

College expectations in cross-national comparative perspective

Research-based evidence on the formation of educational aspirations
in different educational systems*

Petr Matějů

with the assistance of

Michael L. Smith, Petr Soukup, and Josef Basl

Institute of Sociology, Academy of Sciences of the Czech Republic

Abstract

Renowned international experts in higher education financing have argued that, due to large government deficits, it will not be possible to open up tertiary education to growing demand without introducing cost-sharing principles and efficient student financial aid programs. Opponents of cost-sharing in higher education object that introducing tuition fees will raise inequality in access to higher education. Drawing on OECD data, and focusing on college expectations, the authors argue that the effects of ability, gender and socio-economic background on college expectations are formed primarily under the influence of fundamental characteristics of secondary educational systems, such as the degree of stratification and vocational specificity of secondary schools, while principal characteristics of tertiary education system, such as the enrolment rates and model of financing, play much less important role. The results clearly show that, after controlling for the effects of secondary school system characteristics, cost-sharing in itself and its degree do not affect the formation of college expectations by ability, gender and socio-economic background as does the selectivity of the secondary school system.

Introduction

Adolescents' aspirations and expectations guide not only what they choose to study in school, but also how they prepare for life as adults and ultimately the kinds of careers they take on. Since aspirations serve as an important link between adolescents' social origin and the educational and occupational careers they may pursue, their study has naturally been one of the liveliest areas of research in social stratification. Most of the studies have brought forward significant evidence about the role of social origin, ability, and school context in shaping aspirations. There has also been growing attention to the role of institutional context. However, much of the research on the impact of educational systems on aspirations and expectations has been based on a small sample of countries, which limits the generalizability of those findings and prevents sociologists from being able to better weigh the importance of different factors in shaping educational aspirations around the world.

Our study therefore contributes to this body of knowledge by conducting an analysis of the role of specific features of educational systems in shaping college expectations in the largest cross-national comparison to date: the 30 OECD countries participating in the PISA 2003 (Program

* Research for this article was made possible by the gracious support of the Czech Ministry of Labor and Social Affairs, grant no. 1J 005/04-DP2 "Unequal Access to Education: The Extent, Sources, Social and Economic Consequences, Policy Strategies". Work on this paper has been made possible also by the grant from Fulbright Commission awarded to its first author under the New Century Scholars 2007 - 2008 program titled "*Higher Education in the 21st Century: Access and Equity*". Address correspondence to Petr Mateju, Institute of Sociology, Academy of Sciences of the Czech Republic, Jilská 1, 110 00 Praha 1, Czech Republic, email: petr.mateju@soc.cas.cz.

on International Student Assessment, in which 41 countries total participated in the survey). The analysis involved a number of steps. First, by drawing on concepts proposed in previous research on the relationships between aspirations and the structural characteristics of educational systems, we created composite variables (dimensions) representing the degree of stratification and vocational specificity of the secondary education system, on the one hand, and the permeability, openness and financing of tertiary education, on the other. Next, we used PISA 2003 data to conduct individual-level logistic regressions of college expectations on parental socioeconomic status (SES), child's measured ability, and gender to assess the degree to which they determine college expectations. The results of the logistic regressions are then entered into the analysis of the relationships between the degree of educational system stratification, openness and selectivity on the one hand, and the degree to which they determine college expectations, on the other.

1. Prior research on the role of social psychological and structural factors in the formation of educational aspirations and expectations

Already at its outset, social stratification research brought overwhelming evidence that the educational aspirations of adolescents are one of the strongest predictors of educational and occupational careers (Hyman 1953; Reissman 1953; Kahl 1953; Herriott 1963). Since the early 1950s, the development of pupils' aspirations has been one of the most frequent topics in research on social stratification and the intergenerational transmission of social status. Thus by the early 1970s, Williams (1972) identified more than four hundred studies relating to educational aspirations alone. Considering only articles in professional journals, by 2004 there have been as many as 1100 papers on this topic.¹

Many of the pioneering studies on educational aspirations that significantly influenced further research on social stratification, inequality and mobility emerged from the work of William H. Sewell and his colleagues, who laid the foundations of the so-called social psychological school in social stratification research (Archibald O. Haller, Vimal P. Shah, Alejandro Portes, Otis D. Duncan, Robert M. Hauser, to name some of the most important). In explaining variance in the educational aspirations of adolescents, early studies by these scholars (Sewell, Haller, and Straus 1957; Sewell 1961; Sewell 1963; Sewell and Hauser 1972, Sewell and Shah 1967; Sewell and Shah 1968a,b) pointed to such factors as parental SES, measured ability, academic performance, parents' expectations and encouragement, and peers' aspirations, to list just a few.

The late sixties brought about a new impetus to research on aspirations, particularly due to the seminal contribution of Peter Blau and Otis D. Duncan (1967; Duncan 1968), whose model of the social stratification process offered a new theoretical and methodological context for research. Partly in response to the simplicity of the original Blau-Duncan model, aspirations – previously studied primarily as a dependent variable – were placed at the very center of the so-called Wisconsin social psychological model (Sewell, Haller, and Portes 1969, 1973; Sewell, Haller, and Ohlendorf 1970; Hauser 1972; Sewell and Hauser 1972, 1975; Hauser, Tsai, and Sewell 1983). Based on the extensive Wisconsin Longitudinal Study, Sewell, Hauser and their colleagues demonstrated that educational aspirations – shaped primarily by measured ability, academic performance, parental SES, teachers and peers – play the key role in explaining later

¹ According to research database EBSCOhost.

educational and occupational attainment. In this sense, educational aspirations have become “the strategic centre of the model” (Haller and Portes 1973:68).

Over time, other approaches to the study of educational aspirations eventually challenged some of the core assumptions of the social psychological model. Alan C. Kerckhoff, in his first critical analysis of the “socialization model” (Kerckhoff 1976), emphasized that even though scholars who subscribed to the socialization perspective achieved impressive results in explaining the processes of educational and occupational attainment, they did not pay adequate attention to the structural constraints that individuals take into account (more or less consciously) when making important decisions about their future educational and occupational careers. This is why, Kerckhoff argued, a good deal of the variance in aspirations had not been explained by the social psychological model (Kerckhoff 1976).

Therefore, without questioning the true achievements of the research carried out under the socialization perspective, the adherents of the ‘allocation’ perspective (Kerckhoff 1976; Kerckhoff and Campbell 1977a,b; Wilson and Portes 1975; Simmons and Rosenberg 1971; Alexander and Eckland 1975; Karabel and Astin 1975; Jencks 1972; Han 1968, 1969) suggested that the research on aspirations and their role in the attainment process underestimated how contextual and institutional conditions influence the way pupils’ unconstrained “wishes” transform into “realistic” plans. The allocation model was not intended to replace the socialization model, but was rather meant to bring into consideration additional factors that could help explain the attainment process and, in particular, the formation of educational aspirations. “The socialization model interprets the strong association between ambition and attainment as indicating that the goals direct and motivate the child’s efforts during the formative years and thus determine the level of attainment he reaches later. (..) this interpretation implies an open system within which the major determinants of attainment are motivation and ability. (...) It seems reasonable to argue that expectations of the future are affected by observed structural constraints, and thus they reflect more than pure motivation” (Kerckhoff 1976:371).

The real impact of educational systems on the formation of educational aspirations can be properly assessed only in cross-national comparative analysis. One of the first comparative analyses of aspirations formation was Kerckhoff’s study (1977) of thirteen-year-old boys in the United States and England, which built on the distinction between “contest” and “sponsored” mobility proposed earlier by Turner (1960). Following Turner’s argumentation, Kerckhoff pointed out that the English educational system forced adolescents to make irreversible decisions about their educational careers.² Both authors emphasized that the American system was much more open to the “contest” type of mobility, “providing more opportunity for adolescents to change course throughout secondary school and encourages the belief that such a change is possible” (Kerckhoff 1977:564). Thus, as Turner concludes, “the earlier that selection of elite recruits is made, the sooner others can be taught to accept their inferiority and to make ‘realistic’ rather than phantasy plans” (Turner 1960:859).

Kerckhoff’s comparative analysis confirmed that social origin and ability played a greater role in explaining educational aspirations among English boys than among their American counterparts. In interpreting these results, in line with Turner’s argument, Kerckhoff attributed the more structurally constrained aspirations in England, compared to the US, to the greater

² At the age of eleven or twelve, English boys had to choose between the “elite” grammar school, which has a more demanding and academically oriented curriculum that prepares students for post-secondary education, on the one hand, and the more popular, and academically less demanding, “secondary modern school,” on the other.

“realism” of English pupils and the English system’s emphasis on ability in determining the type of secondary school pupils will attend. While the English system leads pupils to develop realistic educational and occupational plans earlier in life, the American system does not provide the same structural constraints, and thus pupils maintain lofty aspirations until late in the educational process, that is, as high school graduation nears and realistic assessments of career options need to be made.

Thus educational aspirations are not only shaped by factors at the individual or social psychological level (e.g. parental SES, measured ability) and at the contextual level (e.g. quality and type of attended schools), but also at the structural level of the educational system. Research on the role of educational systems on educational aspirations has been largely based on the typology of systems introduced by Müller and Shavit (1998) and further elaborated by Kerckhoff (2001). The typology is based on three dimensions along which educational systems can be classified: the degree of *stratification* of the educational system, its orientation to vocational training (*vocational specificity*), and its *standardization*.

Stratification, most often used to classify secondary schools, “refers to the degree to which systems have clearly differentiated kinds of school whose curricula are defined as ‘higher’ and ‘lower’. (...) In stratified systems, the program offerings in the types of secondary schools are associated with different degrees of access to opportunities for additional, more advanced schooling. So, the term *stratification* refers to both the kind of programs offered and their links to future opportunities.” (Kerckhoff 2001:4). *Vocational specificity*, another relevant dimension often used in the analyses of educational systems, is the degree to which curricula are designed to prepare students for particular vocations. In terms of statistical indicators, it can be represented by the proportion of students leaving the educational system with specific skills (e.g. Buchmann and Dalton 2002). A high degree of vocational specificity very often indicates also a high degree of system stratification, because schools providing training for specific occupations usually co-exist with schools preparing for further, more academic types of education at a higher level. In other words, high vocational specificity goes hand in hand with high stratification, usually within the so-called dual system of secondary education, such as in Germany. *Standardization* refers to the degree in which governments create conditions (e.g. teachers’ education, financing, etc.) and control mechanisms (nationwide tests, school-leaving examinations, etc.) to achieve certain standards of quality in education provided by different schools.

The above mentioned classification of educational systems, together with highly standardized statistical data on educational systems published every year by the OECD’s *Education at a Glance*, and data from large-scale comparative surveys of adolescents assessing various aspects of their ability and skills, socioeconomic background, values and aspirations (such as TIMSS, PISA, and PIRLS), provide unusually strong empirical evidence enabling the use of multilevel analytical strategies aiming at the explanation of educational aspirations in different institutional settings and societal contexts. In other words, these very rich sources of data can be used to explain the formation of educational aspirations and educational attainment by factors belonging to different levels: *individual* (parental SES, measured ability), *contextual* (school level differentiation) and *structural* (institutional characteristics of educational systems).

Research on the interplay between the individual, contextual and structural levels in the formation of educational aspirations has already brought valuable results. Buchmann and Dalton (2002) used data from one of the large-scale student assessment projects (TIMSS 1995) to identify differences between selected countries in the effect of parents’ and peers’ attitudes towards education on the educational aspirations of 13 year-olds. First, the study has confirmed

that, after controlling for the effect of ability (math achievement), the effect of parents' education on the educational aspirations of adolescents is significantly higher in countries with highly stratified educational systems than in countries with relatively undifferentiated systems of secondary education. Conversely, parents' and peers' attitudes towards education more significantly affect the educational aspirations of adolescents in countries with less stratified systems. The authors, though they acknowledge that their evidence is not strong, come to the conclusion that in more differentiated systems aspirations are largely determined by the type of school students attend, so there is little room for interpersonal effects (Buchmann and Dalton 2002:99).

Special attention has to be paid to differences in educational aspirations and expectations between schools, be it due to a formal stratification of schools (i.e. due to the existence of different types of schools at a secondary level), tracking within schools of the same type, or just differences in the quality of schools not associated with any formal school classification. While differences in student achievement according to type of school have been recently studied in cross-national comparative perspective, namely thanks to PISA assessments (see e.g. OECD 2005c), cross-national differences in between-school-variance still wait for a thorough analysis. Similar to school performance also differences in educational aspirations between schools are often attributed to differences in socio-economic background of students, especially in highly stratified systems.

But even in quite comprehensive systems there are mechanisms through which schools develop specific educational settings affecting the further aspirations of their students. In many countries, for example, the choice of school may effectively homogenize the socio-economic composition of the student body; schools may also differ significantly by their geographic scope, with wealthy areas being served by particular schools that tend to have not only higher levels of student performance, but also higher educational aspirations. Therefore, even in more universal school systems, parents with higher socio-economic status may find means how to send their child to better schools. Technically, this effect may be revealed by multi-level analysis, particularly by separating the so called intra-class correlation, which indicates the degree to which aspirations vary between schools. We may assume that in highly stratified or tracked education systems the intra-class correlation for college aspirations will be much larger than in less stratified systems, but even there, due to processes mentioned above, it may be quite large.

The aim of this paper is to take a step further in the empirical elaboration of the relationships between educational expectations and institutional characteristics of educational systems. More specifically, in the first step, statistical data portraying systems of secondary and tertiary education in OECD countries are used to assess relevant structural characteristics of educational systems (degree of stratification, vocational specificity, selectivity, openness, etc.). In the second step, survey data from the OECD international student assessment (PISA 2003) are analyzed to assess the degree to which the college expectations of 15-year-olds are determined by measured ability, gender, and socioeconomic background. Finally, in the third step, the results from the previous two steps are entered into a set of regression analyses carried out again at the country level, designed to test relevant hypotheses about the role of relevant educational system characteristics, such as secondary school system openness, enrolment rates into tertiary education, principal characteristics of its financing, in the determination of college expectations by ability and socio-economic background.

2. Hypotheses, data, analytical strategy, and methodology³

2.1. Hypotheses

Drawing on previous comparative research on the institutional embeddedness of college expectations, we proposed four main hypotheses for the analysis:

- H1: The degree of stratification and vocational specificity are two closely related characteristics of secondary educational systems, which in fact form one dimension indicating the ‘openness and permeability’ of such systems.
- H2: Openness and permeability of secondary education is strongly associated with the openness of tertiary education.
- H3: The greater the openness of secondary education, the less college expectations are determined by social origin, ability and gender.
- H4: The effects of ability and socio-economic background on college expectations are shaped more by the openness of the secondary system than by the openness of the tertiary system.
- H4a: Between-school variation is the most important characteristic of the secondary education system that affects the degree to which college expectations are determined by ability and socio-economic background. Such variation can be due to either formal system stratification (the existence of different types of schools, tracking, etc.) or other, rather hidden, processes (school choice, within school tracking, etc.). By controlling for between- school variation (represented by the intra-class correlation), the effects of other characteristics of the secondary school system will be largely eliminated.
- H4b: After controlling for the effect of the openness of the secondary education system on the determination of college expectations by ability and socio-economic background the effects of *tertiary education enrolment*, *the share of tuition fees in financing tertiary education*, and *financial aid to students* would not be significant.

2.2. Data

Statistical data used to describe educational systems and to define relevant dimensions of their stratification come from the OECD yearbook *Education at a Glance* (OECD 2003, 2004 and 2005c).⁴ This rich source of data provides information about the basic characteristics of educational systems, access to education, participation and progress, financial and human resources invested in education, the learning environment and the organization of schools, etc. Most of the indicators published in the 2005 edition of the yearbook describe the situation in 2003, when the PISA 2003 survey data was collected in participating countries.

³ Given the large number of tables and figures necessary for presenting the data and results of the analysis, only the most crucial and/or most useful tables are depicted in this article. Readers are urged to consult the article’s full set of tables available at http://www.stratif.cz/attachments/doc176/Aspirations_tables_and_figures_SOE.pdf (or go to “Files to Download” from the <http://www.stratif.cz> website) in order to follow the discussion below. Hereinafter, we will refer to the above “Tables and Figures” file as T&F.

⁴ Some indicators which were not available in the most recent edition of *Education at a Glance* (2006) were obtained from earlier editions (2003, 2004 and 2005).

Two sets of statistical indicators were used to describe educational systems of individual countries in terms of their stratification, openness, and permeability. The following four indicators were used for secondary education:⁵

- a) GENSEC: Upper secondary education enrolment in general education programs (2003)
- b) NUMPRG: Number of school types or distinct educational programs available to 15-year-olds (2003)
- c) VOCAT: Proportion of 15-year-olds enrolled in programs that give access to vocational studies at the next level of education or direct access to the labor market (2003)
- d) EXPSEC: Expenditure on educational institutions of primary, lower secondary and primary education as a percentage of GDP from public and private sources (2002)

The openness of the tertiary education system was also indicated by four variables:

- a) ENROL: Net entry rates into tertiary education (2003)
- b) PRVRSC: Relative proportion of private sources of funding on institutions of tertiary education (percentage of total expenditure - 2002)
- c) FINAID: Financial aid to students: public subsidies for households and other private entities as a percentage of total public expenditure on tertiary education (percentage of total expenditure on tertiary education - 2002)
- d) EXPTER: Expenditure on tertiary educational institutions as a percentage of GDP from public and private sources.

To test our hypotheses about the determination of college expectations by ability, parental socioeconomic status, gender and type of school, we used the international data file from PISA 2003. Though PISA 2003 focused mainly on mathematical literacy, other three dimensions, i.e. reading literacy (covered mainly in PISA 2000), science literacy (covered mainly by PISA 2006), and problem solving were also tested. The target population of PISA surveys is 15-year-olds enrolled in school, regardless of the grade or type of institution in which they are enrolled.

PISA surveys use a two-stage stratified sampling design. At the first stage, schools are sampled systematically from a comprehensive national list of all eligible schools with probabilities that are proportional to a measure of size.⁶ Within sampled schools, students are selected with equal probability from a list of 15-year-old students in each selected school.⁷ From the 41 OECD and non-OECD countries participating in the 2003 PISA data collection, we selected for our comparative analysis only 30 OECD countries for which we can also obtain statistical data regularly published in the OECD statistical yearbook *Education at Glance* (OECD 2006).

The following variables were used in analyses based on data from PISA 2003:

- a) COLLEXP – expectations to attain tertiary (i.e. college or university) education (0=no, 1=yes);⁸
- b) SEX (1=female, 2=male),
- c) HISEI – the highest occupational status of parents;⁹

⁵ Acronyms for statistical indicators (i.e. the names of variables used in analyses), as well as values of indicators in individual countries, are displayed in Table A1 in the Appendix

⁶ The measure of size was a function of the estimated number of eligible 15-year-old students enrolled. Individual schools in which students in this age can be enrolled were selected systematically with probabilities proportional to size, the size being a function of the estimated number of eligible (15-year-old) students enrolled.

⁷ See OECD 2005b (chapter 4) for a detailed description of PISA sampling procedures and target population coverage.

⁸ This means category 5 or 6 in the ISCED coding.

⁹ Occupational data for both the student's father and student's mother were obtained by asking open ended questions. The responses were coded into four-digit ISCO codes and then recoded to the international socioeconomic index of occupational

- d) ABIL – index of measured ability (derived from five plausible values for each literacy domain),¹⁰

2.3 Analytical strategy and methodology

To define composite variables representing stratification, vocational specificity, permeability, and openness of the educational system, we applied factor analysis of the OECD statistical indicators to the data for the subset of OECD countries participating in PISA 2003. To assess the degree of determination of college expectations at the country level for each OECD country in the PISA 2003 data set (30 countries out of 41 participating on PISA 2003), we conducted logistic regression of college expectations (COLLEXP) on parental socioeconomic status (HISEI), child’s measured ability (ABIL) and gender (SEX). The individual regression coefficients as well as standardized (centered) coefficients of determination (Nagelkerke R^2) for these countries then entered the analysis of the relationships between stratification, openness and selectivity of educational systems, and the degree of determination of college expectations. Finally, we regressed the above variables bearing on the determination of college expectations by ability and socio-economic background on the most important characteristics of secondary and tertiary education systems.

For reasons discussed above, we computed the intra-class correlation (ICC), which in our case indicates the degree to which college expectations vary between schools. Statistically, the intra-class correlation takes between-school variance in expectations as a proportion of their total variation. The general formula for ICC_0 is:

$$ICC_0 = \frac{\sigma_u^2}{\sigma_e^2 + \sigma_u^2},$$

where ICC_0 is the intra-class correlation for the null model, σ_u^2 is the variance at the second (school) level, and σ_e^2 is the variance at the first (individual) level. Since the college expectations variable is binary, we applied a slightly different formula (see e.g. Snijders and Bosker 1999 or Hox 2002):

$$ICC_1^{11} = \frac{\sigma_u^2}{\pi^2/3 + \sigma_u^2},$$

where $\pi^2/3$ is the variance at the first level, and σ_u^2 is the variance at the second level.

status (ISEI) (Ganzeboom et al. 1992). HISEI corresponds to the higher ISEI score of either parent or to the only available parent’s ISEI score. Higher ISEI scores indicate higher levels of occupational status.

¹⁰ Students’ achievements in mathematics, reading, science and problem solving are reported on standardized composite scales (average score is 500, standard deviation is 100 across all students of the OECD countries in PISA). Since the creation of scales was based on Item Response Theory, the data set contains five plausible values for each student instead of one fixed value. When achievement scores are used in analyses as dependent variables, all five plausible values should be used simultaneously to obtain the estimates of population parameters (OECD 2005b). We use achievement scores only as independent or control variables, so the scale of “ability” could have been created by averaging five plausible values for each literacy domain (obtaining four variables: MATH for mathematics, READ for reading, SCIE for science, and PROB problem solving) and computing an additive scale (MATH + READ + SCIE + PROB/4). The analysis of reliability confirmed that these variables clearly form one scale (Cronbach’s $\alpha = 0.9672$).

¹¹ Snijders and Bosker use the symbol ρ_i instead of our ICC_i (Snijders and Bosker 1999:224)

The first step of the analysis involved thirty logistic regressions on data from PISA 2003 (i.e. separately for each country),¹² aimed at assessing the net effects of measured ability, parental socio-economic status, and gender on college expectations, as well as the overall degree of determination of college expectations by these three variables (Nagelkerke R²). The second step of the analysis was designed to explain differences between countries in regression coefficients associated with the variables ABIL and HISEI, as well as the values of the Nagelkerke R², by indicators describing educational systems of individual nations.

To achieve this goal, two sets of regression analyses were performed with three equations in each. The first set included an equation for the overall determination of college expectations by ability, socio-economic background, and gender (dependent variable ZDETEXP), while the other two equations estimated the effect of ability and socio-economic background on expectations (dependent variables RCABIL and RCISEI):¹³

$$\text{ZDETEXP} = a + b_1 \cdot \text{SCND} + b_2 \cdot \text{TERT} \quad [1]$$

$$\text{RCABIL} = a + b_1 \cdot \text{SCND} + b_2 \cdot \text{TERT} \quad [2]$$

$$\text{RCISEI} = a + b_1 \cdot \text{SCND} + b_2 \cdot \text{TERT} \quad [3]$$

The second set of equations tested both the gross and net effects of specific characteristics of the tertiary education system on the determination of college expectations:

$$\text{ZDETEXP} = a + b_1 \cdot \text{SCND} + b_2 \cdot \text{ICC} + b_3 \cdot \text{ENROL} + b_4 \cdot \text{PRVRSC} + b_5 \cdot \text{FINAID} \quad [4]$$

$$\text{RCABIL} = a + b_1 \cdot \text{SCND} + b_2 \cdot \text{ICC} + b_3 \cdot \text{ENROL} + b_4 \cdot \text{PRVRSC} + b_5 \cdot \text{FINAID} \quad [5]$$

$$\text{RCISEI} = a + b_1 \cdot \text{SCND} + b_2 \cdot \text{ICC} + b_3 \cdot \text{ENROL} + b_4 \cdot \text{PRVRSC} + b_5 \cdot \text{FINAID} \quad [6]$$

where ICC is the intra-class correlation for college expectations, SCND and TERT are the factor scores for openness of secondary education and tertiary education respectively, ENROL is the net entry rate into tertiary education, PRVRSC is the relative proportion of private sources of funding in institutions of tertiary education (represents the actual role of tuition fees in financing tertiary education), and FINAID is the financial aid to students defined as public subsidies to households and other private entities as a percentage of total public expenditure on tertiary education.

3. Results

Factor analysis (PCA) was applied to the full set of eight statistical indicators and separately to the two subsets depicting secondary and tertiary education. The results (Table 1) confirm that the stratification of the secondary educational system (indicated by the number of school types or distinct educational programs) is strongly correlated with its vocational specificity (indicated by the proportion of 15-year-olds enrolled in programs that give access to vocational studies or direct access to the labor market and upper secondary education enrolment in general education programs). Another well-defined dimension of a country's educational system is comprised of enrolment rates, expenditure on tertiary education, financial aid to students, and the system's openness to private resources (indicating a demand driven system). Though the correlation of the two dimensions (SCND, TERT) is very high and significant ($r = 0.627$, $p < 0.001$), and the analysis of the full set suggests that there is clearly one strong dimension that consistently describes a country's educational system as a whole (component DIM1 in Table 1), for descriptive and analytical purposes we decided to keep the two dimensions separate (SCND,

¹² For SPSS syntax for logistic regressions see the appendix.

¹³ These variables are the values of the standardized regression coefficient from the logistic regression of aspirations on ability, socio-economic background and gender.

TERT). For the sake of simplicity we refer to them as the “openness of secondary education” and the “openness of tertiary education.”

<Table 1 about here>

Since the OECD statistical data used to describe the openness and permeability of educational systems contains missing values, and since dropping the countries with the missing data from the analyses would have reduced the number of units for multilevel analysis below a critical level, we used the regression method of imputation for the missing data.¹⁴ Since the correlation between TERT and SCND was not affected by the imputation, we decided to use imputed data for further analysis.

The values of the two dimensions (principal components) in OECD/PISA countries¹⁵ are displayed in Figure 1. At first glance, most European countries (except the Scandinavian countries) show low levels of openness in both the secondary and tertiary systems of education (e.g., the Czech Republic, Netherlands, Austria, Slovakia, Germany, Italy, Ireland, France, Belgium, etc.). The United States, Canada, New Zealand, and Australia, on the one hand, and Sweden, Norway Denmark, and Finland, on the other, show consistently greater openness in both segments of the educational system.

<Figure 1 about here>

The results of a simple descriptive analysis of the effects of ability and parental socioeconomic status in three selected countries exhibiting different levels of educational system stratification (the Czech Republic, Germany, United States and Sweden) displayed in Figure 2 reveal the different effects of socioeconomic background in these three countries. In the Czech Republic, a country with one of the most stratified systems of secondary education and one of the least accessible systems of tertiary education in the OECD, only 18% of the most competent 15-year-olds from the lowest SES group (SES = 1) expect to achieve education at the tertiary level, while in the highest SES group the figure is 95% (ratio 0.18). In the United States and Sweden – the countries with the least stratified secondary education and the most open tertiary education – highly capable adolescents from lower strata are much more likely to expect to continue on to college than their Czech counterparts (18% in the Czech Republic, compared to 64% in the US and 47% in Sweden). Thus the contrast between the lowest and highest SES quintiles are much smaller in those countries (US: 64/96, ratio 0.66, Sweden 47/91, ratio 0.51).¹⁶

<Figure 2 about here>

The logistic regression of college expectations on ability (ABIL), parental socioeconomic status (HISEI) and gender (SEX),¹⁷ which was applied to assess the net effect of ability and parental socioeconomic status on college expectations and the degree to which college expectations are determined by ability, gender and parental socioeconomic status, revealed significant differences between countries, especially in the net effect of socioeconomic background. Figure 3 displays standardized logistic regression coefficients (B) of expectations

¹⁴ SPSS Missing Value Analysis was applied (a regression method augmenting estimates with random components). For details see: <http://www.siue.edu/IUR/SPSS/SPSS%20Missing%20Value%20Analysis%207.5.pdf>

¹⁵ Hereinafter, “OECD/PISA countries” refers to the OECD countries that participated in the PISA 2003 project.

¹⁶ Figure S2 in T&F displays odds ratios of educational aspirations for groups defined by quintiles of parental SES after controlling for the effect of ability. It shows that the decline in the odds of aspiring to college is much steeper in the Czech Republic, Germany, Hungary, Poland and other Central European countries than, for example, in the US, Sweden, Canada, Australia, and France.

¹⁷ The SPSS binomial logistic regression procedure was applied. See the SPSS command file in the Appendix.

on ability (ABIL) and the socioeconomic status of parents (HISEI), controlling for gender. Consistently with the results of the descriptive analysis and with hypotheses H3, the net effect of socioeconomic status is much stronger in the Czech Republic, Germany, Hungary, Poland and other Central European countries than in the US, Canada, Australia, France and other countries with less stratified and more open educational systems.

<Figure 3 about here>

The overall degree to which college expectations are determined by ability, gender and parental socioeconomic status was assessed by the model coefficient of determination (Nagelkerke's R^2).¹⁸ The values of the coefficient rank from more than 0.40 (Hungary, Czech Republic, Slovakia, Portugal, Belgium, Netherlands, Poland, and Spain) to less than 0.25 (Denmark, New Zealand, France, United States, Korea, Canada, Australia, and Finland).

To simplify the graphical presentation, we transformed the Nagelkerke's R^2 values to their z-scores (see Figure 4 for the results) and also conducted second-level principal component analysis, which identified a single dimension representing the openness and permeability of the educational system on the whole (variable OPENNESS).¹⁹ As the third hypothesis (H3) predicted, we found a strong relationship between the determination of college expectations at the individual level (ZDETEXP) on the one hand, and the openness and permeability of the educational system (OPENNESS) on the other.²⁰

<Figures 4 and 5 about here>

Figure 5 displays individual OECD/PISA countries in a two-dimensional space defined by the determination of college expectations (ZDETEXP) and the openness and permeability of the educational system (OPENNESS). The figure confirms the strong relationship between the openness and permeability of the educational system, assessed at the country level, and the degree of overall determination of college expectations, assessed at the individual level.

In order to test the specific effects of the relevant characteristics of educational systems on the determination of college expectations,²¹ we ran a series of regression analyses at the country level. The results from this exercise are displayed in Tables 2 to 5. We started from a simple model containing only two independent variables: SCND and TERT (Table 2). As for the degree of overall determination of expectations, both of these independent variables show a strong and significant effect (-.415, -.380).²² Therefore, the assumption has been confirmed that the greater openness of secondary and tertiary education is associated with a weaker overall determination of expectations. The degree to which expectations are determined by

¹⁸ Nagelkerke's R-Square is a modification of the Cox and Snell coefficient of determination. It divides Cox and Snell's R^2 by its maximum in order to attain a measure that ranges from 0 to 1. Therefore, Nagelkerke's R^2 will normally be higher than the Cox and Snell measure but will tend to run lower than the corresponding OLS R^2 . Nagelkerke's R^2 is the most-reported of the R-squared estimates (see Nagelkerke 1991).

¹⁹ One identified component, OPENNESS, accounted for 81% of the variance with loadings 0.902 for both SCND and TERT.

²⁰ The regression coefficients of DETASP on SCND, TERT and OPENNESS (b/se/sig) are: SCND (-.452/0.188/0.023), TERT (-.375/0.172/0.038), OPENNESS (-.441/0.170/0.015)

²¹ There were three dependent variables: the overall determination of college aspirations by ability, socio-economic background and gender (ZDETEXP), the effect of ability on aspirations (RCABIL) and the effect of socio-economic background on aspirations (RHISEI).

²² Since the analysis was performed on all PISA 2003 countries, i.e. we in fact worked with a full set of cases, and thus it does not make much sense to use statistical significance *stricto sensu*. We refer to it just to avoid over-interpreting the coefficients themselves, since they were produced on a really small sample of 30 countries. On the other hand, we may assume that the 30 countries in the analysis is a sample of the larger "population" of developed and developing countries (which may include about 60 countries), to which the results can be generalized. In this case we would use the significance level of 0.1, instead of 0.05.

ability (RCABIL) also strongly depends on the openness of secondary and tertiary education (-.556, -.311). The degree of determination of expectations by socio-economic background shows a much higher sensitivity to the openness of the secondary education system than the tertiary system.

<Table 2 about here>

Table 3 shows the results of regressions for the overall determination of expectations in which the composite variable “openness of tertiary education” was decomposed into the three most relevant original indicators (ENROL, PRVRSC, and FINAID); also, the between-school variance (ICC) was added to the set of independent variables. The story becomes more interesting, particularly because the between-school variation in expectations turned out to be by far the strongest predictor of their overall determination. It should be noted that this is the only variable in the whole model which remains strong and significant when it comes to net effects (before ICC was added to the model, it was the composite variable SCND, i.e. the “openness of the secondary education”). The results show that the larger the differences in college expectations at the school level (ICC), the stronger the effects of both students’ socio-economic background and ability.

Importantly, when either the openness of the secondary education or between-school variation in expectations enter the model, the effects of enrollment into tertiary education and indicators of its financing (traditionally thought to be important in shaping college expectations), become negligible. The same story comes out from Table 4, which displays the results for the degree of determination of expectations (RCABIL) by ability. Again, the openness of secondary education and the between-school variation in expectations override the effects of all relevant characteristics of tertiary education, including the enrollment rate (ENROL) and its model of financing (PRVSRC, FINAID).

<Tables 3 and 4 about here>

As for the regression analysis of the effect of family socio-economic status on college expectations (RCHISEI), results presented in Table 5 are quite similar to those presented so far, with the only difference consisting in the fact that the between-school variation is the only independent variable in the model showing a strong and significant effect. As for the role of tuition fees (PRVSRC) and financial aid to students, it is interesting to see that in the final model (Table 5, model 7) their effects go in the direction one would expect: the presence of tuition fees (PRVRSC) increases the role of socio-economic background in the formation of expectations (.208), while the presence of financial aid to students tends to eliminate it (-.270). However, these effects are not statistically significant, and also – as already emphasized – largely overridden by the effects of secondary school system stratification. Given these results, we find strong support for hypothesis H4 (as well as its specifications: H4a and H4b).

4. Conclusions

The analysis of the OECD data confirmed the hypothesis that the degree of stratification in the secondary educational system, and its vocational specificity, constitutes one dimension indicating the permeability of the secondary educational system (hypothesis H1). We also found that there is a strong association between the permeability of secondary education and the openness of tertiary education (H2). These two intertwined characteristics of an educational system strongly predict the degree to which college expectations are determined by socioeconomic background, ability and gender (H3).

The series of regression analyses carried out on the country level has brought forward strong evidence supporting the hypothesis that the most important characteristics of an educational system that generate a strong degree of determination of college expectations by ability and socio-economic background pertain primarily to secondary, not tertiary education. In this regard, the decisive aspects of secondary education are the degree of secondary school system stratification and vocational specificity on the one hand, and between-school variance in college expectations (measured by the intra-class correlation), on the other. At the country level, these characteristics of a secondary school system largely override the effects of characteristics describing tertiary education, such as the role of tuition fees and financial aid to students. It has to be emphasized that the results of our analysis as well as our main conclusions are not at odds with the research that shows that, at the individual level, the actual and perceived levels of tuition fees, student financial aid, as well as factual and perceived “openness” or “closeness” of the tertiary education system, actually may matter a lot. These questions will be on the agenda of our longitudinal research we launched in 2003 (PISA-L, 15-year-olds) and 2004 (first year university students).

As for the main message of our analysis for educational policy, we believe that we have made a step further in assessing the role of the institutional structures of educational systems and the degree of their openness and permeability in the formation of college expectations of pupils. Our analysis strongly supports the idea that in order to increase equity in access to higher education, policymakers should focus primarily on the secondary school system, particularly on the existing structural conditions for the reproduction of inequality in access to higher education through secondary school system stratification and other sources of differences between schools.

Tables and figures

Table 1: Factor analysis (PCA) of the openness of secondary and tertiary education

Variable	DIM1	DIM2	SCDN	TERT
GENSEC	0.638	0.455	0.650	-
NUMPRG	-0.922	0.177	-0.853	-
VOCAT	-0.520	0.486	-0.702	-
EXPSEC	0.668	-0.310	0.705	-
ENROL	0.721	-0.031	-	0.720
PRVRSC	0.339	0.882	-	0.615
FINAID	0.681	-0.238	-	0.618
EXPTER	0.741	0.294	-	0.793
% of VAR	45.3	18.6	53.5	47.7

Figure 1: Openness of secondary and tertiary education systems in OECD countries (dimensions SCND and TERT)

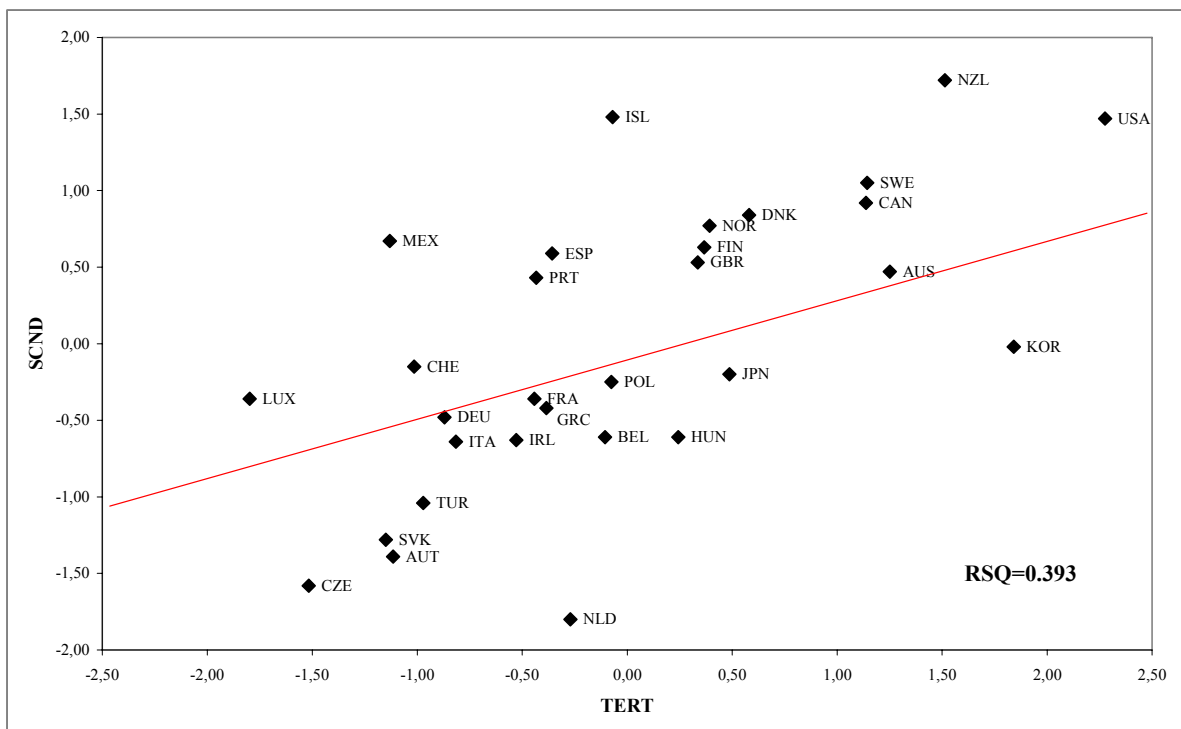


Figure 2: College expectations by measured ability (quintiles) and parental SES quintiles

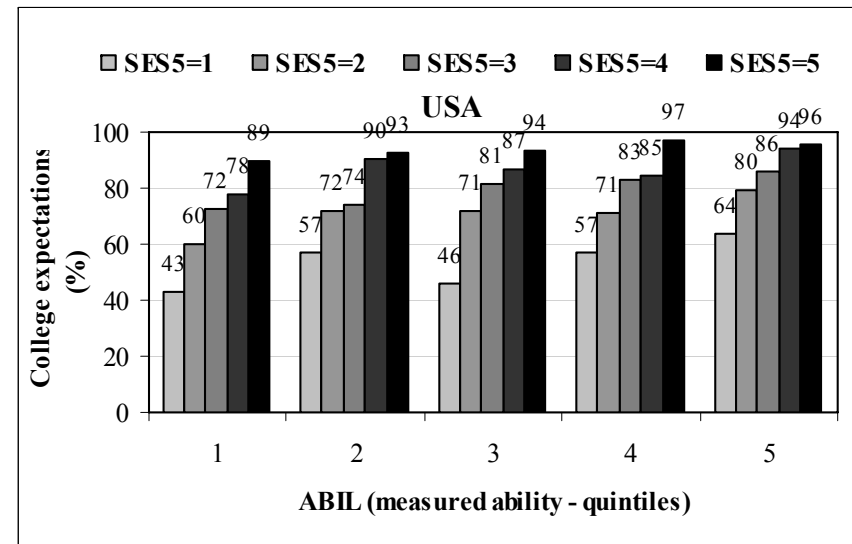
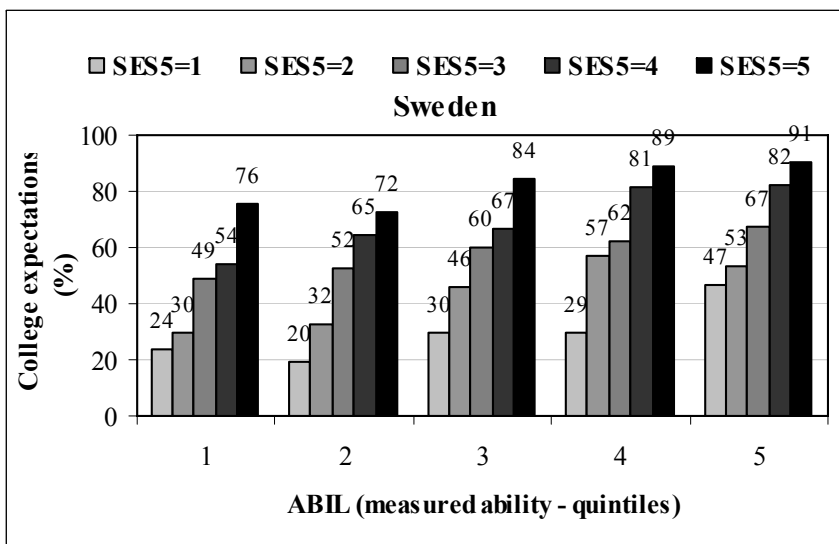
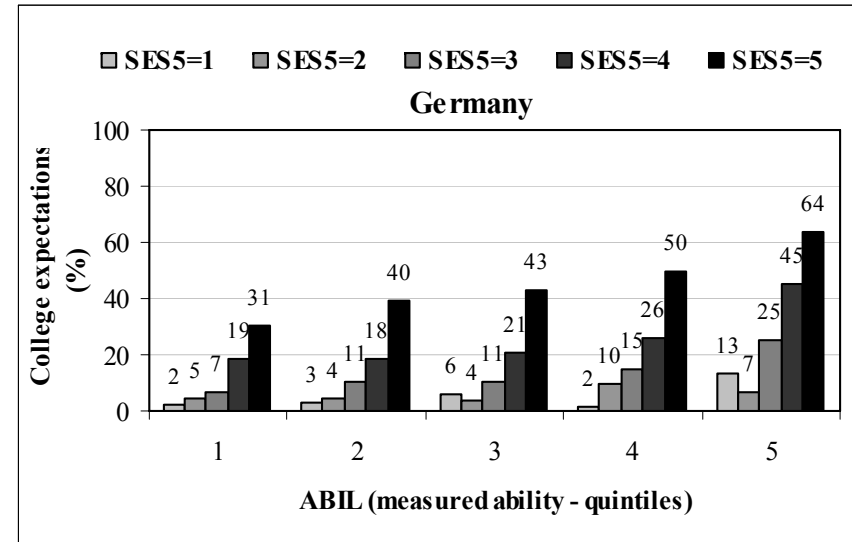
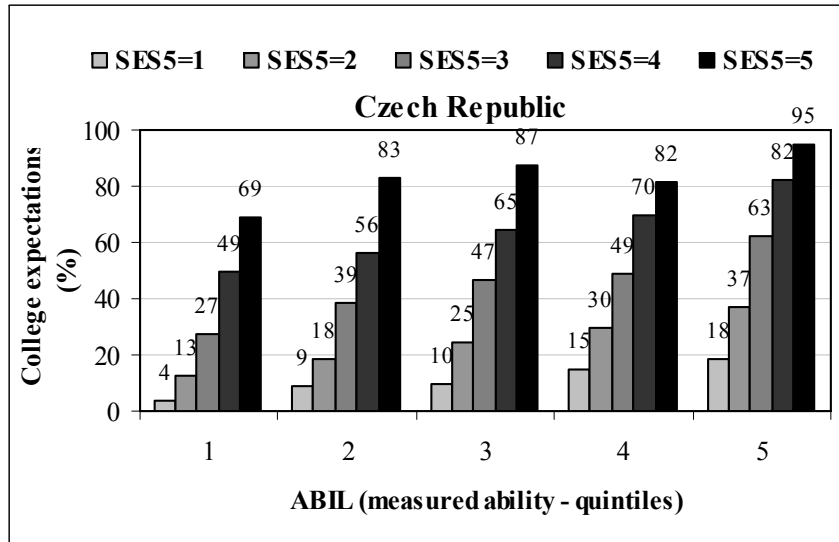


Figure 3: Logistic regression coefficients (B) of aspiration on ability (ABIL) and socioeconomic status of parents (HISEI), controlling for gender. Variables ABIL and HISEI have been standardized.

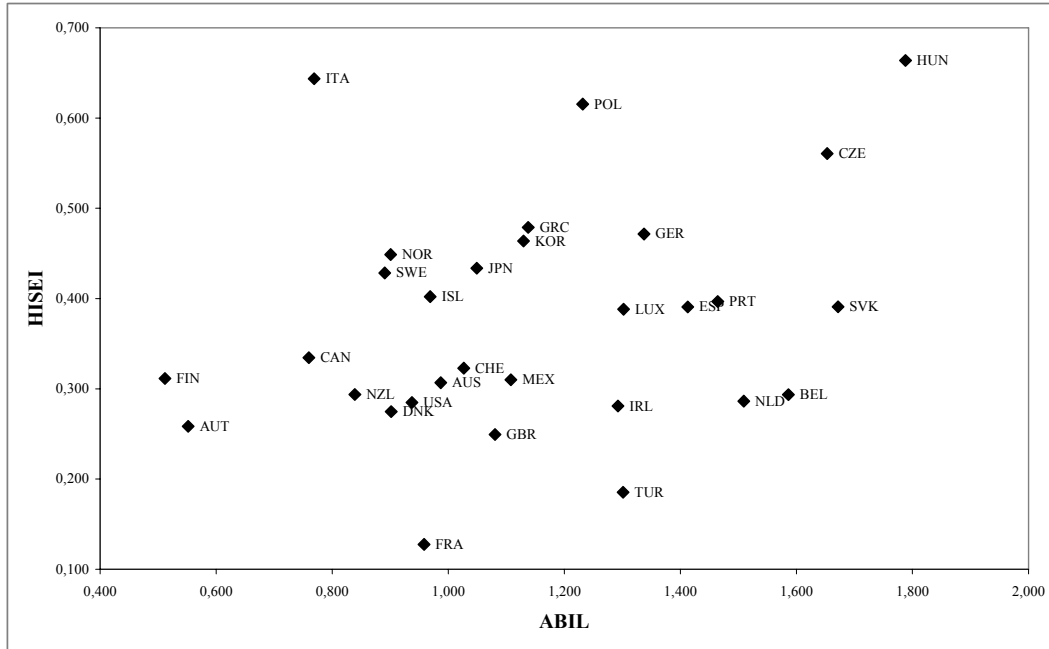


Figure 4: Standardized values (Z-scores) of the model coefficient of determination (Nagelkerke R^2) from the logistic regression of college expectations on ability, gender and parental socioeconomic status.

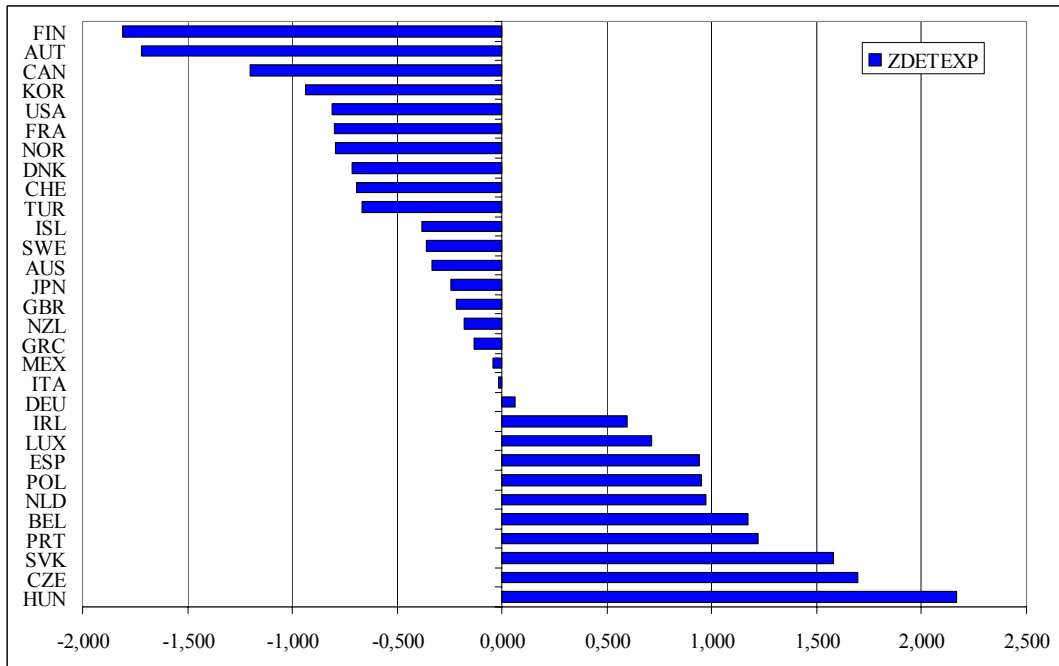


Figure 5: The relationship between the determination of college expectations (ZDETEXP) and the composite variable indicating openness and permeability of educational system (OPENNESS).

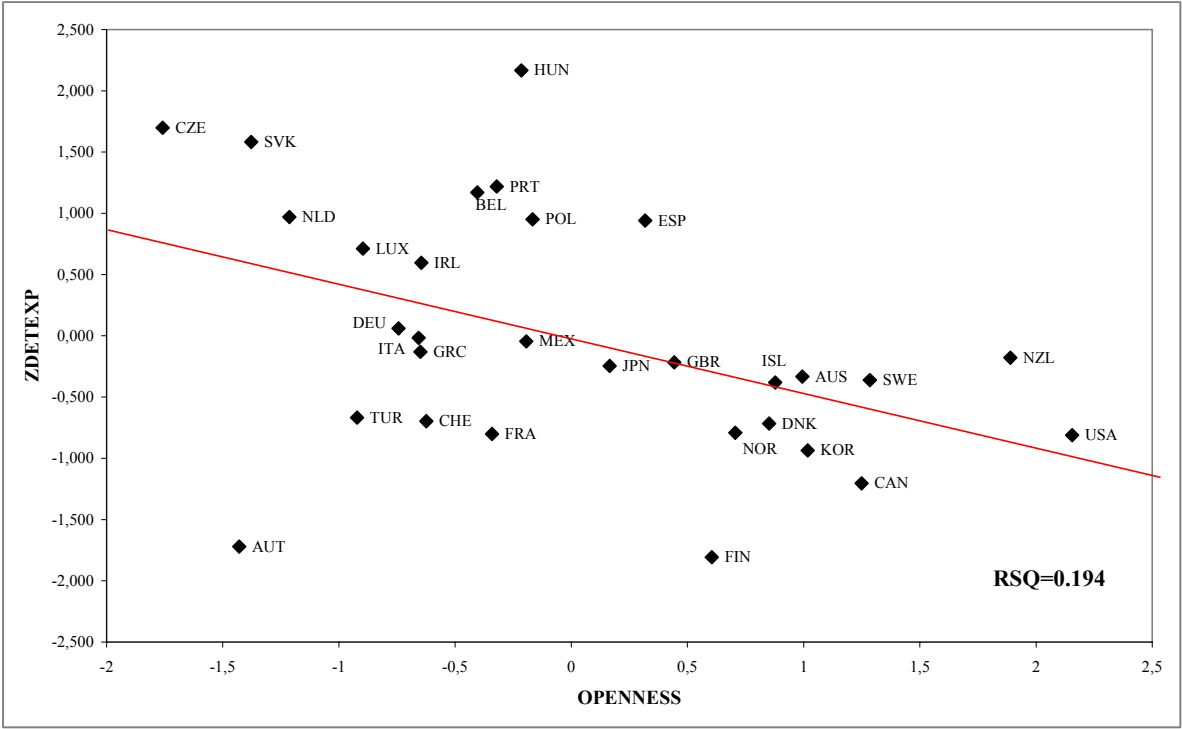


Table 2: Regression analysis of the overall determination of college aspirations (ZDETEXP),* the effect of ability on college expectations (RCABIL), and the effect of socio-economic background at the country level

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	R ²
		B	Std. Error	Beta			
Dependent variable= ZDETEXP							
1	(Constant)	.009	.169		.055	.957	.172
	SCND	-.452	.188	-.415	-2.411	.023	
2	(Constant)	-.024	.172		-.141	.889	.145
	TERT	-.375	.172	-.380	-2.176	.038	
3	(Constant)	-.006	.171		-.036	.971	.196
	SCND	-.316	.242	-.290	-1.310	.201	
	TERT	-.196	.219	-.198	-.896	.378	
Dependent variable= RCABIL							
1	(Constant)	1.097	.058		18.997	.000	.309
	SCND	-.226	.064	-.556	-3.537	.001	
2	(Constant)	1.085	.066		16.404	.000	.096
	TERT	-.114	.066	-.311	-1.729	.095	
3	(Constant)	1.099	.059		18.622	.000	.311
	SCND	-.242	.084	-.595	-2.901	.007	
	TERT	.023	.076	.062	.304	.764	
Dependent variable= RCHISEI							
1	(Constant)	.338	.026		12.774	.000	.100
	SCND	-.052	.029	-.316	-1.760	.089	
2	(Constant)	.336	.028		12.093	.000	.011
	TERT	-.016	.028	-.106	-.566	.576	
3	(Constant)	.339	.027		12.642	.000	.113
	SCND	-.067	.038	-.410	-1.763	.089	
	TERT	.022	.034	.151	.648	.522	

* The dependent variable ZDETEXP has been defined as the z-score of the coefficient of determination of college expectations (Nagelkerke's R²) from the model with three independent variables: ability, gender and parental socioeconomic status.

Table 3: Regression analysis of the overall determination of college expectations (ZDETEXP)* at the country level

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	R ²
		B	Std. Error	Beta			
1	(Constant)	.009	.169		.055	.957	.172
	SCND	-.452	.188	-.415	-2.411	.023	
2	(Constant)	-1.025	.301		-3.400	.002	.354
	ICC	4.534	1.159	.595	3.914	.001	
3	(Constant)	.646	.909		.711	.484	.023
	ENROL	-.011	.014	-.152	-.755	.458	
4	(Constant)	.085	.283		.299	.767	.010
	PRVRSC	-.005	.010	-.099	-.519	.608	
5	(Constant)	.290	.343		.847	.405	.042
	FINAID	-.018	.017	-.206	-1.094	.284	
6	(Constant)	-.560	1.078		-.520	.609	.188
	SCND	-.526	.268	-.500	-1.964	.063	
	ENROL	.007	.017	.106	.436	.668	
	PRVRSC	.001	.010	.013	.065	.949	
	FINAID	.003	.020	.037	.161	.873	
7	(Constant)	-1.372	.968		-1.417	.172	.428
	SCND	.129	.323	.122	.399	.694	
	ICC	5.568	1.922	.737	2.897	.009	
	ENROL	.007	.014	.095	.456	.653	
	PRVRSC	-.005	.009	-.094	-.523	.606	
	FINAID	-.010	.018	-.118	-.578	.569	

* The dependent variable ZDETEXP has been defined as the z-score of the coefficient of determination of college expectations (Nagelkerke's R²) from the model with three independent variables: ability, gender and parental socioeconomic status.

Table 4: Regression analysis of the effect of ability on college expectations (RCABIL) * at the country level

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	R ²
		B	Std. Error	Beta			
1	(Constant)	1.097	.058		18.997	.000	.309
	SCND	-.226	.064	-.556	-3.537	.001	
2	(Constant)	.700	.111		6.299	.000	.371
	ICC	1.735	.427	.609	4.061	.000	
3	(Constant)	1.573	.338		4.649	.000	.085
	ENROL	-.008	.005	-.291	-1.490	.149	
4	(Constant)	1.071	.107		10.033	.000	.001
	PRVRSC	.001	.004	.035	.182	.857	
5	(Constant)	1.245	.126		9.870	.000	.078
	FINAID	-.009	.006	-.280	-1.515	.141	
6	(Constant)	1.009	.368		2.743	.012	.359
	SCND	-.246	.092	-.608	-2.689	.014	
	ENROL	-.001	.006	-.027	-.126	.901	
	PRVRSC	.004	.003	.202	1.113	.278	
	FINAID	.002	.007	.051	.251	.804	
7	(Constant)	.824	.367		2.245	.036	.444
	SCND	-.097	.122	-.239	-.791	.438	
	ICC	1.268	.729	.436	1.740	.097	
	ENROL	-.001	.005	-.034	-.163	.872	
	PRVRSC	.003	.003	.138	.782	.443	
	FINAID	-.001	.007	-.041	-.202	.842	

* The dependent variable RCABIL has been defined as the standardized regression coefficient for ability (ABIL) in the model with three independent variables: ability, gender and parental socioeconomic status.

Table 5: Regression analysis of the effect of family socio-economic status on college expectations (RCHISEI) * at the country level

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	R ²
		B	Std. Error	Beta			
1	(Constant)	.338	.026		12.774	.000	.172
	SCND	-.052	.029	-.316	-1.760	.089	
2	(Constant)	.208	.049		4.269	.000	.354
	ICC	.568	.187	.497	3.031	.005	
3	(Constant)	.355	.145		2.448	.022	.023
	ENROL	.000	.002	-.035	-.172	.865	
4	(Constant)	.301	.042		7.145	.000	.010
	PRVRSC	.002	.001	.208	1.104	.279	
5	(Constant)	.401	.051		7.905	.000	.042
	FINAID	-.004	.002	-.286	-1.550	.133	
6	(Constant)	.220	.167		1.317	.202	.188
	SCND	-.059	.041	-.357	-1.430	.168	
	ENROL	.002	.003	.144	.606	.551	
	PRVRSC	.002	.002	.287	1.436	.166	
	FINAID	-.002	.003	-.156	-.698	.493	
7	(Constant)	.126	.163		.771	.450	.428
	SCND	.017	.054	.100	.305	.764	
	ICC	.644	.324	.540	1.991	.060	
	ENROL	.001	.002	.136	.612	.547	
	PRVRSC	.002	.001	.208	1.091	.288	
	FINAID	-.004	.003	-.270	-1.242	.229	

* The dependent variable RCHISEI has been defined as the standardized regression coefficient for family socio-economic status (HISEI) in the model with three independent variables: ability, gender and parental socioeconomic status.

References:

- Alexander, Karl L. and Bruce K. Eckland. 1975. "Contextual Effects in the High School Attainment Process." *American Sociological Review* 40:402-16.
- Blau, Peter M. and Otis D. Duncan. 1967. *The American Occupational Structure*. New York: Wiley.
- Buchmann, Claudia and Ben Dalton. 2002. "Interpersonal Influences and Educational Expectations in 12 Countries: The Importance of Institutional Context." *Sociology of Education* 75:99-122.
- Buchmann, Claudia and Hyunjoon Park. 2005. "The Institutional Embeddedness of Educational and Occupational Expectations: A Comparative Study of 12 Countries." Paper presented at RC28 in Los Angeles, 2005.
- Duncan, Otis D. 1968. "Ability and Achievement." *Eugenics Quarterly* 15:1-11.
- Ganzeboom, Harry B.G., Paul M. de Graaf, and Donald J. Treiman, with Jan de Leeuw. 1992. "A Standard International Socioeconomic Index of Occupational Status." *Social Science Research* 21:1-56.
- Han, Wan S. 1968. "Discrepancy in Socio-Economic Level of Aspirations and Perception of Illegitimate Expediency." *American Journal of Sociology* 74:240-7.
- 1969. "Two Conflicting Themes: Common Values versus Class Differential Values." *American Sociological Review* 34:679-90.
- Hauser, Robert M. 1972. "Disaggregating a Social-Psychological Model of Educational Attainment." *Social Science Research* 11:59-188.
- Hauser, Robert M., Shu-Ling Tsai, and William H. Sewell. 1983. "A Model of Stratification with Response Error in Social and Psychological Variables." *Sociology of Education* 56:20-46.
- Herriott, Robert E. 1963. "Some Determinants of Educational Aspirations." *Harvard Educational Review* 33:157-177.
- Hox, Joop. 2002. *Multilevel Analysis: Techniques and Applications*. Erlbaum associates.
- Hyman, Herbert H. 1953. "The Value Systems of Different Classes: A Social Psychological Contribution to the Analysis of Stratification." Pp. 426-442 in *Class, Status and Power: A Reader in Social Stratification*, edited by R. Bendix and S. M. Lipset. Glencoe: Free Press.
- Jencks, Christopher. 1972. *Inequality: A Reassessment of the Effect of Family and Schooling in America*. New York: Basic Books.
- Johnstone, D. Bruce. 2006. *Financing Higher Education: Cost-sharing in International Perspective*. Boston: Boston College Center for International Higher Education; and Rotterdam: Sense Publisher.
- Kahl, Joseph A. 1953. "Educational and Occupational Aspirations of 'Common Man' Boys." *Harvard Educational Review* 23:186-203.
- Karabel, Jerome and Alexander W. Astin. 1975. "Social Class, Academic Ability, and College 'Quality.'" *Social Forces* 53:381-98.
- Kerckhoff, Alan C. 1976. "The Status Attainment Process: Socialization or Allocation?" *Social Forces* 55:368-381.

- , 1977. "The Realism of Educational Ambitions in England and the United States." *American Sociological Review* 42:563-571.
- , 1995. "Institutional Arrangements and Stratification Processes in Industrial Societies." *Annual Review of Sociology* 15:323-47.
- , 2001. "Education and Social Stratification Processes in Comparative Perspective." *Sociology of Education* Extra Issue:3-18.
- Kerckhoff, Alan C. and Richard T. Campbell. 1977a. "Black-White Differences in the Educational Attainment Process." *Sociology of Education* 50:15-27.
- , 1977b. "Race and Social Status Differences in the Explanation of Educational Ambition." *Social Forces* 55:701-714.
- Müller, Walter and Yossi Shavit. 1998. "The Institutional Embeddedness of the Stratification Process: A Comparative Study of Qualifications and Occupations in Thirteen Countries." Pp. 1-48 in *From School to Work: A Comparative Study of Educational Qualifications and Occupational Destinations* edited by Shavit, Y. and Muller, W. Oxford: Oxford University Press.
- Nagelkerke, N. J. D. 1991. "A note on a general definition of the coefficient of determination." *Biometrika* 78:691-692.
- OECD. 2005a. *PISA 2003 Data Analysis Manual*. Paris, OECD (available at <https://www.oecd.org/dataoecd/35/32/35002862.pdf>)
- , 2005b. *PISA 2003 Technical Manual*. Paris, OECD.
- , 2005c. *School Factors Related to Quality and Equity. Results from PISA 2000*. Paris, OECD.
- , 2003. *Education at a Glance 2003*. Paris, OECD.
- , 2004. *Education at a Glance 2004*. Paris, OECD.
- , 2005b. *Education at a Glance 2005*. Paris, OECD.
- , 2006. *Education at a Glance 2006*. Paris, OECD.
- Raudenbush, Stephen W. and Anthony S. Bryk. 2002. *Hierarchical Linear Models 2nd edition*. London: Sage Publications.
- Reissman, Leonard. 1953. "Levels of Aspiration and Social Class." *American Sociological Review* 18:233-242.
- Sewell, William H. 1961. "Social Class and Childhood Personality." *Sociometry* 24:340-356.
- , 1963. "Some Recent Developments in Socialization Theory and Research." *The Annals of the American Academy of Political and Social Science* 349:163-181.
- Sewell, William H. and Robert M. Hauser. 1972. "Causes and Consequences of Higher Education: Models of the Status Attainment Process." *American Journal of Agricultural Economics* 54:851-861.
- , 1975. *Education, Occupation & Earnings*. New York: Academic Press.
- Sewell, William H. and Vimal P. Shah. 1967. "Socioeconomic Status, Intelligence, and the Attainment of Higher Education." *Sociology of Education* 40:1-23.

- , 1968a. "Social Class, Parental Encouragement, and Educational Aspirations." *American Journal of Sociology* 73:559-572.
- , 1968b. "Parents' Education and Children's Educational Aspirations and Achievements." *American Sociological Review* 33:191-209.
- Sewell, William H., Archie O. Haller, and Murray A. Straus. 1957 "Social Status and Educational and Occupational Aspirations." *American Sociological Review* 22:67-73.
- Sewell, William H., Archibald O. Haller, and Alejandro Portes. 1969. "The Educational and Early Occupational Attainment Process." *American Sociological Review* 34:82-92.
- Sewell, William H., Archibald O. Haller, and George W. Ohlendorf. 1970. "The Educational and Early Occupational Status Attainment Process: Replication and Revision." *American Sociological Review* 35:1014-1027.
- Simmons, Roberta G. and Morris Rosenberg. 1971. "Functions of Children's Perceptions of the Stratification System." *American Sociological Review* 36:235-49.
- Snijders, Tom A. B. and Roel J. Bosker. 1999. *Multilevel Analysis: An Introduction to Basic and Advanced Multilevel Modeling*. London: Sage Publisher.
- Turner, Ralph H. 1960. "Sponsored and Contest Mobility and the School System." *American Sociological Review* 25:855-867.
- Williams, Trevor H. 1972. "Educational Aspirations: Longitudinal Evidence in Their Development in Canadian Youth." *Sociology of Education* 45:107-133.
- Wilson, Kenneth L. and Alejandro Portes. 1975. "The Educational Attainment Process: Results from a National Sample." *American Journal of Sociology* 81:343-63.

Petr Matějů is Professor of sociology and Chair of the Department of Sociology of Education and Stratification at the Institute of Sociology of the Academy of Sciences of the Czech Republic. His major research interests are social stratification and mobility, inequality and equity in education. He has published a number of articles on social transformation in East Central Europe and co-edited three books: *Ten Years of Rebuilding Capitalism, Czech Society after 1989* (published in 1998 in English), *Inequality - Justice - Politics* (in Czech, published in 2000), and *Unequal Chances in Education* (in Czech, published in 2006).

Petr Soukup is a research fellow at the Department of Sociology of Education and Stratification at the Institute of Sociology of the Academy of Sciences of the Czech Republic. He is also a teaching assistant at the Faculty of Social Sciences at Charles University. He focuses in teaching and applications on statistical methodology (esp. on multivariate statistical methods including multilevel analysis).

Josef Basl is a doctoral student and research fellow at the Department of Sociology of Education and Stratification at the Institute of Sociology of the Academy of Sciences of the Czech Republic. His major research interests are inequality in education and educational policy.

Michael L. Smith is a research fellow at the Department of Sociology of Education and Stratification at the Institute of Sociology of the Academy of Sciences of the Czech Republic. He is also a doctoral candidate in political science at the New School for Social Research in New York. He has broad research interests in both political science (democratic governance, voter behavior) and sociology (social policy, social inequality).

Appendix

Table A1: Statistical indicators used in the analysis of educational systems

Acronym	Description	Source
GENSEC	Upper secondary education enrolment in general education programs (2003)	EaG, C2.1
NUMPRG	Number of school types or distinct educational programs available to 15-year-olds (2003)	EaG, D6.1
VOCAT	Proportion of 15-year-olds enrolled in programs that give access to vocational studies at the next program level or direct access to the labor market (2003)	EaG, D6.1
EXPSEC	Expenditure on educational institutions of primary, lower secondary and primary education as a percentage of GDP from public and private sources (2002)	EaG, B2.1
ENROL	Net entry rates into tertiary education (2003)	EaG, C2.2
PRVRSC	Relative proportion of private sources of funding on institutions of tertiary education (percentage of total expenditure, 2002)	EaG, B.3.2
FINAID	Financial aid to students: public subsidies for households and other private entities as a percentage of total public expenditure on tertiary education (percentage of total expenditure on tertiary education, 2002)	EaG, B.5.2
EXPTER	Expenditure on tertiary educational institutions as a percentage of GDP from public and private sources (2002)	EaG, B2.1

Table A2: Correlations between indicators used in the analysis of educational systems

	GENSEC	NUMPRG	VOCAT	EXPSEC	ENROL	PRVRSC	FINAID	EXPTER
GENSEC	1.000							
NUMPRG	-0.477	1.000						
VOCAT	-0.295	0.496	1.000					
EXPSEC	0.261	-0.612	-0.343	1.000				
ENROL	0.275	-0.672	-0.221	0.431	1.000			
PRVRSC	0.531	-0.162	0.191	-0.054	0.240	1.000		
FINAID	0.268	-0.699	-0.314	0.302	0.460	0.050	1.000	
EXPTER	0.464	-0.580	-0.242	0.466	0.399	0.445	0.345	1.000

SPSS Commands

SPSS commands use to run logistic regression of educational aspirations on ability, parental socioeconomic status and gender.

a) commands used to assess the coefficient of determination (Nagelkerke R^2):

```
LOGISTIC REGRESSION VAR=COLLEXP
/METHOD=ENTER abil hisei sex
/CONTRAST (sex)=Indicator
/CRITERIA PIN(.05) POUT(.10) ITERATE(20) CUT(.5) .
```

b) commands used to assess the net effects of parental socioeconomic status and ability for descriptive analyses (ABIL and HISEI transformed into quintiles):

```
split file by cnt2.  
LOGISTIC REGRESSION VAR=COLLEXP  
  /METHOD=ENTER abil5 isei5 sex  
  /CONTRAST (isei5)=Indicator  
  /CONTRAST (abil5)=Indicator  
  /CONTRAST (sex)=Indicator  
  /CRITERIA PIN(.05) POUT(.10) ITERATE(20) CUT(.5) .  
split file off.
```