

CROSS-NATIONAL ESTIMATES OF THE EFFECTS OF FAMILY BACKGROUND ON STUDENT ACHIEVEMENT: A SENSITIVITY ANALYSIS

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Abstract – This article uses the data from the Programme for International Student Assessment (PISA) 2000 to examine whether the influence of family background on educational achievement is sensitive to different measures of the family's socio-economic status (SES). The study finds that, when a multidimensional measure of SES is used, the family background has a stronger influence on achievement across countries than if the simpler measure of SES is used. The new measure, which incorporated aspects of parental occupation, education and cultural resources, was not biased towards more wealthy nations, Western nations, or urban population. However, when a proxy of wealth was included in the measure of SES, this reduced the other measured effects of family background on achievement in many countries.

Résumé – L'INFLUENCE DE L'ARRIÈRE-PLAN FAMILIAL SUR L'ACCOMPLISSEMENT DE L'ÉTUDIANT : DÉVELOPPER UN SYSTÈME DE MESURE PLUS SENSIBLE - cet article utilise les données du Programme International pour le Suivi des Acquis des Élèves (PISA) 2000 pour examiner si l'influence de l'arrière-plan familial sur l'accomplissement en matière éducative est sensible aux différentes mesures du statut socio-économique de la famille (SSE). L'étude constate que, lorsqu'on utilise une mesure multidimensionnelle de SSE, l'arrière-plan familial a une influence plus forte sur l'accomplissement à travers les pays que si la mesure plus simple du SSE est employée. La nouvelle mesure, qui incorporait des aspects du métier parental, de l'éducation et des ressources culturelles, n'était pas prédisposée en faveur des nations plus riches, des nations occidentales, ou de la population urbaine. Cependant, quand une mesure de richesse était incluse dans les données, ceci réduisait dans beaucoup de pays les autres effets mesurés de l'arrière-plan familial sur l'accomplissement.

Resumen – LA INFLUENCIA DEL TRANSFONDO FAMILIAR SOBRE EL RENDIMIENTO DE LOS ESTUDIANTES: DESARROLLO DE UN SISTEMA DE EVALUACIÓN MÁS SENSIBLE - Este artículo utiliza los datos del programa internacional de evaluación de estudiantes (pisa) del año 2000 para comprobar si los valores de influencia del trasfondo familiar cambian con las diferentes formas de medir el status socioeconómico (SES). según este estudio, cuando se utiliza una medición multidimensional del ses, el trasfondo familiar muestra una mayor influencia sobre el rendimiento, a lo largo de los diferentes países, que cuando se aplica una medición del ses más simple. el nuevo sistema de medida, que ha incorporado aspectos como ocupación, educación y nivel cultural de los padres, no beneficia a las naciones con mayor bienestar, ni a las naciones occidentales ni a la población urbana. sin embargo, la inclusión en los datos de una comprobación del bienestar redujo en muchos países los valores relacionados con los efectos del trasfondo familiar sobre el rendimiento de los estudiantes.

Zusammenfassung – DER EINFLUSS DES FAMILIENHINTERGRUNDS AUF SCHÜLERLEISTUNGEN: ZUR ENTWICKLUNG EINES SENSIBLEREN NOTENSYSTEMS – Der Artikel stützt sich auf Daten aus dem internationalen Schülervergleichsprogramm (PISA) 2000 unter der Fragestellung, ob sich der Einfluss des Familienhintergrunds auf die Schülerleistungen je nach Messmethode des sozio-ökonomischen Status der Familie (SES) unterschiedlich darstellt. Die Studie kommt zu dem Ergebnis, dass bei Verwendung von multidimensionalen SES-Messungen der Familienhintergrund im Ländervergleich einen stärkeren Einfluss ausübt als bei einfacheren SES-Messungen. Die neue Messmethode, die auch den Aspekt der Berufstätigkeit, Bildung und kulturellen Ressourcen der Eltern einbezug, war unvoreingenommen in Bezug auf reichere Nationen, westliche Nationen oder städtische Bevölkerungen. Wurde jedoch eine Wohlstandsmessung in die Daten einbezogen, so reduzierte dies in vielen Ländern die anderen gemessenen Effekte des Familienhintergrunds auf die Schülerleistungen.

Резюме – ВЛИЯНИЕ СТАТУСА СЕМЬИ НА УСПЕВАЕМОСТЬ СТУДЕНТОВ: СОЗДАНИЕ БОЛЕЕ ТОЧНОЙ СИСТЕМЫ ИЗМЕРЕНИЯ – В данной статье используются данные Международной программы оценки студентов (PISA) 2000 с целью исследовать вопрос: оказывает ли статус семьи влияние на академическую успеваемость, и обуславливается ли это различными измерениями социально-экономического статуса семьи (SES). В данном исследовании обнаруживается, что, когда используется многоуровневая система определения SES, статус семьи оказывает большее влияние на успеваемость в разных странах в отличие от использования упрощенного способа измерения SES. Новый способ измерения, который включал такие аспекты, как профессии родителей, образование и культурный уровень, не был предвзято ориентирован на более состоятельные нации, западные страны или городское население. Тем не менее, когда в данные исследования был включен показатель измерения состоятельности, это снизило другие показатели определения статуса семьи и его влияния на успеваемость во многих странах.

Measurement of SES

There has been a long debate regarding the relative effects of family background and school resources on educational achievement, and whether these effects are a function of national economic development (Heyneman and Loxley 1983; Baker et al. 2002). The findings have been contradictory, but an important question that has received less attention in this debate is whether the effects of family background on achievement have been adequately measured in cross-national studies. Despite the theoretical advance in how families influence their children's educational outcome through multiple forms of family resources, the theories have not been applied widely across countries of different national income level. Thus, we cannot ascertain whether these theories are generalizable in both economically developed and less-developed countries.

In this article, I examine whether the effect of family background on student achievement is sensitive to different measures of family background. To address this question, the effect of multidimensional socio-economic status (SES) measure is compared to that of a standard SES measure across countries. Based on theories of how parents transform various forms of capital into their children's human capital, one can hypothesize that a multidimensional measure of family background will have a stronger association with student achievement than a measure that is less complex. However, it remains to be tested whether this hypothesis holds across a wide range of countries, including economically developed and less-developed countries. A better understanding of the multidimensional SES is important, because the standard SES may have resulted in under-estimating the effects of family background on achievement and over-estimating the relative effects of school resources on achievement in past studies. In addition, the multidimensional SES will highlight the complex roles that families play in transmitting their status. This, in turn, will imply that schools need to consider that students of low-status families may lack the educational environment outside of schools, and that this may be a critical factor in the educational opportunity available for middle-class children, in overcoming the learning gap.

Prior research

Conceptualization and measurement of family background in status attainment literature

Status attainment literature laid the foundation for the conceptualization and measurement of socio-economic status and highlighted the importance it has on educational attainment (Blau and Duncan 1967; Sewell and Hauser 1975). For example, considerable effort was devoted to developing a more comprehensive measure of occupational status in this field. Otis Dudley Duncan, using the 1947 North-Hatt prestige study and the 1950 U.S. Census, regressed prestige scores for 45 occupational titles on education and income to produce weights that would predict prestige. This algorithm was then used to calculate SEI scores for all occupational categories, which provided the basis for the later development of comparative measures of occupational status.

Constructing a cross-national measure of socio-economic status became a major challenge as researchers began comparing socio-economic status across countries with differing educational systems and economics. In this context, Treiman's (1977) comparative study of occupational prestige was influential. Using 85 occupational prestige studies conducted in 60 societies from a wide range of regions and levels of economic development, he showed that prestige hierarchies were basically invariant through space and time, and developed a cross-national scale of occupational prestige. His

underlying theory was that all complex societies have fundamentally similar occupational status hierarchies because they are characterized by a highly developed division of labor, which similarly give rises to occupational roles that differ in power, privilege and prestige. Ganzeboom and Treiman (1996) extended this study, using data from 16 countries of different regions and wealth level, and developed a cross-national measure of socio-economic status, the International Socio-Economic Index of Occupational Status (ISEI), which measures the attributes of occupations that explain the relationship between a person's education and income.

In a similar vein, researchers have explored cross-national measures of educational attainment, as the organization of the educational systems and the kinds of credentials they award vary greatly across societies. Some researchers have cautioned against the use of a common measurement, such as years of schooling, because credentials in different societies require different numbers of years of schooling and provide access to different adult occupations (Braun and Muller 1997). Two sets of standard categories of educational attainment have been widely used. The International Standard Classification of Education (ISCED) categories were originally developed by UNESCO, and are often used in international reports on education. The CASMIN categories were developed as part of a project at the University of Mannheim known as "Comparative Analysis of Social Mobility in Industrial Nations", and are widely used in comparative social stratification research. Although both represent the educational level completed, the CASMIN scale goes a step further by differentiating general and academic credentials from vocational credentials. In short, ISCED is a general measure of educational attainment, whereas CASMIN was developed for the special purpose of comparing social stratification and mobility across countries (Buchmann 2002; Kerckhoff et al. 2002).

Kerckhoff et al. (2002), using the International Adult Literacy Survey (IALS), compared the validity of the above-mentioned two most widely used measures, CASMIN and ISCED. They concluded that CASMIN, which distinguishes general and academic credentials from vocational credentials, has stronger explanatory power with respect to the education-occupation association for Great Britain and the Netherlands, but that ISCED is superior for the United States. This study reminds us that even widely used comparable scales are not flawless, and that the measures may be more appropriate in some national contexts than in others.

In summary, status attainment literature has contributed greatly to constructing two cross-national measures of family background, namely parental occupation and parental education. However, in general, family background measures in educational achievement studies have been less systematic than those in educational attainment literature, especially in the field of comparative studies (Buchmann 2002). For example, Baker et al. (2002), who replicated the Heyneman and Loxley study with a large cross-national dataset, used only parents' education and number of books to construct

their composite SES index. They did not include any measures of parental occupation. Although this may have been the result of limitations in the data set they used, the Third International Mathematics and Science Study (TIMSS), the absence of a measure of parental occupation is unfortunate. Kohn (1989) has shown how the hierarchical division of labor is reflected in family lifestyles such as parents' interaction and communication with their children. He demonstrated how people in lower-status jobs tend to value extrinsic aspects of jobs and exhibit more conformity to social rules, and how these aspects of occupation affect parents' behaviors with respect to child rearing. Despite the long heated debate regarding the relative effects of family background and school resources on student achievement, researchers have not paid sufficient attention to measures of family background itself.

Theory of wealth

Two other theories have contributed greatly to the conceptualization of family background, but remain to be tested whether they are applicable across different societies. Many researchers have argued that a family's financial capital is better measured by wealth than by income measures (Conley 1999; Filmer and Pritchett 1998; Wong 1998). On the one hand, family possessions and structural characteristics of the home, most often characterized as measures of wealth in comparative research, reflect lifetime earnings and purchasing power as well as the economic environment in which the child developed. On the other hand, measures of income or consumption expenditures only reflect the family economic environment at a particular point in time. Furthermore, incomes may not be the best measure of economic inequality: in countries such as former socialist societies where deliberate equalization of the distribution of incomes and earnings took place, wealth may instead capture the most persistent and hidden inequalities (Wong 1998). It is especially relevant to include wealth when examining the relationship between family background and educational achievement because, in addition to the direct impact of wealth on family's economic well-being, wealth could affect parents' college expectations, the amount of educational resources and cultural capital available to the child in the home, and the child's level of self-esteem. All of these, in turn, have a direct impact on children's achievement (Orr 2003). Studies in the United States have shown how re-conceptualizing socio-economic status by taking into account the levels of accumulated wealth better explains racial inequality in educational attainment (Conley 1999) and educational achievement (Orr 2003).

Filmer and Pritchett's (1999) study was influential in testing the effects of family wealth on educational outcome across a large number of countries. Using the Demographic Health Surveys (DHS), they developed an Asset Index that is comparable across 35 developing countries, which included measures of family possessions and home characteristics. They employed principal components to derive an index that captures the most common

variation from questions on ownership of various assets (e.g., radio, television, refrigerator, motorcycle, etc), and questions on housing characteristics (e.g., availability of electricity, source of drinking water, the type of toilet facilities, etc). By finding larger gaps in enrollment between rich and poor, and considerably less measurement error, they showed that the Asset Index is better than consumption expenditures in predicting school enrollment (Filmer and Pritchett 1998, 1999). However, they applied their analysis only to developing countries, leaving us with the question of whether the index would be similarly effective in explaining the education gaps in more economically developed countries. In addition, as they point out, the levels of the asset index are not directly comparable across countries, that is, the “poor” in Brazil cannot be compared to the “poor” in India, because they calculated the asset index separately for each country and thus, the measure is relative.

Theory of cultural capital

Another theory that has contributed greatly to the conceptualization of how family background affects student achievement is the theory of cultural capital. The principal tenet of cultural capital theory is that family lifestyles and cultural resources establish the intellectual climate for children’s educational aspirations, motivation to achieve and performance in schools. Differences in cultural capital, thus, illustrate the differences in the quality of home environment between different status groups. The concept of “capital” is useful in illuminating the differential resources that families possess, because capital is convertible from one type to another, and economic capital is at the root of all types of capital (Bourdieu 1986).

Cultural capital is typically operationalized as exclusionary class-related practices and defined as resources used by a socially dominant group to exclude the less privileged. Examples include families attending concerts and visiting museums as well as the presence of cultural possessions, such as classical literature and works of art in the home. According to Bourdieu (1977), schools reflect the cultural orientations of the existing elite and reward their particular cultural signals and practices. This, in turn, creates a disadvantage in schools for the children of the less privileged.

Bourdieu’s concept has been criticized for its focus on high-brow cultural activities. DeGraaf (1986), in his studies in the Netherlands, concludes that although the associations between parental education and occupation and participation in classic cultural activities are high, the associations between a family’s participation in classic cultural activities and educational attainment are spurious. He emphasizes the importance of investigating other types of cultural resources. Recent researchers have included other cultural resources that are more directly related to education, such as reading patterns and the number of books at home, as measures of cultural capital (Kingston 2001). In this respect, Lareau’s ethnographic studies have been influential in defining

cultural capital in the American context and in the educational context, by showing how parents of different social classes vary in their use of time for children's leisure activities, language use in the home, and interventions in schooling (Lareau 2000, 2003).

However, it still remains to be tested whether a family's cultural capital matters for children's educational success across countries of a wide range of national income level. Cultural reproduction theory postulates that as the demand for equality of opportunity increases and the transmission of tangible capital is prohibited, cultural capital becomes more important because of its disguised form (Bourdieu 1986). Therefore, one can hypothesize that as education becomes more accessible across countries, the manner in which and the extent to which families invest their cultural resources in children's education will have stronger effects. Furthermore, Bourdieu claims that "any given cultural competence (e.g., being able to read in a world of illiterates) derives a scarcity value from its position in the distribution of cultural capital and yields profits of distinction for its owner" (1986: 245). Hence, one may argue that, especially with the influence of globalization, elite students in economically less-developed countries may receive an extra advantage, because they have access to cultural resources that are scarce in their country.

Despite the theoretical advance in the conceptualization of family background in studying the inter-generational transmission of inequality, as shown by the theories of wealth and cultural capital, the status attainment literature rarely provides a comprehensive measurement of family background. Instead, it tends to use parental education and occupation as standard measures (Buchmann 2002; Wong 1998). Empirical studies that have used more comprehensive measures of family background are usually single-country case studies or cross-national studies for a handful of countries at relatively similar levels of economic development, such as "OECD countries" or "developing countries." Thus, further empirical studies with a wide range of countries at different levels of economic development are needed to test the ability of these more comprehensive measures to explain educational achievement.

Data

The data used for this article are from Programme for International Student Assessment (PISA) 2000, a cross-national study sponsored by the Organization for Economic Cooperation and Development (OECD), in which 43 countries participated. The purpose of the PISA study was to collect information about 15-year-old students in participating countries. The study assessed student performance at the end of compulsory education in three domains: reading, mathematics and scientific literacy. Each student took a two-hour pencil and paper test. Based on the concept of "life-long learning," the tests looked at students' ability to use their knowledge and skills in

real-life situations rather than how well they had mastered a specific school curriculum. Students also completed questionnaires that included information on their family, home environment, reading habits, school and everyday activities. In addition, principals or head administrators completed school questionnaires, which contained information on the demographics of the school, school staffing, the school environment, human and material educational resources in the school, selection of transfer policies, and educational and decision-making practices in the school. The tests together with the questionnaire provide a rich source of information about the students and their multiple educational settings (Organization for Economic Co-operation and Development 2002a).

In each country, a two-stage stratified sample was drawn. In the first stage, schools were sampled by Probability Proportional to Size. In the second stage, 35 students were selected from a list of 15-year-old students in each sampled school. Sampling weights were used to take into account any disproportional sampling of subgroups and to adjust for non-response (Organization for Economic Co-operation and Development 2002b). Three countries (Canada, Liechtenstein, and Netherlands) are excluded from the analyses in this article due to the sampling methods or the amount of missing data, resulting in approximately 196,000 students in 40 countries in my sample.

Measures

Student achievement

Given that the PISA 2000 assessment was conducted with an emphasis on reading, the main outcome variable of this article is reading literacy (Organization for Economic Co-operation and Development 2003). Furthermore, the primary interest of this article is the effect of family background on student achievement, and the literature shows a particularly strong link between family background and reading performance, based on the assumption that reading activities are more likely to take place at home from an early age (Fuller 1987).

Reading literacy in PISA is defined as “the ability to understand, use, and reflect on written texts in order to achieve one’s goals, to develop one’s knowledge and potential, and to participate effectively in society” (Organization for Economic Co-operation and Development 2003). Thus, reading literacy in PISA is a broader concept than the notion of reading literacy as decoding written material and literal comprehension. Reading literacy was measured in a single composite scale having an average score of 500 and a standard deviation of 100 across all of the students in the OECD countries participating in PISA.

Table 1. Descriptive statistics for SES items

	Mean	SD	Min	Max	Missing
Parental education	11.90	3.41	0.00	18.00	0.06
Parental occupation	47.04	16.94	16.00	90.00	0.07
Home educational resources	-0.33	1.18	-3.42	0.76	0.02
Home possession related to classical culture	0.00	0.99	-1.65	1.16	0.02
Books at home	4.19	1.60	1.00	7.00	0.05
Wealth	-0.47	1.19	-2.95	3.40	0.02

Items used in SES measures

Six items are considered in constructing various SES composite indices: parental education, parental occupation, three items related to cultural resources (home educational resources, home possession related to classical culture, the number of books at home), and family wealth. Descriptive statistics for each item (before standardizing) across countries are shown in Table 1.

Parental education is computed by converting the International Standard classification of Education (ISCED 1997) (1=no school, 2=ISCED level 1, 3=ISCED level 2, 4=ISCED level 3B or 3C, 5=ISCED level 3A) into appropriate years of schooling for each country. The higher of either the father's or mother's education is used. The rescaled variable, years of schooling, ranges from 0 to 18. The mean 11.90 indicates that on average, one of the parents has completed high school education. Parental occupation is measured with the ISEI index, which captures the attributes of occupations that explain the relationship between parents' education and income. The index was derived by the optimal scaling of occupation groups to maximize the indirect effect of education on income through occupation and to minimize the direct effect of education on income, net of occupation (Organization for Economic Co-operation and Development 2002b). The higher of either the father's or mother's occupation is used. The index values range from 16 to 90; low values represent low socio-economic status, and the mean 47.04 suggests that there are fewer parents at the higher end of the distribution. The PISA index of home educational resources was derived from students' reports on: (1) the availability in their home, of a dictionary, a quiet place to study, a desk for study, and textbooks, and (2) the number of calculators at home. The three PISA indices (home educational resources, cultural possessions and wealth) were constructed by OECD. Confirmatory Factor Analysis was used to validate the indices, and the Rasch item response theory approach was used to produce scale scores. The scale scores are a weighted maximum likelihood (Warm) estimate (Organization for Economic Co-operation and Development 2002b). The negative values for the mean only signify that the average is lower than the OECD average, as the PISA

index was standardized across the OECD countries. The PISA index of home possession related to classical culture was derived from students' reports on the availability in their home, of classical literature, books of poetry and works of art. Number of books was measured in an ordinal scale and ranges from 1 to 7 (1=0, 2=1-10, 3=11-50, 4=51-100, 5=101-250, 6=251-500, and 7=more than 500 books), and the item is treated as a continuous variable. The mean 4.19 indicates that on average, students have somewhere between 51 and 100 books at home. Finally, the PISA index of family wealth was derived from students' reports on: (1) the availability in their home of a dishwasher, a room of their own, educational software, and a link to the Internet; and (2) the number of cellular phones, television sets, computers, motor cars and bathrooms at home. As the scale was standardized to have a standard deviation of 1 across OECD countries, the minimum of -2.95 and the maximum of 3.40 indicate that there is a wide range.

Multidimensional SES

I use confirmatory factor analysis to validate the multidimensional socio-economic status measure and principal component analysis to produce weights for the data pooled across countries. Principal component analysis is a technique for summarizing the information contained in a number of variables into a smaller number of variables by creating a set of mutually uncorrelated components from the data. The first principal component is the linear combination of the underlying variables that captures the most common variation among them. Principal component analysis was also performed for each country to determine to what extent the components of the index operate in similar ways across countries. Table 2 shows the factor loadings for each item, indicating the extent to which each item contributes to the underlying component, the size of the first eigenvalue, and the proportion of variance explained by the first principal component, showing how well the component fits the underlying variables, both for the data pooled across countries and for each country. The table reveals that the patterns of factor loadings are similar across countries, justifying the use of common weights across countries in the composite index.

The following items are used to construct the multidimensional SES: (1) parental occupation; (2) parental education; (3) PISA index of home educational resources; (4) PISA index of home possessions related to classical culture; and (5) the number of books at home. All items are standardized to have a mean of zero and a standard deviation of one across students in OECD countries participating in PISA 2000, before combining. It should be noted that there is a large percentage of missing data for information on parental education and occupation in some countries. Therefore, the index is constructed with some limitations. If parental education, or parental occupation, or both are missing, a principal component analysis is conducted with the remaining items to produce a new set of weights and eigenvalues, and

Table 2. Principal component analysis of SES composite index

	Factor loadings					Percentage of variance explained by first principal component	
	Parental education	Parental occupation	Home educational resources	Cultural possessions	Number of books		First eigen value
All countries	0.71	0.69	0.52	0.69	0.76	2.31	46.13
Albania	0.75	0.72	0.64	0.63	0.74	2.42	48.48
Argentina	0.79	0.77	0.68	0.62	0.76	2.63	52.61
Australia	0.65	0.65	0.51	0.71	0.71	2.12	42.31
Austria	0.75	0.73	0.35	0.70	0.76	2.29	45.89
Belgium	0.72	0.63	0.47	0.69	0.74	2.18	43.59
Brazil	0.73	0.75	0.71	0.65	0.72	2.54	50.88
Bulgaria	0.66	0.68	0.63	0.62	0.72	2.20	43.92
Chile	0.76	0.73	0.69	0.70	0.77	2.66	53.27
Czech Republic	0.74	0.73	0.58	0.63	0.70	2.32	46.31
Denmark	0.69	0.67	0.61	0.73	0.74	2.38	47.52
Finland	0.70	0.64	0.51	0.70	0.73	2.19	43.78
France	0.70	0.68	0.45	0.71	0.74	2.20	43.90
Germany	0.74	0.71	0.44	0.70	0.78	2.33	46.55
Greece	0.75	0.74	0.46	0.67	0.70	2.24	44.85
Hong Kong	0.68	0.72	0.55	0.68	0.67	2.20	43.97
Hungary	0.74	0.78	0.54	0.65	0.78	2.47	49.48
Iceland	0.64	0.72	0.52	0.69	0.66	2.10	41.97
Indonesia	0.71	0.76	0.72	0.53	0.50	2.13	42.69
Ireland	0.66	0.64	0.56	0.65	0.74	2.14	42.85
Israel	0.72	0.71	0.50	0.63	0.70	2.15	43.06
Italy	0.77	0.76	0.37	0.66	0.72	2.27	45.45
Japan	0.48	0.50	0.40	0.73	0.71	1.69	33.83
Korea	0.68	0.67	0.55	0.67	0.72	2.18	43.68
Latvia	0.59	0.60	0.61	0.69	0.68	2.01	40.13

Table 2. Continued

	Factor loadings						Percentage of variance explained by first principal component
	Parental education	Parental occupation	Home educational resources	Cultural possessions	Number of books	First eigen value	
Luxemburg	0.74	0.72	0.42	0.72	0.77	2.36	47.24
Macedonia	0.75	0.71	0.67	0.59	0.68	2.32	46.45
Mexico	0.77	0.79	0.71	0.74	0.75	2.83	56.63
New Zealand	0.63	0.64	0.60	0.68	0.71	2.13	42.69
Norway	0.66	0.61	0.61	0.77	0.74	2.31	46.24
Peru	0.70	0.71	0.69	0.59	0.71	2.31	46.26
Poland	0.71	0.71	0.62	0.68	0.74	2.41	48.13
Portugal	0.79	0.78	0.49	0.72	0.79	2.62	52.33
Romania	0.78	0.75	0.75	0.67	0.80	2.84	56.70
Russian Federation	0.68	0.63	0.64	0.61	0.71	2.15	43.04
Spain	0.74	0.77	0.42	0.70	0.77	2.39	47.83
Sweden	0.69	0.60	0.50	0.75	0.74	2.20	44.07
Switzerland	0.74	0.73	0.43	0.69	0.77	2.34	46.87
Thailand	0.74	0.77	0.76	0.42	0.67	2.33	46.68
United Kingdom	0.67	0.65	0.55	0.72	0.77	2.28	45.68
United States	0.65	0.65	0.66	0.70	0.75	2.32	46.31

thus, the SES index is constructed with the remaining items. As a result, for over 60% of the cases in Japan, the SES index is constructed without the measure of parental education and occupation, and, therefore, findings for Japan in the PISA 2000 data should be interpreted with caution. The composite measure is then standardized to have a mean of zero and a standard deviation of one across students in OECD countries participating in PISA 2000. The overall Cronbach Alpha is .72, and the within-country Cronbach Alpha ranges from .61 to .80, which confirms that the inter-correlations among the variables are high across countries.

Standard SES

The composite measure is constructed by standardizing and then taking the mean of parental education and occupation. The resulting variable is then standardized to have a mean of zero and a standard deviation of one across students in OECD countries participating in PISA 2000. This standard SES will be compared to the multidimensional SES mentioned above.

SES measure used by Baker et al.

In order to compare results with the results of Baker, Goesling and Letendre using the TIMSS 2002 data, I have also constructed an index comparable to theirs, using PISA 2000 data. The composite measure is constructed by standardizing and taking the mean of parental education and the number of books at home. The resulting variable is then standardized to have a mean of zero and a standard deviation of one across students in OECD countries participating in PISA 2000.

Methodology

Ordinary Least Squares model: standardized regression coefficients of SES measures

In this article, an Ordinary Least Squares (OLS) model is used to estimate the association between family background and educational achievement. The focus is to examine whether the family background composite measure, which takes into account the multidimensional aspects of family background, shows a stronger effect on educational achievement than the SES measures used in previous studies. The metric of comparison will be the standardized regression coefficient, which will show the effect size and will be comparable within countries.

First, the combined effect of parental education, occupation and cultural resources at home, referred to as the “multidimensional SES” index, will be compared to the combined effect of parental education and occupation,

which will be called the “standard SES” index. I hypothesize that cultural resources will predict achievement over and above parental education and occupation, and therefore that the former coefficient will be larger than the latter in most countries.

Second, the effect of the multidimensional SES index will be compared to that of the SES measure used in Baker et al.’s (2002) study, a composite index of parental education and the number of books at home. These two comparisons with SES measures used in previous studies will show whether the magnitude of family effects on achievement is sensitive to different measures of family background. If the effects are sensitive, it suggests that the effects of family background have been under-estimated in past cross-national educational achievement studies.

Third, a proxy for wealth will be added to the standard SES measure, to see whether wealth contributes beyond parental education and occupation, and whether it is a good cross-national measure as theories have postulated.

Sensitivity test: rural versus urban sample

Some may argue that the theory of wealth and cultural capital may only apply in urban settings. If this were true, the new multidimensional SES index would be biased towards countries with larger populations in urban settings. In order to test this, I created a sub-file, composed of only the rural sample. First, the ratio of the effect size for multidimensional SES to that for standard SES in rural population will be examined, to check whether the former is larger than the latter even in rural settings. Second, this ratio in the effect sizes of the two measures will be compared to the ratio in the total sample. I hypothesize that the effect size for multidimensional SES will be larger than that for standard SES in rural settings as well, and that the ratio of the effect sizes for the two measures will not be consistently smaller in rural settings. The important thing to emphasize is that the comparison will not be about the magnitude of SES effects between the rural and total populations, as one may expect that the SES effects will be smaller in rural settings in many countries, but rather the ratio of the effect sizes of the two SES measures.

Findings

Ordinary Least Squares model: Standardized regression coefficients of SES measures

Table 3 compares the magnitude of the effects of the two measures of SES, to test whether the effect is sensitive to different measures. Column 1 shows the standardized coefficient for standard SES; column 2 shows the standardized coefficient for multidimensional SES; column 3 shows the ratio between column 2 and column 1; and column 4 shows the ratio between the

Table 3. Comparison between the effect sizes of standard SES and multidimensional SES

Country	(1) Standard SES		(2) Multidimen- sional SES		(3) Ratio (2)/(1)	(4) Ratio of R-Squares
	Beta	S.E.	Beta	S.E.	Beta	R-Square
Albania	0.34	(1.17)	0.43	(1.24)	1.27	1.61
Argentina	0.40	(1.32)	0.48	(1.36)	1.21	1.47
Australia	0.36	(1.51)	0.44	(1.38)	1.24	1.53
Austria	0.35	(1.45)	0.42	(1.36)	1.21	1.46
Belgium	0.38	(1.15)	0.46	(1.15)	1.23	1.51
Brazil	0.36	(1.01)	0.39	(1.05)	1.09	1.19
Bulgaria	0.41	(1.84)	0.51	(1.41)	1.23	1.52
Chile	0.44	(1.18)	0.47	(1.07)	1.07	1.15
Czech Republic	0.42	(1.60)	0.51	(1.33)	1.20	1.44
Denmark	0.37	(1.63)	0.42	(1.42)	1.13	1.27
Finland	0.26	(1.35)	0.33	(1.32)	1.30	1.68
France	0.36	(1.27)	0.49	(1.23)	1.34	1.78
Germany	0.43	(1.36)	0.53	(1.37)	1.22	1.49
Greece	0.34	(1.25)	0.42	(1.32)	1.24	1.55
Hong Kong	0.25	(1.30)	0.33	(1.32)	1.32	1.73
Hungary	0.48	(1.51)	0.58	(1.22)	1.22	1.48
Iceland	0.25	(1.49)	0.30	(1.70)	1.22	1.48
Indonesia	0.32	(0.73)	0.29	(0.91)	0.89	0.78
Ireland	0.31	(1.71)	0.40	(1.51)	1.29	1.65
Israel	0.33	(1.74)	0.38	(1.72)	1.14	1.30
Italy	0.30	(1.18)	0.36	(1.26)	1.20	1.45
Japan ¹	0.05	(2.49)	0.29	(1.33)	5.32	28.30
Korea	0.24	(1.01)	0.34	(1.01)	1.42	2.01
Latvia	0.24	(1.67)	0.36	(1.69)	1.49	2.23
Luxemburg	0.39	(1.37)	0.50	(1.35)	1.30	1.70
Macedonia	0.39	(1.27)	0.40	(1.28)	1.03	1.06
Mexico	0.43	(0.93)	0.48	(0.94)	1.11	1.23
New Zealand	0.31	(1.79)	0.42	(1.67)	1.37	1.87
Norway	0.29	(1.72)	0.39	(1.53)	1.36	1.86
Peru	0.44	(1.27)	0.44	(1.33)	1.00	1.00
Poland	0.32	(2.01)	0.41	(1.56)	1.27	1.61
Portugal	0.39	(1.25)	0.46	(1.22)	1.20	1.43
Romania	0.26	(1.44)	0.32	(1.29)	1.24	1.54
Russian Federation	0.28	(1.17)	0.37	(1.13)	1.32	1.75
Spain	0.36	(0.89)	0.44	(0.94)	1.22	1.50
Sweden	0.29	(1.60)	0.39	(1.41)	1.33	1.77
Switzerland	0.41	(1.27)	0.48	(1.21)	1.17	1.36
Thailand	0.26	(0.98)	0.31	(1.00)	1.19	1.41
United Kingdom	0.41	(1.09)	0.48	(0.96)	1.17	1.37
United States	0.36	(1.89)	0.48	(1.50)	1.32	1.73

¹The high ratio is due to the large number of missing data for parental education and occupation, resulting in inaccurate estimate for the standard SES.

R-squares of the two models. First, column 3 reveals that the effect size of multidimensional SES is larger than the effect size of standard SES across all countries except Indonesia and Peru. This means that the estimated family effect is consistently larger when taking into account cultural resources at home in addition to parental education and occupation. Second, a reduction in the estimated standard error is found in over half of the countries when using the multidimensional SES. Interestingly, the reduction in standard errors is especially high in Eastern European countries. For example, in Poland, Hungary and Bulgaria, the standard errors decrease by approximately 20%. One possible explanation is that a large percentage of population was guaranteed free education under the socialist regime, as evident in the low variance in (and skewed distribution of) parental education in these countries. Thus, families may have differentiated themselves from other families not by parental education or occupation, but rather by cultural resources, as evident in the relatively high standard deviation in the measure of the number of books at home. This may suggest that the effect of SES on educational achievement is estimated with less accuracy when only parental education and occupation are used, especially in the former socialist societies. Third, column 4 shows that the R-squares are consistently larger when using the multidimensional SES (again with the exception of Indonesia and Peru), suggesting that the multidimensional SES has a stronger explanatory power and that the model fit is better and is, in this sense, a better measure.

Another way to interpret this difference in effect size between the two measures is to examine the size visually. In Figure 1, two points in the SES scale are chosen, one standard deviation below the mean and one standard deviation above the mean. The reading score is predicted at these two points for each measure. The bars show the score point difference between a student with SES measure one standard deviation below the mean (low SES) and a student with SES measure one standard deviation above the mean (high SES). The lighter shaded bars reflect the results when the SES measure comprises only parental education and occupation and the darker shaded bars similarly reflect the results when the SES measure is constructed by cultural resources, such as the number of books, educational resources and cultural possessions at home, in addition to parental occupation and education. The figure confirms that, in all countries except Indonesia and Peru, the achievement gap between a student of low SES and a student of high SES is larger when the multidimensional SES is used.

Next, Table 4 compares the magnitude of the multidimensional SES effect to the magnitude of the SES effect used in Baker et al.'s study. Column 1 shows the standardized coefficient for Baker et al.'s SES, which comprises parental education and the number of books at home. Column 2 shows the standardized coefficients for multidimensional SES. Column 3 shows the ratio between the two, and reveals that the coefficients in column 2 are again larger than those in column 1 across all countries, except Denmark and Peru. The standard errors are also reduced in most countries. Column 4

Figure 1. Comparison between standard SES and multidimensional SES in explaining the reading gap

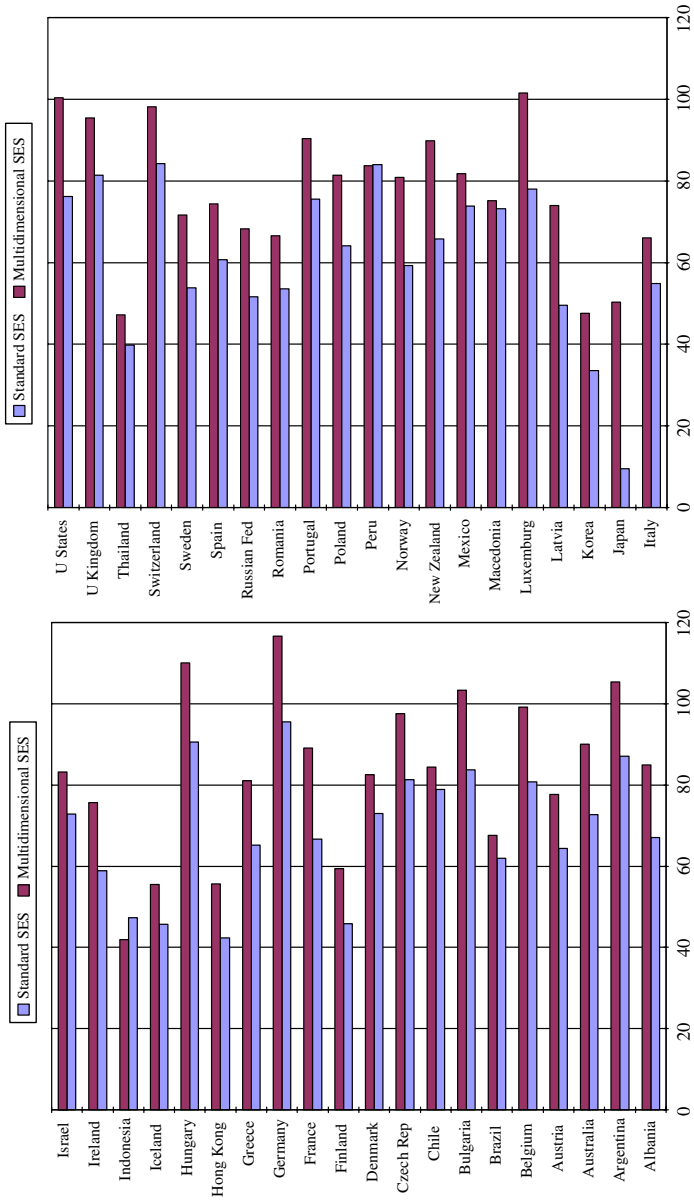


Table 4. Comparison between the effect sizes of Baker's SES and multidimensional SES

Country	(1) Baker's SES		(2) Multidimen- sional SES		(3) Ratio (2)/(1)	(4) Ratio of R-Squares
	Beta	S.E.	Beta	S.E.	Beta	R-Square
Albania	0.30	(1.36)	0.43	(1.29)	1.40	1.97
Argentina	0.42	(1.41)	0.48	(1.37)	1.14	1.31
Australia	0.35	(1.56)	0.44	(1.39)	1.25	1.56
Austria	0.41	(1.34)	0.42	(1.37)	1.02	1.03
Belgium	0.38	(1.16)	0.46	(1.18)	1.23	1.52
Brazil	0.35	(1.18)	0.39	(1.07)	1.14	1.29
Bulgaria	0.45	(1.64)	0.51	(1.46)	1.14	1.29
Chile	0.45	(1.24)	0.47	(1.08)	1.04	1.08
Czech Republic	0.48	(1.58)	0.51	(1.36)	1.06	1.13
Denmark	0.43	(1.55)	0.42	(1.44)	0.99	0.98
Finland	0.29	(1.45)	0.33	(1.32)	1.13	1.28
France	0.40	(1.31)	0.49	(1.25)	1.20	1.45
Germany	0.49	(1.30)	0.53	(1.37)	1.07	1.14
Greece	0.34	(1.38)	0.42	(1.33)	1.24	1.53
Hong Kong	0.29	(1.30)	0.33	(1.33)	1.12	1.26
Hungary	0.55	(1.39)	0.58	(1.24)	1.05	1.09
Iceland	0.29	(1.61)	0.30	(1.73)	1.04	1.08
Indonesia	0.23	(0.91)	0.29	(0.92)	1.23	1.52
Ireland	0.33	(1.68)	0.40	(1.53)	1.21	1.47
Israel	0.30	(1.79)	0.38	(1.75)	1.27	1.62
Italy	0.33	(1.22)	0.36	(1.27)	1.08	1.17
Japan	0.23	(1.11)	0.29	(1.34)	1.24	1.54
Korea	0.34	(1.00)	0.34	(1.02)	1.01	1.02
Latvia	0.29	(1.87)	0.36	(1.71)	1.25	1.56
Luxemburg	0.42	(1.30)	0.50	(1.40)	1.19	1.41
Macedonia	0.31	(1.49)	0.40	(1.34)	1.31	1.71
Mexico	0.45	(1.04)	0.48	(0.95)	1.06	1.12
New Zealand	0.35	(1.82)	0.42	(1.72)	1.19	1.43
Norway	0.31	(1.68)	0.39	(1.55)	1.26	1.58
Peru	0.45	(1.39)	0.44	(1.39)	0.97	0.93
Poland	0.34	(1.78)	0.41	(1.62)	1.19	1.42
Portugal	0.40	(1.27)	0.46	(1.23)	1.17	1.37
Romania	0.29	(1.41)	0.32	(1.29)	1.11	1.23
Russian Federation	0.33	(1.21)	0.37	(1.15)	1.14	1.30
Spain	0.41	(0.90)	0.44	(0.94)	1.07	1.15
Sweden	0.35	(1.62)	0.39	(1.42)	1.13	1.27
Switzerland	0.45	(1.24)	0.48	(1.21)	1.07	1.15
Thailand	0.29	(1.09)	0.31	(1.01)	1.06	1.12
United Kingdom	0.43	(1.09)	0.48	(0.97)	1.12	1.25
United States	0.45	(1.74)	0.48	(1.51)	1.07	1.15

shows the ratio between the R-squares of the two models, and demonstrates that the multidimensional SES measure has a stronger explanatory power. This suggests that, although the number of books is often used as a proxy for income or cultural resources in comparative studies and is indeed highly correlated with achievement, it does not fully account for the effect of family background. The finding also suggests that, although parental occupation is sometimes disregarded in large cross-national studies on the grounds that there is less variation in occupation in economically less-developed countries, neglecting parental occupation reduces the predicted effect as well as the explanatory power of SES. In summary, the new SES measure is superior in that it shows a stronger effect on achievement and greater explanatory power across most countries, in both industrialized and economically less-developed countries.

Wealth as a dimension of SES measure

Table 5 compares the effect size of standard SES with an SES measure that includes wealth in addition to parental education and occupation. Column 3, which shows the ratio between the standardized coefficients of standard SES and SES including the wealth measure, reveals that, contrary to our expectation, in only a few countries does wealth increase the magnitude of SES. Column 4, which shows the ratio between the R-squares of the two models, reveals that in many countries, the inclusion of wealth actually reduces the explanatory power of SES and introduces error. The reason might be that items used in the wealth measure in the PISA data are limited. The PISA measure comprises possessions in the home and does not include any items that account for financial assets. The latter may be important if we are to look at lifelong earnings and the purchasing power of families, and especially if the effect of wealth on educational achievement is through financial security. Moreover, although possessions in the home are one component of family wealth, it may be challenging to identify common items that distinguish the better-off and the poor across countries. For instance, whether the ownership of a car or a dishwasher is part of family's socio-economic status may be highly dependent on the location where one lives and the housing situation in the country. I explored alternative ways of measuring wealth, removing items such as ownership of dishwasher, but the correlation between wealth and educational achievement was still inconsistent across countries, suggesting the difficulty of constructing a wealth index that is comparable across countries. Although Filmer and Pritchett (1999) constructed a wealth index from possessions and characteristic items within the home with the data of Demographic Health Survey (DHS), such an effort was less successful with the PISA data. This may be due to the fact that fewer items were identified in the questionnaire, and also to the fact that the selection of countries is larger and more varied in the PISA data than in the DHS data, which focused solely on economically less-developed countries.

Table 5. Comparison between the effect sizes of standard SES and standard SES + wealth

Country	(1) Standard SES		(2) SES + Wealth		(3) Ratio (2)/(1)	(4) Ratio of R-Squares
	Beta	S.E.	Beta	S.E.	Beta	R-Square
Albania	0.34	(1.17)	0.31	(1.30)	0.91	0.83
Argentina	0.40	(1.32)	0.42	(1.29)	1.06	1.13
Australia	0.36	(1.51)	0.35	(1.53)	0.98	0.95
Austria	0.35	(1.45)	0.32	(1.52)	0.92	0.84
Belgium	0.38	(1.15)	0.35	(1.29)	0.92	0.84
Brazil	0.36	(1.01)	0.39	(0.97)	1.07	1.15
Bulgaria	0.41	(1.84)	0.37	(1.75)	0.90	0.81
Chile	0.44	(1.18)	0.46	(1.08)	1.04	1.09
Czech Republic	0.42	(1.60)	0.37	(1.56)	0.88	0.77
Denmark	0.37	(1.63)	0.34	(1.72)	0.90	0.81
Finland	0.26	(1.35)	0.25	(1.42)	0.98	0.96
France	0.36	(1.27)	0.38	(1.36)	1.04	1.08
Germany	0.43	(1.36)	0.43	(1.47)	0.99	0.99
Greece	0.34	(1.25)	0.32	(1.30)	0.96	0.93
Hong Kong	0.25	(1.30)	0.24	(1.40)	0.94	0.89
Hungary	0.48	(1.51)	0.45	(1.41)	0.94	0.89
Iceland	0.25	(1.49)	0.20	(1.64)	0.81	0.66
Indonesia	0.32	(0.73)	0.32	(0.79)	0.98	0.97
Ireland	0.31	(1.71)	0.29	(1.67)	0.94	0.89
Israel	0.33	(1.74)	0.36	(1.68)	1.07	1.15
Italy	0.30	(1.18)	0.28	(1.24)	0.93	0.87
Japan	0.05	(2.49)	0.10	(1.73)	1.80	3.24
Korea	0.24	(1.01)	0.26	(1.09)	1.06	1.12
Latvia	0.24	(1.67)	0.22	(1.68)	0.92	0.85
Luxemburg	0.39	(1.37)	0.39	(1.49)	1.02	1.03
Macedonia	0.39	(1.27)	0.35	(1.31)	0.89	0.79
Mexico	0.43	(0.93)	0.43	(0.90)	1.00	1.01
New Zealand	0.31	(1.79)	0.33	(1.86)	1.07	1.14
Norway	0.29	(1.72)	0.26	(1.88)	0.89	0.80
Peru	0.44	(1.27)	0.45	(1.24)	1.02	1.04
Poland	0.32	(2.01)	0.30	(1.85)	0.94	0.89
Portugal	0.39	(1.25)	0.39	(1.20)	1.01	1.02
Romania	0.26	(1.44)	0.28	(1.31)	1.08	1.17
Russian Federation	0.28	(1.17)	0.28	(1.19)	1.00	0.99
Spain	0.36	(0.89)	0.35	(0.92)	0.97	0.94
Sweden	0.29	(1.60)	0.27	(1.68)	0.94	0.88
Switzerland	0.41	(1.27)	0.38	(1.32)	0.92	0.85
Thailand	0.26	(0.98)	0.26	(0.93)	1.01	1.01
United Kingdom	0.41	(1.09)	0.36	(1.15)	0.90	0.80
United States	0.36	(1.89)	0.39	(1.80)	1.08	1.17

However, it should be noted that Treiman (1977) was successful in finding a similar pattern among the rankings of occupational prestige across 70 countries, including a wide range of countries at different levels of economic development,

and thus, the goal of constructing a worldwide measure of wealth should not be considered impossible. In summary, the measure of wealth added little to the other components of SES and did not have a consistent effect on estimates of educational achievement across countries in this article.

Sensitivity test: rural versus urban sample

The validity of the new SES measure may be questioned in terms of whether it has additional explanatory power in both a rural and an urban setting. For example, one might argue that cultural resources will distinguish one's status in an urban setting, but not in a rural setting. In order to test whether the multidimensional measure is biased towards an urban setting, Table 6 shows the result of the previous analysis for the rural sample only. Column 1 shows the percentage of rural population, when defined as a village or town with a population below 15,000. Column 4 shows the ratio between the standardized coefficients of multidimensional SES and standard SES, for the rural population only. The column reveals that the multidimensional SES has a stronger effect on reading achievement in a rural setting in all countries tested except Indonesia and Hong Kong. This suggests that, with few exceptions, the new measure is useful in explaining the achievement gap between students from high and low SES families in rural settings as well. Column 5 shows whether the ratio between the effect sizes of the two measures is larger in rural settings (by subtracting column 3 in Table 3 from column 4 in Table 6). In most countries, the difference is minimal, suggesting that the new measure is equally effective among rural populations; and the mix of positive and negative values indicates that the measure is not biased towards an urban setting. There are some relatively high positive values, such as in Japan, Poland and Thailand, which indicate that the difference in the explanatory power of the new SES measure and the standard SES measure is especially large in rural settings. In summary, the additional family effect that the multidimensional SES measure is able to capture holds in both an urban and a rural setting.

Conclusion

This article has examined whether the predicted magnitude of the effect of family background on achievement is sensitive to different measures of family background. First, I examined the kinds of measures that have conventionally been used in the status attainment literature. The vast research and evidence on constructing cross-nationally comparable measures of parental education and parental occupation in the status attainment literature led me to identify those two measures as the standard SES indicators.

I then relied on theories of cultural capital and wealth to construct a more comprehensive SES measure. The premise underlying the new composite SES

Table 6. Difference between the effect sizes of the multidimensional SES and standard SES measures in rural sample

Country	Rural						Rural vs Total	
	(1)	(2)		(3)		(4)	(5)	
	Rural Population ¹	Standard SES		Multidimen- sional SES		Ratio (3)/(2)	Difference ² (4)-Table3(4)	
	Percentage	Beta	S.E.	Beta	S.E.	Beta	Beta	
Albania	42.92	0.20	(1.78)	0.27	(2.27)	1.36	0.10	
Argentina	22.55	0.20	(3.01)	0.30	(3.24)	1.53	0.32	
Australia	14.44	0.27	(4.31)	0.37	(3.87)	1.33	0.10	
Austria	41.84	0.30	(2.53)	0.38	(2.36)	1.27	0.07	
Belgium	28.62	0.34	(2.46)	0.46	(2.33)	1.34	0.11	
Brazil	15.80	0.27	(2.47)	0.28	(2.79)	1.04	-0.05	
Bulgaria	15.91	0.34	(4.87)	0.50	(3.23)	1.47	0.24	
Chile	16.73	0.41	(2.87)	0.45	(2.74)	1.10	0.03	
Czech Republic	32.06	0.42	(2.89)	0.52	(2.28)	1.23	0.03	
Denmark	52.09	0.32	(2.49)	0.35	(2.12)	1.11	-0.02	
Finland	38.86	0.23	(2.17)	0.28	(2.18)	1.24	-0.06	
France	25.50	0.28	(2.81)	0.43	(2.64)	1.53	0.19	
Germany	31.31	0.36	(2.48)	0.42	(2.60)	1.18	-0.04	
Greece	20.89	0.28	(2.69)	0.34	(2.96)	1.22	-0.02	
Hong Kong	2.15	-0.09	(11.20)	-0.04	(13.29)	0.43	-0.88	
Hungary	18.35	0.45	(3.59)	0.61	(2.75)	1.33	0.12	
Iceland	N.A	N.A		N.A		N.A	N.A	
Indonesia	47.26	0.20	(1.16)	0.14	(1.55)	0.70	-0.18	
Ireland	59.66	0.28	(2.26)	0.38	(2.00)	1.34	0.06	
Israel	27.36	0.36	(3.02)	0.42	(3.07)	1.15	0.01	
Italy	18.49	0.15	(2.89)	0.24	(3.04)	1.65	0.44	
Japan	13.37	0.00	(6.63)	0.31	(3.58)	64.41	59.09	
Korea	8.38	0.14	(3.49)	0.20	(3.68)	1.43	0.01	
Latvia	38.03	0.25	(2.59)	0.35	(2.56)	1.43	-0.07	
Luxemburg	29.50	0.35	(2.48)	0.47	(2.52)	1.33	0.03	
Macedonia	13.55	0.33	(3.48)	0.33	(3.39)	1.00	-0.02	
Mexico	35.49	0.23	(1.76)	0.30	(1.87)	1.32	0.22	
New Zealand	24.14	0.27	(3.75)	0.38	(3.62)	1.39	0.02	
Norway	63.71	0.25	(2.26)	0.36	(2.01)	1.47	0.11	
Peru	N.A	N.A		N.A		N.A	N.A	
Poland	19.81	0.14	(4.36)	0.24	(3.36)	1.72	0.45	
Portugal	39.75	0.32	(2.25)	0.41	(2.12)	1.29	0.09	
Romania	23.55	0.21	(3.49)	0.33	(3.03)	1.55	0.31	
Russian Federation	43.32	0.22	(1.80)	0.30	(1.71)	1.34	0.02	
Spain	20.79	0.31	(2.09)	0.40	(2.15)	1.28	0.05	
Sweden	47.76	0.21	(2.48)	0.31	(2.14)	1.50	0.17	
Switzerland	56.55	0.37	(1.82)	0.45	(1.65)	1.21	0.04	
Thailand	47.54	0.07	(1.83)	0.14	(1.78)	1.87	0.68	

Table 6. Continued

Country	Rural					Rural vs Total	
	(1)	(2)		(3)		(4)	(5)
	Rural Population ¹	Standard SES		Multidimen- sional SES		Ratio (3)/(2)	Difference ² (4)-Table3(4)
	Percentage	Beta	S.E.	Beta	S.E.	Beta	Beta
United Kingdom	26.69	0.34	(2.36)	0.44	(1.85)	1.29	0.12
United States	26.83	0.28	(4.19)	0.43	(3.14)	1.53	0.21

¹ Percentage of students in rural schools: Rural defined as a village/ town with a population below 15,000; the question not asked in Canada, Iceland and Peru.

² Positive values indicate the ratio between the effect sizes of multi-dimensional and standard SES measures is larger in rural population.

measure was that cultural resources are correlated with parental education and occupation. Based on Bourdieu’s emphasis on the liquidity and exchangeability of forms of capital in defining the concept of “cultural capital,” it is assumed that cultural capital is heavily determined by one’s financial and human capital, and that there is a common factor underlying these different forms of capital. This assumption was the rationale for using a principal component analysis to derive an SES index that captures the most common variation of the different dimensions of SES. In constructing the new multidimensional SES measure, I attended both to the inter-correlations among the items across countries and within countries and to the correlation of each item with educational achievement across countries and within countries.

A comparison with the standard SES measure showed that the more comprehensive SES measure has a stronger effect on student achievement. Cultural resources predicted achievement over and above parental education and occupation. The overall finding that the multidimensional SES measure had a stronger explanatory power in identifying the family background and student achievement association across countries has three important implications. First, it suggests that family effects in past cross-national educational achievement studies may have been under-estimated. It needs to be emphasized that the new measure, which incorporated aspects of parental occupation, education and cultural resources, although variable in its additional explanatory power, was not biased towards more wealthy nations, Western nations, or urban populations.

Second, the finding that families’ cultural resources add additional power to parental occupation and education in predicting student outcomes suggests that schools need to consider that students of low-status families may lack the educational environment outside of schools, and that this may be a critical factor in the educational opportunity available for middle-class children. This calls for policies that provide additional learning opportunities, in

the form of educational resources, out-of-school tutoring, or educational trips, to disadvantaged students in their homes and communities.

Third, the mismatch between the cultural practices of low-status families and those of schools also suggests that policies concerning parental involvement or family-school partnerships, which are widely promoted in educational policies around the world today, may need some reconsideration. If such policies are promoted without consideration for the different cultural resources and strategies that low- and high-status families possess, they may, in spite of their best intentions, exacerbate the inequality that exists among families of different social backgrounds, allowing the voices of high-status parents to dominate the schools.

This study has also raised some questions for future research. Further exploration of the wealth measure is warranted. In this article, I tested whether a proxy for wealth could be used as a dimension of socio-economic status. I found that, contrary to the literature and theory on wealth, adding the limited measures of wealth in the PISA data to the standard SES index reduced the effect of SES on achievement in many countries. This suggests the challenge in identifying the common items that represent “wealth” across countries of differing levels of economic development. For example, researchers in the past have included possession of different types of livestock to measure families’ wealth in developing countries (Ross and Postlethwaite 1989). It is possible that the reason why the PISA proxy for wealth was not highly correlated with other items of SES and did not increase the SES effect on achievement is due to the lack of culturally relevant indicators of wealth for some countries. However, a large body of empirical literature has shown how and to what extent wealth affects children’s educational outcomes, in both developed and developing countries. Further exploration of worldwide measures of wealth applicable to different levels of economic development is needed. The challenge would be to walk the fine line between including items that are relevant to local conditions while maintaining comparability across a wide range of countries.

Another direction for future research would be to conduct a qualitative study to explore how families use their cultural capital to influence their children’s educational achievement, and whether the patterns are similar across countries. One of the tenets of cultural capital theory is that schools value and reward the cultural practices and signals of the elite, and thus produce a mismatch for the students as well as parents of low-status families. However, most of the measures used in this study were related to cultural possessions, and were not able to fully capture the cultural practices and signals that high-status families use, especially in relation to schools. Moreover, this study assumed that the elite culture is similar across countries. Further qualitative study to compare the different strategies that families use to influence their children’s education and to approach schools in the local context would enhance our understanding of how cultural capital may differentiate high- and low-status families in different countries.

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References

- Baker, David, Brian Goesling, and Gerald Letendre. 2002. Socioeconomic Status, School Quality, and National Economic Development: A Cross-National Analysis of the “Heyneman-Loxley Effect” on Mathematics and Science Achievement. *Comparative Education Review* 46(3): 291–312.
- Blau, Peter, and Otis Duncan. 1967. *The American Occupational Structure*. New York: Wiley.
- Bourdieu, Pierre. 1977. Cultural Reproduction and Social Reproduction. In: *Power and Ideology in Education*, eds. by Jerome Karabel and Albert H. Hasley, 487–511. New York: Oxford University Press.
- Bourdieu, Pierre. 1986. Forms of Capital. In: *Handbook of Theory and Research for the Sociology of Education*, eds. by John G. Richardson, 241–258. New York: Greenwood Press.
- Braun, Michael, and Walter Muller. 1997. Measurement of Education in Comparative Perspective. In: *Methodological Issues in Comparative Social Science*, eds. by Lars Mjoset and Fredrick Engelstad, 163–201. Greenwich, CT: JAI Press.
- Buchmann, Claudia. 2002. Measuring Family Background in International Studies of Education: Conceptual issues and Methodological Challenges. In: *Methodological Advances in Cross-National Surveys of Educational Achievement*, eds. by Andrew C. Porter and Adam Gamoran, 150–197. Washington, DC: National Academy Press.
- Conley, Dalton. 1999. *Being Black, Living in the Red: Race, Wealth, and Social Policy in America*. Berkeley: University of California Press.
- DeGraaf, Paul. 1986. The Impact of Financial and Cultural Resources on Educational Attainment in the Netherlands. *Sociology of Education* 59: 237–246.
- Filmer, Deon, and Lant Pritchett. 1998. *Estimating Wealth Effects without Income or Expenditure data—or Tears: Educational Enrollment in India (World Bank Policy Research Working Paper No.1994)*. Washington, DC: Development Economics Research Group (DECRG), The World Bank.
- Filmer, Deon, and Lant Pritchett. 1999. The Effect of Household Wealth on Educational Attainment: Evidence from 35 countries. *Population and Development Review* 25(1): 85–120.
- Fuller, Bruce. 1987. What School Factors Raise Achievement in the Third World?. *Review of Educational Research* 57(3): 255–292.
- Ganzeboom, Harry, and Donald Treiman. 1996. Internationally Comparable Measures of Occupational Status for the 1988 International Standard Classification of Occupations. *Social Science Research* 25: 201–239.

- Heyneman, Stephen, and William Loxley. 1983. The Effect of Primary-School Quality on Academic Achievement across Twenty-Nine High- and Low-Income Countries. *American Journal of Sociology* 88(6): 1162–1194.
- Kerckhoff, Alan, Elizabeth Ezell, and Scott Brown. 2002. Toward an Improved Measure of Educational Attainment in Social Stratification Research. *Social Science Research* 31: 99–123.
- Kingston, Paul. 2001. The Unfulfilled Promise of Cultural Capital Theory. *Sociology of Education Extra Issue*: 88–99.
- Kohn, Melvin. 1989. *Class and Conformity: A Study in Values; With a Reassessment, 1977*. Chicago: University of Chicago Press.
- Lareau, Annette. 2000. *Home Advantage: Social Class and Parental Intervention in Elementary Education*. Lanham: Rowman & Littlefield Publishers, Inc.
- Lareau, Annette. 2003. *Unequal Childhoods: Class, Race, and Family Life*. Berkeley: University of California Press.
- Organization for Economic Co-operation and Development. 2002a. *Manual for the PISA 2000 Database*. Paris: OECD Publications.
- Organization for Economic Co-operation and Development. 2002b. *PISA 2000 Technical Report*. Paris: OECD Publications.
- Organization for Economic Co-operation and Development. 2003. *Literacy Skills for the World of Tomorrow: Further Results from PISA 2000*. Paris: OECD Publications.
- Orr, Amy. 2003. Black-White Differences in Achievement: The Importance of Wealth. *Sociology of Education* 76(4): 281–304.
- Ross, Kenneth, and Neville Postlethwaite. 1989. *Indonesia Quality of Basic Education*. Jakarta, Indonesia: Ministry of Education and Culture.
- Sewell, William, and Robert Hauser. 1975. *Education, Occupation, and Earnings: Achievement in the Early Career*. New York: Academic Press.
- Treiman, Donald. 1977. *Occupational Prestige in Comparative Perspective*. New York: Academic.
- Wong, Raymond. 1998. Multidimensional Influences of Family Environment in Education: The Case of Socialist Czechoslovakia. *Sociology of Education* 71: 1–22.

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