10 years, the test scores considerably diverged for children from high and low socioeconomic background (Feinstein 2003). This was true with respect to both parents' occupational status, but there was a stronger increase in the case of the mothers' characteristics.

It has been found that the fathers' and the mothers' educational status exert significant net effects on the probability of high school graduation (Haveman, Wolfe, and Spaulding 1991; Kalmijn 1994) as well as for the highest secondary school degree obtained in Germany and the Netherlands (Sieben et al. 2001). In some studies, the mothers' education proved to exert the stronger effect (Haveman and Wolfe 1995; Leibowitz 1974; Murnane, Maynard, and Ohls 1981; for inconsistent results cf. Kane 1994). In other studies, the mothers' education had a significant effect on children's educational attainment, but that of the father proved to be irrelevant in this respect (Arum 1998). It has been analyzed with data from the National Child Development Study (NCDS) and the British Cohort Study (BCS) whether the length of schooling is affected by fathers' and mothers' education, controlling for the socioeconomic status and the income of the families (Chevalier and Lanot 2002). Results have shown for the NCDS data significant net-effects of the fathers' and mothers' schooling, whereas this was not the case when using the BCS data. With data from the German Socioeconomic Panel (GSOEP), it has been found that the fathers' and mothers' education as well as the fathers' class position all exert significant net-effects on the completed educational degrees (Dustmann 2004).

With respect to effects of the parents' occupational status, many studies utilized the fathers' occupational status and proved significant effects of this background measure on educational attainment (i.e.: Hansen 1997; Johnson 2002; Van de Werfhorst and Andersen 2005). However, empirical evidence suggests that the mothers' occupational

status exerts an additional and independent influence. With data from the National Survey of Families and Households, it has been found that, controlling for both parents' education, the fathers' and mothers' occupational status had significant net-effects on the probability of children to obtain a high school degree and to enroll for college (Kalmijn 1994). One study analyzed the net effects of mothers' and fathers' educational as well as occupational status on the length of education subjects obtained in Germany, the Netherlands, and the U.S. (Korupp, Ganzeboom, and Van Der Lippe 2002). The parents' years of schooling and the ISEI socioeconomic index were utilized to operationalize the different status dimensions. It turned out that the mothers' and the fathers' educational as well as occupational status had significant independent effects on the children's educational destinations.

Many studies proved that children's academic competencies, both measured as standardized achievement test scores or school grades, exert strong effects on their realized educational degrees (e.g. Alexander and Entwisle 2001; Evans and Schwab 1995; Light and Strayer 2000; Nguyen and Taylor 2003). There are, however, no studies where the explanatory power of these competency indicators has been compared. With respect to the question whether the differences in the children's academic competencies explain the direct effects of the parents' social status, the results are consistent: In all studies, the direct effects of educational and occupational status are found to be reduced when either the children's test scores or their grades are controlled. Furthermore, in all but one study, there remains a direct effect of the families' social background, and thus secondary effects are found to be relevant. Accordingly, it has been shown with data from the National Longitudinal Study of Youth that the fathers' and the mothers' educational degrees had significant net-effects on the highest grade reached by the children (Ganzach 2000). These effects were reduced when the children's academic competencies, as measured by their results at the Armed Forces Qualifying Tests, were controlled. However, both aspects of the children's status background remained statistically significant predictors. Similar results were found with data from the Beginning School study (BSS): Strong effects of parents' socioeconomic status on the probability of high school dropout were found to be reduced but still significant after a composite measure for the children's competencies, consisting out of test scores and marks, has been

controlled (Alexander and Entwisle 2001). Similar results were found for the net-effects of both parents' occupational status on selecting college after high school (Nguyen and Taylor 2003), for the effects of the mothers' education on the probability to complete college (Light and Strayer 2000), as well as for the effect of both parents' combined educational status on the probability to complete high school and to enroll for college (Powers and Wojtkiewicz 2004). In contrast, it was found with data from the National Child Development Study (NCDS) that significant net-effects of the mothers' and fathers' educational status as well as the families' socioeconomic status and income on the years of schooling girls and boys have completed, was completely explained when controlling for their test scores in mathematics and reading.

Only three studies provided numerical estimates for the relative importance of primary and secondary effects of the families' social status on educational decisions. In the first study with data from the Youth Cohort Study (YCS) of 2002, with 16 years old students from England and Wales, the decision between continuing fulltime education or to finish school after the end of compulsory education has been analyzed (Erikson et al. 2005) In this study, only the fathers' class position has been utilized as an indicator for the families' social status, and the students' results in English and Mathematics in the General Certificate of Secondary Education was taken as an indicator for their academic abilities. The method used to estimate primary and secondary effects was counterfactual analysis implemented by numerical integration, where in a first step the mean and standard deviation of academic abilities were used to fit a normal ability distribution for students from each social class. In a second step, logistic regression analysis was used in order to estimate, again separately for the different social classes and controlling for the effect of academic competencies, the log odds for the transition to post compulsory school. Based on results of numerical integration, transition probabilities for counterfactual combinations of performance levels and transition propensities of the social classes were obtained and odds-ratios calculated. On the basis of the results, it has been concluded that between 76 and 78 percent, depending on which counterfactual odds-ratio between the classes has been compared, of the total effects of the fathers' class on the educational transitions can be attributed to primary effects.

The results of the previously presented study have been replicated, utilizing the same methodology, with an extended database of students from England and Wales (Jackson et al. in press). Here, in addition to the 2002 data of the YCS, the one from 1987 as well as the 1974 data from the National Child Development Study (NCDS) has been used. Furthermore, the analyses were also separately done with the students' results in an IQ-test, as an alternative measure for their competencies. Depending on the birth cohort and which classes were compared, between 55 and 80 percent of class differential in educational decisions were attributed to primary effects. However, test scores were found to much less exhaustively capture primary effects: Utilizing this competency measure led to estimates of only between 23 and 39 percent of the social inequality in educational transitions to be attributable to primary effects. No evidence is available for whether having used the cumulative effect of both competency measures would have led to higher estimates of primary effects.

A third study, utilizing data from Stockholm, Sweden, covering educational decisions in the period between 1969 and 1990, analyzed the strength of primary and secondary effects on the probability for continuing education after compulsory schooling (Erikson 2007). Here, it has been found in 1969, with grade-point averages as a competency measure, that in the case of girls 48 percent and in that of boys 49 percent of the effect of the fathers' social class were due to primary effects, whereas this percentage increased to 57 percent for girls and 58 percent for boys in 1990.

4. EMPIRICAL STUDY

Sample and Method

In this study, we utilize data from the Mannheim Educational Panel Study (MEPS) with families who, in 2003, had children in the third grade of one of 48 randomly selected primary schools in the federal state Rhineland-Palatinate, Germany. Among the population of 2,186 families in these schools, the parents not being immigrants of the first generation, altogether 989, and thus 45.2 percent, agreed to take part in the personal interview of the first panel wave. In this panel wave in the middle of the third grade, information was collected about the parents' educational and occupational status, as well as about their subjective perceptions of their children's school performance. Follow-up

interviews were conducted after the children received the mid-term grade report of the fourth grade, and shortly before the families had to decide about the secondary school track on which the children were supposed to continue after primary school. In this panel wave, the parents were asked about the children's grades in the midterm report-card of the third and fourth grade. They furthermore reported their subjective evaluation of their children's school achievement at this point in time. The third panel wave took place at the end of the fourth grade in summer 2005, after the children had to be registered in a particular type of secondary school. Here, the parents reported their final choice of secondary school. Approximately at the same time as the first and second wave of the questionnaire study, standardized school achievement tests were conducted with the children in a classroom setting. Due to item nonresponse and panel attrition, complete data on all relevant variables are available for 747 families of the initial sample. At the time of the educational decision, the students were on average 10.1 years old. All questionnaire data was provided by that parent who was declared in the first panel wave to mainly deal with school-related issues of the target child. This was the mother in 93.3 percent, the father in 6.3 percent and another person in 0.4 percent of the cases.

Operationalization

The following variables were used in order to operationalize the educational decision, the children's social origin, and the different indicators for their academic competencies.

- *Selected type of secondary school:* Families were supposed to decide at the end of the mid-term of the fourth grade about the type of secondary school they wanted their children to continue in the fifth grade. In contrast to other states within Germany, the school recommendation of the primary school is not binding in Rhineland-Palatinate, and thus, the families were free to select any school type. The choice set consisted of three school types, which, when successfully completed, would lead to clearly defined educational degrees. These were (1) lower secondary school ('Hauptschule'), which is completed after the ninth grade, (2) intermediate secondary school ('Realschule'), taking ten years of schooling, and (3) upper secondary school ('Gymnasium'), where the children are entitled to enter university at the end of the thirteenth grade. In other school types, different degrees can be obtained, depending on which tracks are chosen within the

schools and on how long the children stay at school. These are 'Gesamtschule' and 'Waldorfschule', where all degrees can be realized, as well as 'Regionalschule', where either a lower or intermediate secondary school degree can be obtained. According to the parents' reports, 81.3 percent (N=607) had chosen school tracks which lead to clearly defined degrees, whereas 18.7 percent (N=140) selected other school types. The latter families were regarded as not having decided about the educational degree for their children yet and were therefore excluded from our analysis. Among the 607 families left for the analysis, 4.3 percent selected a lower, 27.0 percent an intermediate, and 68.7 percent an upper secondary school for their children. Because of the low number of families who decided for a lower secondary school, and because in Germany the main issue is whether children are entitled to enter university, we dichotomized the outcome variable in having chosen upper secondary school (coded 1) or a less ambitious school type (coded 0).

- *Parents' occupational status:* The parents' occupational status has been operationalized using their position on a four-category EGP-class scheme (Erikson, Goldthorpe, and Portocarero 1979). Following the reasoning of Goldthorpe (2000), we differentiated between occupational positions which can be characterized by (a) pure service contracts (upper (I) and lower (II) service class), those with pure (b) qualified (lower sales services (IIIb), skilled manual workers (VI)) as well as (c) unqualified (unskilled workers (VII)) labor contracts, and classes with mixed kinds of occupational positions (routine non-manuals (IIIa), small proprietors (IV), supervisors (V)). When the respective parent did not participate in the labor market at the time of the interview, but was gainfully employed before, the class position of this former occupation was utilized. This was the case for 3.3 percent of the fathers and 45.3 percent of the mothers. The distribution of the fathers' and mothers' class position was as follows: Father's class: service: 48.8 percent, mixed: 17.0 percent, qualified worker: 17.0 percent, unqualified worker: 6.6 percent, missing: 10.7 percent; Mother's class: service: 42.8 percent, mixed: 36.2 percent, qualified worker: 14.8 percent, unqualified worker: 2.8 percent, missing: 3.3 percent.

- *Parents' educational status:* The educational status was operationalized in the case of both parents using their highest completed secondary school degrees. These degrees were

differentiated: (1) lower secondary or less, (2) intermediate secondary and (3) upper secondary school degree. The distribution of education in our sample was as follows: Fathers' secondary school degree: lower: 26.0 percent, intermediate: 24.2 percent, upper: 44.8 percent, missing: 4.9 percent; Mothers' secondary school degree: lower: 14.8 percent, intermediate: 40.2 percent, upper: 44.7 percent, missing: 0.3 percent.

- *Indicators for the level and temporal development of students' academic competencies:* We compared three indicators for the students' academic competencies with respect to how exhaustively they captured primary effect of the students' social origin. These were *first* the students' standardized test scores, collected using the 'Educational Counseling Test' for Third and Fourth Grades' (Ingenkamp 1996). This test has proven to be a reliable and valid indicator for the actual school-related abilities as well as a good predictor for children's academic success in the future (Ingenkamp 1996; Borchert, Knopf-Jerchow, and Dahbashi 1991:175). The test consists of three parts with 20 tasks in each test domain: (a) understanding word meanings, (b) handling numbers, and (c) solving brain-teaser tasks. The test has been administered in the middle of the third grade (t1) and then again in the middle of the forth grade (t2), with on average 13 months elapsed between the two measurements. We utilized the percentage of correct solutions on the altogether 60 tasks as a first indicator for the children's school-related abilities. The *second* indicator consists out of the parents' subjective beliefs about their children's academic performance, judged in the first wave (t1) and the second wave (t1) of the questionnaire study. On average 16 months were elapsed between the two measurements. At both points in time, the parents were asked to evaluate their children's school performance in German, Mathematics, and Social Studies on the scale of marks. These marks varied between one ('excellent') and six ('insufficient'), were reverse-coded, higher values then indicating more favorable achievement beliefs. *Third*, we recorded the children's school marks in German, Mathematics, and Social Studies from their report card of the third (t1) and the midterm report card of the fourth (t2) grade as an indicator for their proven academic abilities in these subjects. The teachers' marks originally varied between one ('excellent') and six ('insufficient') and were also reverse-coded before being introduced into the analysis.

5. RESULTS

Description of Competence Indicators and Their Development over Time

Descriptive statistics for the standardized achievement-test scores have shown that the children in the middle of the third grade solved 70.6 percent and about one year later 84.3 percent of the test items correctly (cf., table 1). This represents a significant improvement of performance of 13.7 percentage points ($t=27.6$, $p \leq .05$). In contrast, the parents as well as the teachers evaluated the children's performance as becoming significantly poorer over the observed time period: the parents' evaluations decreased from a grade-point average of 5.04 to 4.98 ($t=3.0$, $p \leq .05$) and the one of the teachers from 4.91 to 4.87 ($t=3.2$, $p \leq .05$). The parents evaluated their children's academic performance at both the first ($t=6.5$, $p \leq .05$) and the second ($t=8.1$, $p \leq .05$) wave of measurement as significantly more favorable than the teachers.

-- table 1 about here --

In table 2, the strength of associations between the different competence indicators, the development of these associations over time, and the temporal consistency of measurement within each indicator are analyzed. It is found *firstly* that the teachers' marks are with a value of $r=.83$ most strongly correlated between t1 and t2, and that, thus, this competency indicator is more consistent over time than the test scores ($r=.73$) and the parents' achievement beliefs ($r=.66$). Accordingly, the teachers' evaluations are temporarily most reliable, whereas the parents' subjective beliefs are much more volatile. It is particularly noteworthy that the teachers' marks are even more temporarily stable competency measures than the standardized test scores. *Secondly*, we found at t1 the parental evaluations with a value of $r=.49$ to be weakest correlated with their children's tested abilities. One year later, parents' achievement beliefs are found, with a correlation of $r=.53$, to be more in agreement with their children's test results. Similar assimilation effects, probably due to learning, are found for the teachers' judgments, where the association with the test scores was $r=.54$ at t1 and slightly increased to $r=.57$ at t2. Thus, the teachers' evaluations are at both points in time more consistent with the children's tested competencies than this is the case for the parents' evaluations. *Thirdly*, the parents' and teachers' competency evaluations became substantially more similar over time: Whereas the association between both indicators was $r=.67$ at t1, this correlation grew to

r=.83 at the second point of measurement. This may either be the result of parents increasingly adopting the teachers' evaluations over time, or because of teachers' evaluations actively being influenced by parents.

-- table 2 about here --

Primary Effects of Parents' Social Status on Different Competency Indicators

We wanted to find out whether and how strongly the different competency indicators are capturing primary effects of the mothers' as well as the fathers' educational and occupational status. This was done in a first step without taking the temporal development of the competencies into account. Thus, we regressed the children's test scores, the parents' achievement beliefs, and the teachers' marks, in each case averaged over t1 and t2, on both parents' educational degrees and social class positions (cf. table 3). On the one hand, we utilized incremental F-tests in order to test for significant net-effects of the different status dimensions. On the other hand, we calculated incremental values of the Bayesian Information Criterion (BIC), which represents a penalized fit measure, suitable for comparing non-nested models (Raftery 1995), in order to analyze the relative strength of these effects.[1] The results have shown *firstly* that the mothers' educational as well as occupational status exert significant net-effects on the children's competencies, as measured by all three indicators (cf., the F-tests in the lower part of table 3). The size of the incremental BIC-values proved that the mothers' class position is the strongest source of primary effects in the case of the test scores, achievement beliefs, and teachers' marks (BIC: 2.92, 1.42, and –1.12). In contrast, the fathers' social class position did not exert a significant effect in the case of any of the competence indicators, when the other aspects of the families' social status have been controlled. This status dimension shows in the case of all competency indicators by far the largest incremental BIC-values, which indicates the existence of the weakest primary effects (BIC: 17.90, 13.73, and 14.04). With respect to the parents' educational status, the effect of fathers and

[1] Please note that smaller BIC-values indicate a better model fit and stronger effects of the respective explanatory variables. Differences in BIC-values in a range between 0 and 2 are assumed to represent weak, between 2 and 6 positive, between 7 and 10 strong, and BIC-differences of more than 10 units very strong evidence in favor for the better fitting model (Raftery 1995).

mothers proved to be more similar in strength, and who exerts the stronger effect depends on the competency measure under consideration. Accordingly, the effect of the mothers' education is substantially stronger in the case of the achievement beliefs and the teacher's marks, compared with that of the fathers' (BIC (mother): 3.87, 3.68 vs. BIC (father): 9.29, 7.23). However, in the case of the test scores, the fathers' education has a slightly stronger and in this case statistically significant effect on the children's competencies (BIC (mother): 4.60 vs. BIC (father): 3.71). In sum, the mothers' status characteristics and particularly their social class can be regarded as the substantially stronger source of primary effects, compared with those of the fathers.

Which competency indicator captures the effects of the different status dimensions most exhaustively? We found that the effects of the mothers' EGP-class, as the families' most influential status dimension, is most completely represented in the case of the teachers' marks: Here, the incremental BIC-values is -1.12, whereas the effect on the parents' achievement beliefs is only 1.42 and the test scores proved with a BIC-value of 4.04 even much less differentiated. According to conventional criteria, this provides positive evidence for the teachers' marks to be the most appropriate indicator for this kind of primary effects. In contrast, with differences of less than one incremental BIC-value, all competency indicators proved to be very similarly strongly differentiated according to the mothers' education. This is the case for the achievement beliefs and the teacher's marks with respect to the very weak effect of the father's EGP-class as well, whereas there is positive evidence that test scores are the least exhaustive indicator for these kinds of primary effects (BIC: 17.90 vs. 13.74/14.04). In the case of the medium strong effects of the father's education, there is clear evidence that test scores are the best indicator for capturing these primary effects: This measure proved to be by 3.52 BIC-values more strongly affected than the teacher's marks and even by 5.58 values stronger than the subjective achievement beliefs. According to the adjusted R^2 as a summary measure for how strongly the three competency measures are affected by the different parental status dimensions, the teachers' marks are most strongly differentiated (adj. R^2=.14), followed by the test scores (adj. R^2=.12), and the subjective achievement beliefs are least affected (adj. R^2=.11).

-- table 3 about here --

In order to find out whether and to what degree the strength of primary effects changes over the observed time period, we computed the same regression models and incremental fit statistics as presented in table 3, separately for the measures as observed at t1 and t2. Table 4 shows the change in the incremental BIC-statistics between t1 and t2, negative values indicating increasing and positive values decreasing effect of the respective status dimension. We found *firstly* consistent evidence in the case of all three competency measures that the effect of the fathers' education is becoming stronger over time: The incremental BIC-values are decreasing by 6.19, 8.32, and 0.88 units in the case of the test-scores, the subjective achievement beliefs and the teachers' marks, respectively. The same applies, but very much less strongly, for the effect of the fathers' EGP-class: Here, all competency indicators became slightly more differentiated by 1.45, 0.93, and 1.72 incremental BIC-values. Whereas therefore the effect of the father's status characteristics is gaining in strength over time, the mothers' status, with the exception of the effect of their class position on the teacher's marks, is becoming weaker. The effect of the mothers' education on test scores, achievement beliefs, and teachers' marks is decreasing by 4.81, 2.52, and 4.96 units, respectively. This is true for the class effect on the test scores (1.49) and the achievement beliefs (3.12) as well, whereas the effect on the teachers' marks is becoming substantially stronger by 5.26 points on the incremental BIC-value scale.

-- table 4 about here --

Effects of Different Competence Indicators on Educational Decisions

In the following part of our study, we tested whether and how strongly the level and temporal development of children's competencies, as operationalized by different indicators, explain the decision between secondary school tracks. Since the dependent variable of these analyses consists out of whether the families have chosen an upper (coded 1) or a less ambitious (coded 0) secondary school track, logistic regression analyses have been utilized. In order to be able to compare the competence indicators with respect to their strength of effects, all measures were included z-standardized into the analysis.

In the baseline model 4, we first tested for the total effect of the parents' educational and occupational status on the decision between secondary school tracks. Results have shown that the mothers' educational ($\chi^2(2)=20.5$; $p \leq .05$) as well as their occupational ($\chi^2(3)=18.5$; $p \leq .05$) status exert strong net-effects on the educational decision (cf., table 5). However, neither the fathers' education ($\chi^2(2)=4.7$; $p > .05$) nor their class position ($\chi^2(3)=4.3$; $p > .05$) had an additional effect, after the mothers' status characteristics have been controlled. The regression parameters show that mothers having an upper instead of a lower secondary school degree lead to an about four times higher chance of selecting an upper instead of a less ambitious secondary school track. In addition, having a mother with a service-class background, compared with one from the unqualified working class, improved the chances to select the highly ambitious upper secondary school track by a factor of 6.57. Thus, as in the case of the competency indicators, the mothers' status characteristics, in particularly their class background, proved to be the dominant source of effects of the families' social status on the children's educational outcomes.

In the second step, we tested separately for each of the analyzed competence indicators, as measured at t1, whether and how strongly they explain the families' educational decisions (cf. table 5, models 5-7). Results have shown that the test scores ($\chi^2(1)=114.7$; $p \leq .05$), the parents' achievement beliefs ($\chi^2(1)=158.4$; $p \leq .05$), and the teachers' marks ($\chi^2(1)=244.5$; $p \leq .05$) all exert significant, albeit differently strong effects on the decision between secondary school tracks. When comparing the log odds between the different models, we found that the test scores had the weakest (log odds=3.31), the teachers' marks the strongest (log odds=11.46), and the parents' achievement beliefs an intermediately strong effect (log odds=4.92) on the selected type of secondary school. According to the models' adjusted R^2, the explanatory power of the competency indicators strongly increased when using the achievement beliefs (adj. R^2=.34) instead of the test scores (adj. R^2=.28) or even the teachers' marks (adj. R^2=.46) as an indicator for primary effects. The BIC-values between the models including test scores or the parents' achievement beliefs differed by 43.8 units and those between the latter model and the one with the teachers' marks even by 86.1 units. According to conventional criteria, these values provide very strong evidence that the model fit improves substantially over both

comparisons. Thus, the teachers' marks are the most appropriate indicator for most fully capturing the effects of children's competencies on educational decisions.

-- table 5 about here --

Is it sufficient to utilize the teachers' marks as an indicator for primary effects, or does including test scores and parents' achievement beliefs further improve the explanatory power of competencies for educational decisions? In order to answer this question, all three competence measures were simultaneously included into the analysis. The results have shown that test scores ($\chi^2(1)=19.1$; $p \leq .05$), parents' achievement beliefs ($\chi^2(1)=8.2$; $p \leq .05$), and the teachers' marks ($\chi^2(1)=79.0$; $p \leq .05$) all exert significant net-effects on the probability that the families selected an upper secondary school track (cf., table 6, model 8). Comparing the size of the partial regression parameters confirms that the teachers' marks exert by far the strongest net-effect on the educational decisions: Whereas an improvement of the teachers' evaluations by one standard deviation increases the chances of selecting an upper secondary school track by a factor of 6.73, the effect of a unit change is only 1.99 in the case of the test scores and 1.72 in the case of the parents' evaluations.

According to our results up to now, the families take the full set of information about the level of the children's competencies into account when making educational decisions. However, are the decisions sensitive for the development of competencies as well? This question was addressed by introducing for all three competence measures difference scores, representing the chance in the academic abilities between t1 and t2, into the regression equation, controlling for the initial competency level (cf., table 6, model 9). Results have shown that although the positive effect of improving tested abilities did not reach statistical significance ($\chi^2(1)=2.7$; $p \leq .05$), this was found to be the case for the net-effect of improving achievement beliefs ($\chi^2(1)=8.6$; $p \leq .05$) and more favorable teachers' marks ($\chi^2(1)=37.5$; $p \leq .05$). Comparing the log odds between the three competency indicators shows that the temporal development of the test scores exerts with a value of 1.41 the weakest, that of the parents' achievement beliefs with 2.24 an intermediately strong and the teachers' marks with a value of 3.42 the strongest effect on the selected kind of secondary school. As is the case for the relative strength of effects of

the level of competencies, the development of the teachers' marks is the strongest determinant of the educational decisions.

Incremental likelihood-ratio tests have shown that, after controlling for all competency indicators as well as for their temporal development and, thus, taking primary effects exhaustively into account in model 9, the formerly significant effect of the mothers' occupational status does not have a significant influence anymore ($\chi^2(3)=2.5$; $p > .05$). However, the differentiation of secondary school choices according to the mothers' educational status still remains statistically significant ($\chi^2(2)=6.0$; $p \leq .05$).

-- table 6 about here --

Relative Strength of Primary and Secondary Effects

In the last part of our analyses, we calculated numerical estimates for the relative importance of primary and secondary effects, separately for the significant direct effects of the mothers' educational and occupational status. This was realized in three steps. *First*, we computed predicted probabilities for selecting an upper secondary school track, representing children with mothers who held a lower, intermediate, or upper secondary school degree, whereas all other status characteristics included in the analysis were fixed on the respective sample distribution. The same probabilities were obtained for families with mothers from different EGP-classes, here as well holding the other status characteristics constant on their sample distribution. These two sets of predicted probabilities were obtained based on model 4, without controlling for any primary effects, based on the models 5 to 7, controlling for each of the different competency indicators, based on model 8, controlling for all competency indicators, and finally based on model 9, controlling additionally for the effect of the children's competency development. *Second*, we computed the standard deviation for the educational and occupational status differences in the predicted probabilities to select an upper secondary school track. This was done for the status differences in the selection probabilities obtained from the regression models, controlling for qualitative and quantitative different competency indicators. These standard deviations are utilized to compare the inequality in educational decisions according to the mothers' educational and occupational status, which remains unexplained in the different models. *Third*, we assumed the variability of

predicted transition probabilities according to the mothers' social status, observed when no primary effects have been controlled in regression model 4, to represent 100 percent of the total inequality in educational opportunity. This serves as the basis for computing the percentage of remaining direct effects of both of the mothers' status dimensions on the transition probabilities, when the different competence indicators were controlled. This percentage of residual variation in the transition probabilities represents the secondary effect of the mothers' educational and occupational status.

In table 7a, it is presented to what degree the different competency indicators capture primary effects of the mothers' educational status and which percentage of the total effect is attributable to secondary effects. Results have shown *firstly* that the probability to select an upper secondary school track varies between .54 in the case of mothers with a lower, .67 in the case of those with an intermediate, and .82 in the case of mothers with an upper secondary school degree. The standard deviation of selection probabilities, attributable alone to the net-effect of the mothers' educational status, is found to be .14. *Secondly*, this unexplained inequality in educational opportunity is reduced to .11 when primary effects captured by test scores are controlled, to .13 when subjective achievement beliefs are used as an indicator for primary effects, and to .10 when the explanatory power of the teachers' marks is taken into account. Accordingly, the teachers' marks, leaving only 71.4 percent of the initial inequality unexplained, can be regarded as the best single representation for primary effects, whereas test scores are with 78.6 percent unexplained variability the second best indicator. The subjective achievement beliefs, leaving 92.9 percent of the educational status effects unexplained, must be regarded as the weakest indicator for primary effects. *Thirdly*, utilizing all three competence indicators, instead of only the teachers' marks, leads to a substantial reduction of the unexplained status effects from 71.4 to 57.1 percent. Thus, not taking the complete set of competence measures into account leads to an underestimation of primary effects by 14.3 percentage points. *Fourthly*, our results show furthermore that taking not only the level but the temporal development of competencies as well into account leads to an additional, albeit modest reduction of the unexplained effects of the mothers' educational status from 57.1 to 50.0 percent. *Fifthly*, taking the cumulative effects of the complete set of competency indicators into account leads to the conclusion that 50 percent of the net-

effects of mothers' educational status is attributable to primary effects, whereas the remaining other 50 percent must be regarded as the consequence of secondary effects.

-- table 7a about here --

In table 7b, the same analysis as presented above is shown for the net-effect of the mothers' occupational status. Here, *firstly* the probability of selecting an upper secondary school track increases from .41 in the case of mothers from the unskilled working class to .81 for those with service-class background. The standard deviation of these selection probabilities is with .17 substantially higher than in the case of the educational status effect. *Secondly*, here as well, the teachers' marks, reducing alone the initially observed variation of selection probabilities according to social class to 52.9 percent, can be regarded as the best single indicator for primary effects. Controlling for the subjective achievement beliefs, however, leaves only 58.8 percent of the total status effect unexplained. This competency indicator must be regarded in the case of effects of the mothers' social class as the second most exhaustive indicator for primary effects. Test scores, leaving 82.4 percent of the variability of educational decisions unexplained, are least able to capture primary effects. *Thirdly*, including all competency measures, instead of only the teachers' marks, leads to a moderate reduction of the unexplained variance from 52.9 to 47.1 percent. Thus, restricting the operationalization of primary effects to teachers' marks only causes an underestimation of primary effects by 5.8 percentage points. *Fourthly*, not taking the temporal development of the children's competencies into account leads to a very strongly biased estimate of primary effects: The percentage of unexplained variability in the selection probabilities decreases from 47.1 to 29.4 percent when the class differentiation in the temporal competency development is taken into account. Thus, without including this indicator, primary effects of the mothers' social class are underestimated by 17.7 percentage points. *Fifthly*, according to our final estimate, about 70 percent of the total effect of the mothers' social class can be attributed to primary effects and the remaining 30 percent to secondary effects.

-- table 7b about here --

6. SUMMARY AND DISCUSSION

The main aim of this paper was to analyze the relative strength of primary and secondary effects on the decision between secondary school tracks in Germany. This was done separately for both parents' educational as well as occupational status. We compared altogether three indicators for the children's academic competencies with respect to how strongly they are differentiated by the parents' social status, to what degree they explain educational decisions, and, in particular, the social inequality herein. These indicators are the children's standardized test scores, the parent's achievement beliefs, and the teachers' grade-point averages. Furthermore, we tested whether and to what degree the temporal development of competencies, which from the perspective of RCT must be regarded as an important measure for primary effects, additionally explains inequality in educational decisions.

With respect to the status determinants of primary effects, our results have shown *first* that the mothers' EGP-class exerts the strongest net-effect on the children's academic abilities, as measured by all three competency indicators, whereas the fathers' class position proved not to lead to an additional differentiation of the children's competencies. In the case of the parents' educational status, the mother was found to exert similar and moderately strong effects on all competency measures, which were in the case of the achievement beliefs and teachers' marks substantially stronger than those of the fathers' education. Only when considering the children's tested abilities, the fathers' education had a significant net-effect, similar in size to the one of the mothers. *Second*, with the exception of the effect of the fathers' educational status, the teachers' marks were found to capture primary effects better or at least as good as all other competency indicators. *Third*, we found the effects of the fathers' education to become stronger and the one of the mothers' become weaker over time, as indicated by all competency measures. The effect of the fathers' social class remained largely unchanged and very weak. The temporal development of how strong the mothers' class affected the children's competencies was inconsistent with respect to different competency indicators: While there was a substantial reduction of the effects in the case of the achievement beliefs, the differentiation of the teachers' marks became stronger over time.

With respect to the consequences of primary effects for educational decisions, our results have shown *first* significant net-effects of the mothers' educational and occupational status on the probability that an upper secondary school track was selected. In contrast, both of the fathers' status characteristics did not exert any additional effect on the educational decisions. *Second*, the children's test scores, the parents' achievement, beliefs and teachers' marks had all, analyzed separately, strong and significant effects on the decision between secondary school tracks. However, the teachers' marks proved to be by far the strongest determinant of these decisions. *Third*, even when controlling for the effect of the teachers' marks, we found both the children's test scores and the parents' achievement beliefs to exert significant additional effects on the educational decisions. *Fourth*, this was the case for the temporal development of the children's competencies, as indicated by the parents' and teachers' evaluations, as well: The more children's academic abilities improved, controlling for their initial competency level, the more likely they were supposed to visit an upper secondary school track. Only the net-effect of the children's competency development with respect to their tested abilities did not reach statistical significance.

We obtained numerical estimates for which percentage of the total direct effects of the mothers' educational and occupational status can be attributed to primary and secondary effects. Results have shown *first*, that, in the case of both the mothers' educational and occupational status, the teachers' marks do most extensively explain the respective status differentiation of educational decisions: Utilizing this competency indicator explained 28.6 percent of the net-effects of the mothers' education and 47.1 percent of those of their social class position. *Second,* we found that not exploiting the full set of competency indicators leads to a substantial underestimation of primary effects. Utilizing only the teachers' marks in order to operationalize primary effects, this mechanism for the emergence of inequality in educational opportunity is underestimated by 14.3 percentage points in the case of the mothers' educational and by 5.8 percentage points in the case of the mothers' occupational status. Similarly, utilizing all competency indicators, but neglecting the relevance of the children's temporal competency development, leads to an underestimation of primary effects by 7.1 percentage points in the case of the educational and by 17.7 percentage points in the case of the occupational status. According to our

estimates, 50 percent of the total net-effect of the mothers' educational status and about 70 percent of the one of their class position can be attributed to the cumulative effect of the analyzed indicators for the children's academic abilities and their temporal development.

With the exception of fathers' education affecting the children's test scores, the mothers' education and social class are the only sources of primary as well as of secondary effects of social origin. This dominance of the mothers' status characteristics is inconsistent with the results from the few studies where educational outcomes have been found to be differentiated by both parents' education and social class (e.g., Kalmijn 1994; Korupp et al. 2002. There are two possible reasons for this difference in results. On the one hand, all other studies analyzed realized educational credentials, whereas our results are valid for the decision about secondary school types, which are not necessarily identical with the degrees children will finally complete. Although the mobility between school tracks is relatively restricted in the German school system, there is, nevertheless, a certain degree of upward and in particular downward mobility between secondary school tracks (cf. Bellenberg, Hovestadt, and Klemm 2004:79ff.). We found the effect of the fathers' status characteristics either strongly or at least slightly to increase over time, whereas the mothers' effects were generally becoming weaker. Thus, as a cumulative result of this development, the relative effect of both parents' status on the final educational outcomes may well be more similar than the results observed in our study suggests. On the other hand, the effects of parents' status have been analyzed in the other studies with respondents who were born in the period between 1923 and 1962, whereas our sample consists of the birth cohort 1995/96. Since women are increasingly participating in the labor market, it is plausible that the effect of mothers' status may have become stronger nowadays, compared with the one in older cohorts. The empirical evidence for this explanation is however mixed: Whereas the effect of the mothers' occupational status has been found in one study to increase over the cohorts in Germany (Solga and Wagner 2001), it was found to be stable over time in another (Korupp et al. 2002).

Our results have shown that, among the analyzed competency indicators, the teachers' marks exert by far the strongest effects on the selection between secondary school tracks.

This indicates that the decision makers regard the teachers' evaluations to be the most trustworthy source of information about the children's future academic prospects. Furthermore, teachers' marks were found to be the strongest source of status differentiation in educational decisions: Teachers' evaluations tend to be more strongly affected by the children's educational and social class background than the other competence indicators, and, in particular, explained the observed direct status effects on the educational decisions to the largest extent. The question is then why particularly these judgments are so strongly differentiated according to the children's social origin. One possibility is that they most correctly and exhaustively mirror status differences in the children's academic abilities. Another possibility is that teachers' stereotypes about social class differences in academic competencies may have biased their evaluations and, thus, led to the intensified effect of social origin. However, although teachers' academic evaluations have been found to be a much less than perfect measure for children's academic abilities (Harlen 2005), empirical evidence does not generally support the existence of systematical bias according to the students' socioeconomic background (Hauser 1969; Madon et al. 1998).

Aside from the teachers' competence information, the parents' achievement beliefs were found, albeit very less strongly, to exert a significant net-effect on the decisions between secondary school tracks. Thus, parents rely both on how much and in which direction their own competency beliefs deviate from those of the teachers when estimating their children's future academic prospects. Furthermore, the children's test scores had an additional net-effect on the families' decisions between secondary school tracks. We interpret this latter effect to result from differences in the children's abilities, which are neither captured by the teachers' nor the parents' performance evaluations in school subjects, but taken into account when selecting between differently ambitious secondary school tracks. It has been found that the students' effort (Helwig, Anderson, and Tindal 2001) and social skills (Seyfried 1998) had an effect on teachers' grading when controlling for academic ability.

In previous research, utilizing the fathers' class as an indicator for social origin and the children's examination results as a competency measure, primary effects were found to account for between 73 and 80 percent of the total status effect in the case of the youngest

cohorts analyzed in Britain and Wales (Erikson et al. 2005; Jackson et al. in press) and for between 57 and 58 percent of those observed in the city of Stockholm (Erikson 2007). In our study, also only taking the effects of teachers' marks into account, we estimated 47 percent of the significant effects of the mothers' class to be due to primary effects. Thus, the class differentiation of students' competencies is much less relevant for the inequality in educational opportunity in our German sample, as compared with the Swedish and in particular with the English case. This difference may be due to varying institutional settings under which the educational decisions have been made. The decisions in our study were made in a federal German state where, although the primary schools recommend a secondary school track, the families are free to select any secondary school they want. In contrast, the selection of upper secondary schools in Sweden and the decision to continue to A-level in England are institutionally much stronger restricted by the students' academic performance. Thus, academic performance and its social differentiation can be expected to be more important in the latter types of school systems, whereas in Germany secondary effects based on the parents' free will have greater weight. Furthermore, the German school system can clearly be characterized as a sponsored school system, where students are channeled into separate tracks when the students are 10 years of age (Turner 1960). In contrast, in England and Sweden the first important educational decisions take place when the students are about 15 or even 18 years old, respectively. Thus, parents in Germany have relatively little opportunity to collect information about their children's academic competencies. The resulting ambiguity about the future school prospects may explain the relatively weak effect of ability differences and primary effects on educational decisions in Germany.

We found 50 percent of the effect of the mothers' education and about 70 percent of the one of their social class to be due to the cumulative effect of the inequality of different indicators of the children's educational competencies. This indicates that, at least in the case of class inequality, differences in the costs and benefits of educational investments, assumed in RCT to be the reason for secondary effects, are less relevant for inequality in educational opportunity. This suggests that policy measures with the aim of reducing status differences in academic competencies are more effective in lowering effects of social origin on educational attainment. Furthermore, with respect to the factors

causing secondary effects, it has been shown for the selection between secondary school tracks in Germany that economic costs expected when completing different educational degrees do not explain the selection between school tracks (Stocké in press), whereas the utility from status maintenance proved to be a substantially relevant factor in this respect (Stocké 2007). Since it seems difficult to imagine how to change families' concerns about avoiding intergenerational downward mobility, this is another argument for concentrating on the reduction of primary effects.

The present paper is innovative in the sense that it analyzed on the one hand the net primary effects of both parents' educational and occupational status on academic competencies and educational decisions. This was done, on the other hand, by comparing separately and cumulatively the primary effects captured by three different indicators for children's competencies, as well as those of their temporal development. Both aims cannot be achieved with counterfactual analysis implemented by numerical integration, the methodology used in previous studies (Erikson 2007; Erikson et al. 2005; Jackson et al. in press). Our study, nevertheless, leaves questions unanswered. *First*, we analyzed the relative significance of primary and secondary effects in a school system with very weak institutional constraints of the families' educational decisions. In other systems, where binding minimum performance standards are defined for selecting educational options, children's school performance and primary effects can be expected to be more relevant for the final decisions. Our results about the relative strength of primary effects are likely to actually represent a lower limit of the one present in other school systems.

Second, we assumed that the effect of all three competence indicators on the educational decisions is mediated by the parents' subjective beliefs about the children's school success in future. Although evidence exists that competencies strongly affect the parents' subjective probability that there children will be able to successfully complete secondary school tracks (Stocké in press), our assumption has not been proven in the present study.

Third, it has been argued by other scholars that the level of school performance observed at a certain time point may actually be the result of an earlier decision for a particular educational option (Erikson et al. 2005). Such anticipatory decisions may influence the students' academic motivation and thus causes competencies to develop in

the direction of being compatible with the selected educational degree. We cannot rule this mechanism out, which implies that a part of the observed variance in academic abilities is actually the result of secondary effects. In this case, the observed strength of primary effects must be regarded as an overestimation. Whether this is the case should be analyzed in future research.

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TABLES AND FIGURES

Tab. 1: Descriptive Statistics for the Level and Temporal Development of Different Indicators for the Students' Academic Competencies

	Mean	Standard Deviation	Minimum / Maximum
Test Scores [a)]			
Test Scores: t1	70.6	17.7	18.3 / 100.0
Test Scores: t2	84.3	13.5	36.7 / 100.0
Test Scores: Average (t1, t2)	77.5	14.5	32.5 / 98.3
Test Scores: Difference (t2 – t1)	13.7	12.2	-33.3 / 60.0
Parents' Achievement Beliefs [b)]			
Achievement Beliefs: t1	5.04	.56	2.67 / 6.00
Achievement Beliefs: t2	4.98	.57	2.67 / 6.00
Achievement Beliefs: Average (t1, t2)	5.01	.51	3.17 / 6.00
Achievement Beliefs: Difference (t2 – t1)	-.06	.46	-2.00 / 2.33
Teachers' Evaluations [b)]			
Teachers' Evaluations: t1	4.91	.61	3.00 / 6.00
Teachers' Evaluations: t2	4.87	.64	2.33 / 6.00
Teachers' Evaluations: Average (t1, t2)	4.89	.60	2.83 / 6.00
Teachers' Evaluations: Difference (t2 – t1)	-.05	.36	-1.33 / 1.33

N=607; [a)] Percentage correct solutions of 60 tasks; [b)] Scale of marks: 1 'very poor performance', 6 'very good performance'.

Tab. 2: Associations between Different Competency Indicators at First (t1) and Second (t2) Point in Time

		Test Scores		Achievement Beliefs		Teachers' Marks	
		t1	t2	t1	t2	t1	t2
Test Scores	t1	1.00					
	t2	.73**	1.00				
Achievement Beliefs	t1	.49**	.46**	1.00			
	t2	.53**	.53**	.66**	1.00		
Teachers' Marks	t1	.54**	.55**	.67**	.80**	1.00	
	t2	.54**	.57**	.61**	.83**	.83**	1.00

N=607; + $p \leq .10$; * $p \leq .05$; ** $p \leq .01$.

Tab. 3: Primary Effects of Parents' Educational and Occupational Status on Children's Test Scores, Parents' Achievement Beliefs, and Teachers' Marks (OLS-Regression Results)

	Model 1.1 Test Scores Beta (t-value)	Model 1.2 Achievement Beliefs Beta (t-value)	Model 1.3 Teachers' Marks Beta (t-value)
Education/Father [a)]			
- Intermediate Sec. Degree	.26 (2.2)*	.18 (1.6)	.21 (1.8)+
- Upper Sec. Degree	.35 (2.9)**	.20 (1.7)+	.27 (2.3)*
Education/Mother [a)]			
- Intermediate Sec. Degree	.20 (1.6)	.11 (0.8)	.15 (1.2)
- Upper Sec. Degree	.38 (2.7)**	.35 (2.5)*	.37 (2.7)**
EGP-Class/Father [b)]			
- IIIb, VI (Skilled Workers)	.16 (0.9)	.31 (1.7)+	.17 (1.0)
- IIIa, IV, V (Mixed Class)	.15 (0.8)	.35 (1.9)+	.18 (1.0)
- I, II (Service Class)	.20 (1.1)	.42 (2.3)*	.34 (1.9)+
EGP-Class/Mother [b)]			
- IIIb, VI (Skilled Workers)	.34 (1.4)	.74 (2.9)**	.70 (2.8)**
- IIIa, IV, V (Mixed Class)	.45 (1.8)+	.77 (3.1)**	.83 (3.4)**
- I, II (Service Class)	.72 (2.9)**	.98 (3.9)**	1.03 (4.2)**
Constant	-1.18 (4.6)**	-1.51 (5.8)**	-1.51 (5.9)**
BIC	1724.1	1732.3	1713.6
Adjusted R^2	.12	.11	.14
F-Value (14, 592)	7.05**	6.39**	7.91**
Observations (N)	607	607	607
Incremental Effects:			
- Education/Father F(2, 592) / BIC	4.47** / 3.71	1.73 / 9.29	2.73+ / 7.23
- Education/Mother F(2, 592) / BIC	4.04* / 4.60	4.40** / 3.87	4.49** / 3.68
- EGP-Class/Father F(3, 592) / BIC	0.43 / 17.90	1.79 / 13.73	1.69 / 14.04
- EGP-Class/Mother F(3, 592) / BIC	5.37** / 2.92	5.87** / 1.42	6.73** / -1.12

Significance: + $p \leq .10$; * $p \leq .05$; ** $p \leq .01$; Omitted Categories: [a)] Lower Secondary Degree; [b)] VII (Unskilled Workers).

Tab. 4: Temporal Development of Incremental Effect of Fathers' and Mothers' Educational and Occupational Status on Different Competence Indicators (OLS-Regression Results)

	Test Scores	Achievement Beliefs	Teachers' Marks
- Education/Father	-6.19	-8.32	-0.88
- Education/Mother	+4.81	+2.52	+4.96
- EGP-Class/Father	-1.45	-0.93	-1.72
- EGP-Class/Mother	+1.49	+3.12	-5.26

Figures are the differences in the incremental Bayesian-Information Criterion (BIC) values for the respective status dimension between t1 and t2. Positive values indicate a reduced and negative values an increased effect of the respective status dimension on the different competency measures.

Tab. 5: Determinants for Selecting Upper Secondary School (Logistic Regression Results)

	Model 4	Model 5	Model 6	Model 7
	Odds-(z) Ratio	Odds-(z) Ratio	Odds-(z) Ratio	Odds-(z) Ratio
Education/Father [a)]				
- Intermediate Sec. Degree	1.30(1.0)	1.02(0.1)	1.22(0.6)	1.07(0.2)
- Upper Sec. Degree	1.96(2.3)*	1.63(1.5)	2.35(2.5)*	2.13(2.0)*
Education/Mother [a)]				
- Intermediate Sec. Degree	1.74(1.9)+	1.64(1.5)	1.88(1.8)+	1.92(1.7)+
- Upper Sec. Degree	4.06(4.2)**	3.29(3.1)**	3.88(3.4)**	3.52(2.8)**
EGP-Class/Father [b)]				
- IIIb, VI (Skilled Workers)	1.27(0.6)	1.24(0.5)	.78(-0.5)	1.10(0.2)
- IIIa, IV, V (Mixed Class)	1.58(1.1)	1.74(1.1)	1.28(0.5)	1.87(1.1)
- I, II (Service Class)	2.10(1.8)+	2.21(1.7)+	1.38(0.7)	1.72(1.1)
EGP-Class/Mother [b)]				
- IIIb, VI (Skilled Workers)	2.73(1.6)	2.70(1.3)	1.47(0.5)	1.75(0.6)
- IIIa, IV, V (Mixed Class)	2.87(1.7)+	2.59(1.3)	1.70(0.7)	2.03(0.8)
- I, II (Service Class)	6.40(2.9)**	4.86(2.2)*	3.45(1.6)	3.76(1.5)
Competence Indicators (T1)				
- Test Scores (z-values)	--	3.31(9.5)**	--	--
- Achievement Beliefs (z-values)	--	--	4.92(10.0)**	--
- Teachers' Marks (z-values)	--	--	--	11.46(10.7)**
BIC	720.0	611.8	568.0	481.9
Adjusted Mc Fadden's R^2	.13	.28	.34	.46
LR-Chi^2	130.6	245.3	289.0	375.1
N	607	607	607	607

Significance: + $p \leq .10$; * $p \leq .05$; ** $p \leq .01$; Omitted Categories: [a)] Lower Secondary Degree; [b)] VII (Unskilled Workers).

Tab. 6: Determinants for Selecting Upper Secondary School (Logistic Regression Results)

	Model 8	Model 9
	Odds-Ratio (z)	Odds-Ratio (z)
Education/Father [a)]		
- Intermediate Sec. Degree	1.06 (0.2)	1.34 (0.6)
- Upper Sec. Degree	2.18 (1.9)+	2.19 (1.7)+
Education/Mother [a)]		
- Intermediate Sec. Degree	1.74 (1.4)	1.70 (1.1)
- Upper Sec. Degree	3.06 (2.3)*	3.46 (2.2)*
EGP-Class/Father [b)]		
- IIIb, VI (Skilled Workers)	.91 (-0.2)	.76 (-0.4)
- IIIa, IV, V (Mixed Class)	1.82 (1.0)	1.50 (0.6)
- I, II (Service Class)	1.43 (0.7)	1.15 (0.2)
EGP-Class/Mother [b)]		
- IIIb, VI (Skilled Workers)	1.77 (0.6)	1.40 (0.3)
- IIIa, IV, V (Mixed Class)	2.07 (0.8)	1.57 (0.4)
- I, II (Service Class)	3.34 (1.3)	2.68 (0.9)
Competence Indicators (T1)		
- Test Scores (z-values)	1.99 (4.3)**	2.36 (3.3)**
- Achievement Beliefs (z-values)	1.72 (2.8)**	3.53 (3.4)**
- Teachers' Marks (z-values)	6.73 (7.5)**	12.88 (6.1)**
Competence Development (T2-T1)		
- Test Scores	--	1.41 (1.6)
- Achievement Beliefs	--	2.24 (2.9)**
- Teachers' Marks	--	3.42 (5.6)**
BIC	461.4	391.8
Adjusted Mc Fadden's R^2	.49	.60
LR-Chi^2	408.5	497.3
N	607	607

Significance: + $p \leq .10$; * $p \leq .05$; ** $p \leq .01$; Omitted Categories: [a)] Lower Secondary Degree; [b)] VII (Unskilled Workers).

Tab. 7a: Reduction of Net-Effect of Mothers' Educational Status on the Probability to Select an Upper Secondary School Track when Controlling for Different Competency Indicators (predicted probabilities obtained from regression models 4-9 in tables 5 and 6)

	Mothers' Secondary School Degree			Standard Deviation of Selection Probabilities	Remaining Secondary Effect
	Lower	Inter-mediate	Upper		
Predicted probability based on					
Model 4, including: - Education/Father - Education/Mother - EGP-Class/Father - EGP-Class/Mother	.54	.67	.82	.14	100.0%
Model 5: Model 4 + Test Scores (t1)	.61	.72	.84	.11	78.6%
Model 6: Model 4 + Achievement Beliefs (t1)	.61	.74	.86	.13	92.9%
Model 7: Model 4 + Teachers' Marks (t1)	.68	.80	.88	.10	71.4%
Model 8: Model 4 + Test Scores (t1) + Achievement Beliefs (t1) + Teachers' Marks (t1)	.72	.82	.89	.08	57.1%
Model 9: Model 8 + Test Scores (t2-t1) + Achievement Beliefs (t2- t1) + Teachers' Marks (t2-t1)	.79	.86	.93	.07	50.0%
Predicted probabilities represent families with a mother with the respective educational status, all other status dimensions of the family fixed on the sample distribution. The competency indicators included in the different models were set on the sample mean.					

Tab. 7b: Reduction of Net-Effect of Mothers' Occupational Status on the Probability to Select an Upper Secondary School Track when Controlling for Different Competency Indicators (predicted probabilities obtained from regression models 4-9 in table 5 and 6)

	Mothers' EGP-Class				Standard Deviation of Selection Probabilities	Remaining Secondary Effect
	VII	IIIb, VI	IIIa, IV, V	I, II		
Predicted probability based on						
Model 4, including: - Education/Father - Education/Mother - EGP-Class/Father - EGP-Class/Mother	.41	.65	.66	.81	.17	100.0%
Model 5: Model 4 + Test Scores (t1)	.50	.73	.72	.83	.14	82.4%
Model 6: Base Model 4 + Achievement Beliefs (t1)	.61	.70	.73	.85	.10	58.8%
Model 7: Model 4 + Teachers' Marks (t1)	.64	.76	.78	.87	.09	52.9%
Model 8: Model 4 + Test Scores (t1) + Achievement Beliefs (t1) + Teachers' Marks (t1)	.67	.79	.81	.87	.08	47.1%
Model 9: Model 8 + Test Scores (t2-t1) + Achievement Beliefs (t2-t1) + Teachers' Marks (t2-t1)	.80	.85	.86	.92	.05	29.4%

Predicted probabilities represent families with a mother with the respective occupational status, all other status dimensions of the family fixed on the sample distribution. The competency indicators included in the different models were set on the sample mean.

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