The Foundations of Educational Inequality in the European Union.

A Comparative Empirical Analysis

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Abstract

A central tenet of Globalisation Theory is the convergence of national public policies and its outcomes within the EU as a prototype of a supranational organization. In contrast, we persistently observe highly varying living conditions within the EU. Accordingly, we demonstrate that social inequality of education shows a strong variation between the EU member states. The core postulation of this study is that the unequal degrees of educational inequality are determined by persistent nation specific education policies. The aim of our investigation is to examine whether country specific education policy conditions moderate the relationship between the individual social background and educational success. To reveal these cross-level interactions we apply multilevel analysis. Our main result is that the macro political determinants of social inequality of education systematically differ between the western EU countries and the former communist states. In accordance with our hypotheses we find significant effects of the development of all-day schools in the western EU and of the private school tradition in the eastern member states. Moreover, in the eastern part of the EU high preschool enrolment rates increase social inequality of education rather than equalizing education opportunities.

Introduction

From the perspective of Globalisation Theory the varying extent of social inequality of education within the EU is astounding. A basic tenet of Globalisation Theory posits that public policies and their outcomes within supranational organisations will converge due to the immense degree of supranational rules (Drezner 2001: 1; Knill 2005). Adapted to educational polices, this implies a convergence of both the embodiment of national education policies and the degrees of social inequality of education as an outcome (Green 1999). Nonetheless, there is a substantial amount of literature challenging the convergence of education policies within the EU. Green (1999) and Dale (1999) for instance illustrate that despite the spread of globalisation, national education policy differences remain. Moreover, current publications of the Program for International Student Assessment (PISA) also show highly varying degrees of social inequality of education among the EU member states. This dependence of educational performance on individuals' social background plays a pivotal role in current public affairs. During the 1980s social inequality of education was supposed to disappear because of the blatant general expansion of education within industrialised societies (Geißler 1996). TIMSS[1] (e.g., Beaton, Mullis et al. 1996) and PISA (Baumert, Klieme et al. 2001; Prenzel, Baumer et al. 2005) however disprove this assumption, demonstrating that social inequality of education also persists in modern and developed countries. Furthermore it is revealed that the extent of social inequality of education varies among political entities. For example, PISA 2000 (Baumert, Klieme et al. 2001) shows that the dependence of reading achievement on social background is much stronger in Germany than in Finland and Ireland; while social background explains 17% of reading competencies in Germany, it only explains 5% in Finland or 10% in Ireland.

In sum, the relationship between individual social background and education assessment thus remains a nation specific parameter. The core postulation of this study is that the unequal living conditions within the EU, as a prototype of a supranational organisation, are determined by persistent national education policies (Dale 1999; Green 1999). The nucleus of this study is to evaluate the effectiveness of national education systems within the EU in consideration of equal education opportunities. This leads us to our central question: Which

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[1] Third International Mathematics and Science Study

national education system and policy properties are responsible for a nation specific degree of social inequality of education within the EU?

The persistent inequality of education in modernised countries attracts public and scientific interest for at least three reasons: First, the dependence of educational attainment on social background, rather than on individual capabilities, is judged as a dissipation of human capital (Handl 1985). The investment in education is considered to be a prerequisite to future economic and technical competitiveness (Plümper and Schneider 2007). Second, meritocratic values discourage an allocation of public goods that is based socially rather than on individual capabilities and achievements (Solga 2005). A transmission of social background from parents to children via education leads to an inheritance of social status that circumvents a meritocratic allocation of social goods. Social inequality of education is therefore seen as a central reason for further curricular inequalities (Allmendinger and Leibfried 2003; Allmendinger 2004; Müller and Pollak 2004). Third, educational inequality is also relevant for the functioning of democracy (Coleman 1965). Preston and Green (2005) observe negative effects of social inequality of education on aspects of social trust as well as political and civil freedom. By contrast, they show strong positive relations among social inequality of education and the occurrence of political revolts, crime and xenophobia. Therefore, the school systems' capacity to produce social equality plays a major role for today's welfare state (Heidenheimer 1973; Wilensky 1975; Schneider and Keesler 2007).

While there is a rapidly growing body of work assessing the effects of individual social background on educational performance, little to no empirical research has been conducted with regard to the macro foundations of educational inequality. Exceptions include the studies by Schütz et al. (2005). Schütz et al. (2005) analyse macro-structural causes of differences among nations regarding social inequality of education. They show promoting influences of early childcare and late tracking on social equality of education. The shortcoming of this study is the broad geographic scope. Schütz et al. (2005) include many partly incomparable countries in terms of economic and democratic development, thus, neglecting factors which are deeply embedded in the political and economic constitution. Moreover, several publications deal with macro-conditions of social inequality referring to the US context. A pioneer work in this field is the Coleman Report (Coleman 1966; Dye 1987: 8ff). Coleman (1966) analysed the effects of several education policies on pupils' achievement. One of his findings was that the enrolment of black pupils in white schools and bussing them from their

neighbourhoods to predominantly white schools led to more equal opportunities of education among black and white pupils. However, education expenditures do not possess any effect on pupils' educational achievement (Coleman 1966). Altogether, the international comparison of educational policies and their outcomes is still in its fledging stages (Jahn 2006). Particularly with regard to the EU member states, no comparative study concerning education policies or educational inequality exists. For this reason, it is not feasible to make reliable predictions about the performance of multiple educational institutions. The present study therefore includes several educational conditions that appear to be relevant for the context of the EU member states.

Methodologically, we apply multi-level analysis. Indeed, both our dependent (the degree of social inequality) and the central explanatory variables (education policy conditions) of our investigation are country specific indicators. Nonetheless we have to deal with a multilevel data structure. Our dependent concept, social inequality of education, is constructed by two micro sociological concepts - pupils' individual social background and pupils' individual school success. The aim of our investigation is to examine whether country specific education policy conditions moderate the relationship between these micro-level concepts. We are thus interested in the cross-level interactions between education policies and individual social background.

The article is organised as follows: in the next chapter we first conceptualise social inequality of education. The first analytic step of our investigation is to evaluate persistent contextual differences among the EU member states. We present an outline of the distribution of social inequality of education within the EU member states. In a third chapter we adapt New Institutionalism to our question and thereby present our theoretical framework. We also introduce the policy-centred hypothetical assumptions explaining the differential degrees of social inequality. In the fourth chapter we illustrate the measurements of our variables on the micro and macro societal level. Moreover, we explain the methodological procedures of the multilevel analyses. In a further chapter we present our results and evaluate our hypotheses. We conclude with a summary and a discussion of our major findings.

Differential extents of social inequality of education within the EU

The core concept of this study is social inequality of education within the European Union. The question remains as to how social inequality of education be conceptualised. In

accordance with Jacobs (1996), we focus on social inequality of the <u>school education process</u>. Our indicators for social inequality of education will describe the dependence of the achievement of math capabilities[2] on individuals' social background. We presume social inequality of the school educational process to be the most appropriate concept to illustrate the differing degrees of social inequality of education in an EU comparison. International comparisons of educational inequality mostly refer to inequality of educational process, as the achievement of capabilities is the trait which best lends itself to comparison among groups of states with widely varying educational systems.

In order to illustrate the different degrees of social inequality of education in the EU, we construct national indicators of social inequality of the education process. More precisely, we identify the dependence of pupils' mathematic skills on their individual social background in each member state of the European Union. The data of the PISA survey 2006 deliver the most up-to-date information about the degrees of social inequality of the education process within EU member states. Following Bourdieu (1983), our measurement of familiar social background pursues a cultural capital approach. The proxy for individual social background is the highest level of education attained by the parent(s). Conventional wisdom of educational sociology states that incorporated familiar cultural capital is currently the strongest social class factor of children's educational attainment (Henz and Maas 1995; Schimpl-Neimanns 2000; Rössel and Beckert-Ziegelschmid 2002). The parental educational attainment is therefore applied in a great amount of studies as a proxy for social background (Blossfeld and Shavit 1993; Henz and Maas 1995; Schimpl-Neimanns 2000; Rössel and Beckert-Ziegelschmid 2002; Barone 2006; Georg 2006). In order to illustrate the influence of social background on pupils' school attainment, we estimate OLS regressions for each EU country. The regression coefficients of parents' education describe the impact familiar social background has on pupils' educational achievement in each country and can thus be seen as indicators of the degree of social inequality of education. Table 1 demonstrates that social inequality is lowest in Romania (5.14) and highest in Hungary (26.12). This means that an increase of parental educational attainment by one unit raises pupils' math capabilities by only 5.15 units in Romania, but by 26.12 units in Hungary. These two examples display the huge existing differences among the EU member states concerning the degree of social inequality of education. Furthermore table 1 shows that the variance among the EU member states is not smaller than within a broader scope of industrialized countries, which are not

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[2] Math capabilities are chosen as the indicator of individual school success since the content of math syllabi are predominantly similar the world over, thus making it an appropriate comparable indicator.

embedded in a common supranational organisation (EU member states plus other OECD countries). That rebuts the assumption of convergence of education policy outcomes within the EU as a prototype of a supranational organization. Accordingly, it is relevant to ask, whether persistent national education systems and policies within the EU are responsible for the extent of social inequality of education.

Table 1: Regression Coefficients for the Impact of Parental Educational Attainment on Pupils' Mathematic Capabilities. Variance Within the EU Compared to the Variance Within a Broad Scope of Industrialized Countries.

Country	Social Inequality of Education	Country	Social Inequality of Education
EU-Countries			
Romania	5.14	Latvia	12.25
Portugal	7.26	Irland	13.04
Sweden	7.48	Germany	14.17
Austria	7.55	Belgium	14.42
Netherlands	7.84	Slovenia	16.06
Luxemburg	8.39	Bulgaria	17.01
Denmark	8.77	Lithuania	17.75
Great Britain	9.08	Greece	18.49
Finland	9.79	Poland	22.89
Estonia	9.85	Czech Republic	23.61
Italy	10.37	Slovakia	25.26
Spain	10.49	Hungary	26.12
France	11.26		
Other OECD-countries			
Mexico	5.54	Canada	13.11
Norway	8.33	Australia	13.31
Korea	8.79	United States of America	15.14
Switzerland	10.48	Island	15.35
New Zealand	11.99	Japan	18.89
Russia	12,01		
Variance Coefficient all Countries	2.28 (Variance: 29.6)		
Variance Coefficient within EU	2.75 (Variance 36.83)		

Note: Regression Coefficients of parents' education from country-specific multiple OLS-regressions including the following controlling variables: Gender, family wealth, home possessions, first generation foreigner, language of test is different from language spoken at home.

Theoretical accounts

In the previous section we have shown that the degree of social inequality varies considerably among the EU member states. In the following, we introduce a policy-centred approach to

explain the differing degrees of social inequality of education within the EU (model in fig. 1). Our main goal is to investigate whether the inequalities result from persistent national differences in education systems and policies. The focal point of this study is thus to evaluate nation specific education policy with respect to their capabilities to produce equal opportunities of education.

Figure 1: Macro Explanatory Model of Social Inequality of Education
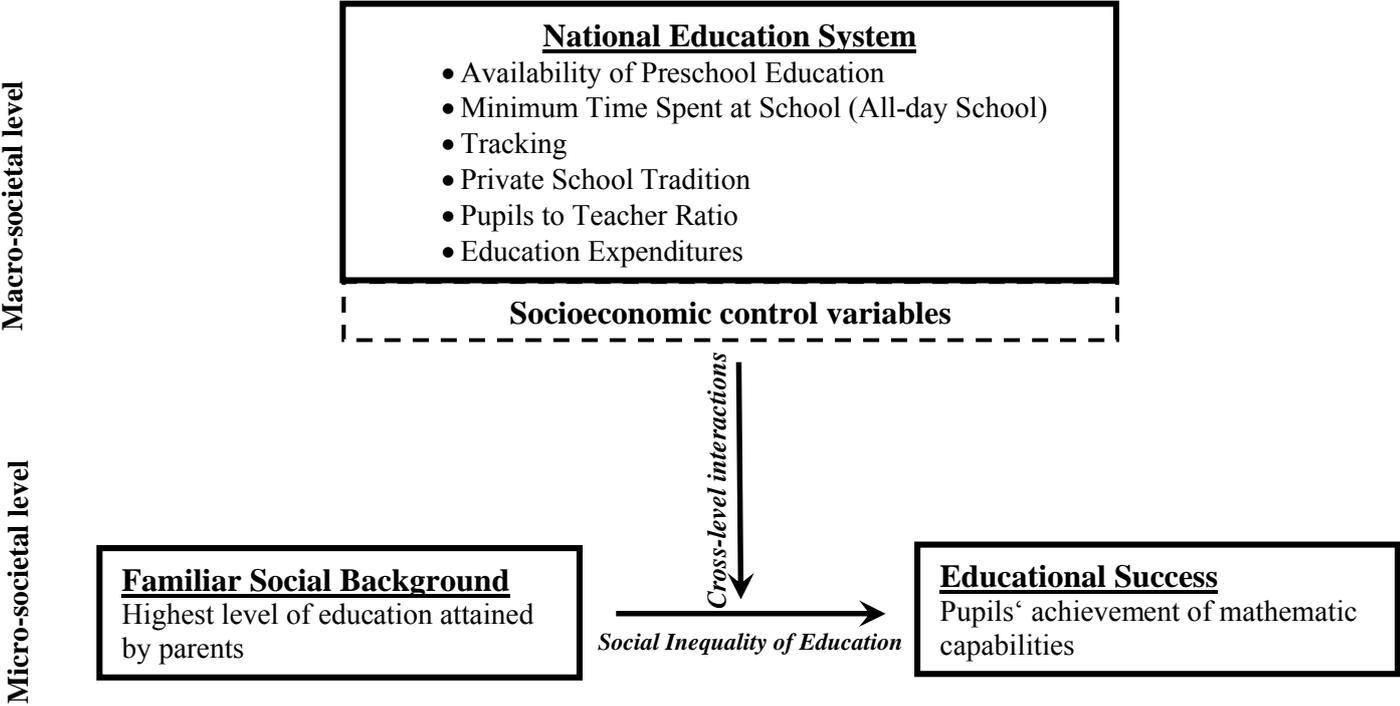
Note: Own illustration.

New Institutionalism provides an appropriate theoretical framework to evaluate education policies and systems with regards to their consequences for social inequality of education (Ostrom 1999). A main assumption of New Institutionalism is that institutional rules, procedures, and conventions mould individual preferences, and stimulate or limit behavioural options by means of certain incentive mechanisms (Mayntz and Scharpf 1995: 43; Hall and Taylor 1996; Immergut 1998; Ostrom 1999). In this sense, institutions can be seen as opportunity structures, which influence individual behaviour and opportunities (Opp 1996).[3] Following applications of New Institutionalism in welfare state research (Esping-Andersen 1990: 23; Alber 2001) pupils are deeply embedded in national education systems and

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[3] Institutions "can range from the rules of a constituted order or the standard operating procedures of a bureaucracy to the conventions governing trade union behaviour or bank-firm relations" (Hall 1996: 938).

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education policy rules. Educational institutions thus structure pupils' education opportunities and therefore act as filters for individual educational success. In particular, specific educational institutions are presumed to enable individuals from lower social classes to equally participate in educational life and to achieve academic merits according to their capabilities, while other systemic characteristics rather hinder equal educational opportunities. While some features of education systems and policies serve to activate individuals and have a supportive function for educational assessment, others can provoke the opposite. From this we infer our main research question: Are national educational institutions able to moderate the relationship between individual social background and school performance within EU member states? The question refers to an interrelation between macro-political institutions and individual features of social background for the achievement of school performance. Based on the aforementioned neo-institutionalist arguments, we formulate the following hypotheses. Following our theoretical model (figure 1) we make postulations about the moderating effect of specific national system and policy features on the extent of social inequality of education within the EU member states.

Hypothesis I:

A high availability of *preschool* education is presumed to weaken the relationship between individual social background and school educational success. We assume that early childhood education is able to act as a surrogate for insufficient capital resources at home (Hurrelmann 1988; Leschinsky and Mayer 1990; Büchel, Spieß et al. 1997; Kreyenfeld, Spieß et al. 2002; Hillmert 2004; Hillmert 2005; Magnuson, Ruhm et al. 2006; McClelland and Acock 2006; Schechter and Bye 2006). Consequently, class specific disparities in educational requirements could be levelled off before entering primary school. While children from the lower social stratum can profit from an enriching environment in early childhood, those exclusively socialised by their parents have lower chances of internalising external enriching influences. Nonetheless, we do not expect a linear influence of the availability of preschool education on social inequality (cp. Schütz, Ursprung et al. 2005). A moderate availability of preschool education may result in an exclusion of lower social classes from early childhood education. We suppose that for the first instance higher social classes use the early childhood education facilities, because they attach higher value to early education and are more likely (and able) to pay the fees for preschool education. Ultimately, a moderate enrolment in preschool education is supposed to be composed by children with wealthier familiar backgrounds. This in turn would even enforce different preconditions for education between social classes, thereby

increasing the degree of social inequality of school education. The gap between wealthier pupils and their counterparts from lower social backgrounds regarding enriching pre-conditions for school education would even grow.

HI: *A high availability of preschool education reduces the degree of social inequality of education.*

Hypothesis II:

Private schools mainly attract pupils from high income and better-educated families (Buddin, Cordes et al. 1998; Wrinkle, Stewart et al. 1999; Fairlie and Resch 2002). We therefore suppose private schools to segregate pupils coming from different social classes by the special focus on wealthier target groups. Furthermore, we assume private schools to perform better than public schools (US Department of Education 2006), as they may provide more individualised attention and encouragement. This is, on the one hand, due to the market related principle-agent-relation to private schools that shifts power to the pupils and their parents as the agents. On the other hand, private schools are presumed to have greater financial resources with which to provide individual support. A high supply of private school should thus lead to a movement of pupils from wealthier social backgrounds to private schools while their less well-off counterparts remain in public schools. Therefore a strong tradition of private schools is presumed to strengthen the relationship between individual social background and school success.

HII: *A strong tradition of private schools increases the degree of social inequality of education.*

Hypothesis III:

A further main characteristic of education systems is whether or not there is an *institutional tracking* of pupils during secondary education into hierarchically ordered educational programs, each with varying academic reputations. The intention of tracking is to "create instruction groups that are homogeneous with respect to student abilities" (Hallinan 1996). A strict selection of pupils into hierarchically ordered and separated school types is, however, supposed to lead to a high degree of social inequality of education (Jonsson 1990; Saporito and Sohoni 2007). According to Rational Choice Theories, educational decisions for special school types depend highly on parents' educational assumptions and tastes, and not

particularly on children's educational goals or abilities (Esser 1996; Goldthorpe 1996; Becker 2000; Becker 2003). As higher graded school forms aim at preparing pupils for higher education, pupils at those schools will achieve better educational capacities. Wealthier families will aspire to send their children to school forms with better reputations. Due to parents' lower expectations concerning children's educational performance and the utility of education, pupils from lower social classes, in contrast, will rather attend school forms with lower academic reputations (Hurrelmann 1988; Ditton 1989; Leschinsky and Mayer 1990; Solga and Wagner 2001). Tracking will thus be associated with more socially biased educational decisions (Lucas 2001: 1646; Hillmert 2005). Consequently, the relation between social background and achieved capacities will be stronger in countries with institutional tracking during secondary education.

HIII: *Tracking of pupils in secondary education into several school forms enforces social inequality of education.*

Hypothesis IV:

The supply of teaching staff is assumed to influence the effect social background has on school performance. The ratio of pupils to teachers can be seen as an indicator for the quality of the education process in a country, which has an important impact on educational outcomes of pupils (Kvist 1999; Szelewa and Polakowski 2008: 118). A low pupil-teacher ratio means that one teacher is responsible for a small number of pupils, allowing a teacher to pay more attention to each individual pupil. Contrarily, a teacher responsible for many pupils may not be able to attend to the special requirements of single pupils and may not be able to cultivate them in an exhaustive manner (Graddy and Stevens 2005). According to Mosteller (1995), we hypothesise that mainly pupils from lower social classes suffer from a failing individual encouragement in classrooms with high pupil-teacher ratios. Pupils from the upper social classes may be compensated for the shortcomings of educational quality at school by parental support; this may be much more difficult for pupils with less educated parents. In turn, a low pupil to teacher ratio should lead to higher performances especially of pupils from lower social classes, since such a situation allows teachers to respond to the special educational requirements of pupils from lower social backgrounds. In conclusion, we assume a low pupil-teacher ratio to weaken the relationship between individual social background and school success. The gap in academic capabilities between pupils from different classes should decrease with smaller class sizes.

HIV: *The lower the pupil to teacher ratio, the lower is the degree of social inequality.*

Hypothesis V:

In all-day schools pupils, regardless of their social background, are socialised in a similar and enriching environment over a period of a full day. In the half-day school tradition, organisation of leisure time completely depends on families. For example, the availability of remedial lessons or participation in enriching leisure activities is very much dependent on parents' resources. Children coming from less well-off families are at a definite disadvantage compared to their wealthier counterparts. Consequently, we expect the relation between individual social background and school success to be weakened by the increase in the number of hours pupils are taught at school. In public debate, *all-day school* is often touted as a means to decrease social inequality.[4]

HV: *The more time pupils spend at school, the lower the degree of social inequality of education.*

Hypothesis VI:

Finally, the degree of social inequality of education is assumed be influenced by the magnitude of public education expenditures. Low public education expenditures generally result in less investment in education and will possibly be substituted by a high proportion of private education expenditures, e.g. private lessons or private purchase of textbooks (Schmidt 2002). This shift of responsibility from the state to the private sector may lead to different opportunities among social classes: Well-educated parents will spend more money on education since they not only have the financial resources to do so, but also attach more value to education than parents from lower social classes. This mechanism ultimately leads to different prospects to achieve educational capabilities. Furthermore, public education expenditures underscore the executive value of education (Schmidt 2002; Wolf 2006). This value may be translated to the society that inherits this value for the individual education behaviour. In sum, low education expenditures are presumed to lead to a high dependence of school success on family resources; high public education expenditures may reduce the necessity of private education expenditures and may so increase social equality of education.

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[4] For example, the German Federal Ministry of Education and Research (2003) has led the shift to *all-day schools* with a four billion Euro investment plan. Decreasing social inequalities in education is an official objective of the federal all-day school treaty.

HVI: *The higher the public expenditures for school education are, the lower the degree of social inequality of education.*

Data, methodological approach and variables

In the remainder of the paper the above-illustrated hypotheses will be empirically tested. The following section will first serve to discuss and explain the units of investigation, the methodological proceedings, as well as the measurement of the dependent variable and of the central independent variables.

The Geographic Scope

The scope of our investigation includes 25 EU member states.[5] The constraint to the EU countries is due to our theoretical starting point. A central assumption of the Globalisation Theory predicts a convergence of national policies and its outcomes (Drezner 2001; Knill 2005). According to Knill (2005), this should particularly pertain to national policies within the EU, as the EU as a prototype of supranational organisation provides a great scale of supranational rules (cp. Council of the European Union 2001). Moreover, the common fundament within the EU with respect to democratic and economic development enables us to focus on education policy explanations for social inequality of education.

Methodological Procedure

Our parameter of interest is social inequality of education, which is constructed by the relationship between individuals' social background and educational performance. Both conditions in this relationship, as well the independent as the dependent variable, are micro-sociological factors. However what we want to explain is *the intensity* of this relationship, which describes a macro-sociological situation in an EU member state. Moreover, we assume that macro-political conditions (more precisely educational policy conditions) moderate this relationship between two individual conditions (cp. fig. 1). To sum up, we assess social inequality of education by estimating the influence of educational policy conditions on the strength of the effect social background has on individual school performance. We thus calculate models in which individual school performance is the dependent variable, which is

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[5] Cyprus and Malta are excluded from the analysis since the two countries did not participate in PISA. Our sample is comprised of the following EU-countries: Austria, Belgium, Bulgaria, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, United Kingdom.

explained by an interaction between individual social background and macro-policy conditions. Our main focus does not lie on the dependent variable as such, but on how the relationships between a specific individual variable, namely social status and school performance (horizontal arrow in figure 1), is moderated by educational system and policy variables (see vertical arrow in figure 1).

In order to estimate such a model, multilevel analysis is the most appropriate method of investigation (Jones 1997; Steenbergen and Jones 2002).[6] Multilevel analysis allows for the simultaneous modelling of individual *and* contextual determinants to explain individual behaviour. Only by modelling the hierarchical structure of the data (each measurement at the individual level can be clearly assigned to a measurement at the national level), can the contextual influence on individual behaviour be explained (Klein 2004). Accordingly, multilevel analysis is of particular importance for the analysis of the effects of institutional arrangements on individual behaviour in comparative analyses. The underlying principle of multilevel analysis is based on the modelling of contextual variance:

(1) $y_{ij} = \beta_{0j} + \beta_1 X_{1ji} + \varepsilon_{ij}$, where

(2) $\beta_{0j} = \beta_0 + \mu_{0j}$ (μ_{0j} stands for the residuals at the contextual level).

Such a model implies that individual behavior can vary between nation states. In other words, unlike standard regression analysis, this model does not assume that individual school performance is the same in all countries (constant β_0); but rather it can vary from context to context. Additionally, multilevel models allow for the modeling of particular macro-level characteristics (in the present case, educational systems and policies), which explain the variance at the macro-level (the variance between the EU countries).

An expansion of the model, which is crucial in our endeavour to explain social inequality of education, is to model different effects of explanatory variables between countries - that is, random slopes. If we explain these random slopes by country specific characteristics (e.g.,

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[6] Analyses which only address the aggregate or the individual level do not provide satisfactory results. While the first procedure is criticised for not taking the original data structure into consideration and for its inherent danger of committing the ecological fallacy, the second design cannot cope with the hierarchical structure of the data and tends to underestimate the standard errors necessary for statistical tests. Although a hierarchical structure can be modelled for individual data by integrating dichotomous contextual variables, single-level analysis cannot account for differences between contexts (Jones 1997).

educational system and policy) we call those cross-level interactions, as the effect of a micro-sociological variable on another micro-sociological variable is moderated by macro-political factors. In this study we are particularly interested in a specific cross-level interaction: Our main focus lies on the variability in the effect of a pupil's social background on his/her school success. According to figure 1, nation specific education conditions W_j are supposed to moderate the effect of the micro relation between social background (X_k) and school success (Y). The final model including these cross-level interactions is shown in equation 4, where $\gamma \cdot W_{kj} \cdot X_{kij} + \mu_{kij} \cdot X_{kij}$ stands for the effect the contextual variable W_k has on the influence of the individual variable X_k.

$$(4)\ Y_{ij} = \beta_0 + \beta_1 \cdot X_{1ij} + ... + \beta_{kj} \cdot X_{kij} + ... + \beta_n \cdot X_{nij} + \alpha_1 \cdot W_{1j} + ...$$
$$+ \alpha_k \cdot W_{kj} + ... + \alpha_n \cdot W_{nj} + ... + \gamma \cdot W_{kj} \cdot X_{kij} + \mu_{oj} + \varepsilon_{ij} + \mu_{kij} \cdot X_{kij}$$

Y_{ij} specifies school performance of a pupil *i* in country *j*. This score is explained by the overall mean (β_0), individual variables (X, their estimates β, respectively), and characteristics of the country (W, their estimates α, respectively). With this approach, not only are individual differences (ε_{ij}) modelled, but also differences between contexts (μ_{0j}) and in the effects of independent variables ($\mu_{kij} \cdot X_{kij)}$.[7]

Our results will disclose whether the relationship between pupils' individual social background (parental educational attainment) and pupils' school success is modified by education policy conditions. The identification of cross-level interactions would support our basic theoretical assumption that education policy enables to enforce or diminish social inequality of education. Referring to Brambor et al. (2005) it does however not suffice to present the interaction effects of the individual social background and an education policy condition on school performance. Indeed it is necessary to compare the marginal effects of the policy condition on the school success in several social classes. With respect to our hypothesis we assume differing effects of education policy conditions on individuals' school success between several social classes (states of parental education). Depending on our hypotheses table 2 contains the expected marginal effects of education policies and system conditions on mathematic capabilities for groups with high and low parental education

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[7] For a more thorough discussion of the method we refer to the relevant literature on MLA (Bullen *et al.* 1994; Ditton 1998; Goldstein 1987, 1995, 1999; Hox 1995; Jones 1997; Jones and Duncan 1996, Steenbergen and Jones 2002). All models were calculated with MLwiN (Goldstein et al. 2002) using Restricted Iterative Generalized Least Squares (RIGLS) (Goldstein 1995).

background. These expectations should be confirmed in the result table 4. For example, referring to our Hypothesis I, preschool education should weaken the degree of social inequality of education. Therefore we expect that the effect of a high preschool enrolment on school success is definitely significant positive in groups with low parental education while it should be either weaker positive significant, not significant, or even negative significant for higher parental education states. In these cases social inequality of preschool education would indeed diminish social inequality of education. Accordingly, our result tables display the marginal effect of a special policy condition on pupils' individual school success for the specific states of parental educational attainment.

Table 2: Expected Marginal Effects of Education Policies and Education System Conditions on Mathematic Capabilities for high and low Parental Education Background.

Education System	Preschool Education		Private School Tradition		Tracking System	
Parental Education:	*Low*	*High*	*Low*	*High*	*Low*	*High*
	sig. + *and* sig. weak +		n.s. *and* sig. +		sig. - *and* sig. +	
or	sig. + *and* n.s.		sig. - *and* sig. +		n.s. *and* sig. +	
or	sig. + *and* sig. -				sig. - *and* n.s	
Education Policy	**Pupil/Teacher Ratio**		**All-day School**		**Expenditures**	
Parental Education:	*Low*	*High*	*Low*	*High*	*Low*	*High*
	sig. - *and* n.s.		sig. + *and* n.s.		sig. + *and* n.s	
or	sig. - *and* sig. weak -		sig. + *and* sig. weak +		sig. + *and* sig. weak +	
or			sig. + *and* sig. -		sig. + *and* sig. -	

Measurement

For the <u>measurement of our individual level variables</u> (individual social background and school performance) we use data of the 2006 PISA study. Our PISA sample consists of 1,791,941 15-year old pupils in the 25 EU member states. We measure <u>individual school performance</u> by means of the mathematical test score in PISA (plausible value in mathematics, PV1MATH). To focus on this single subject seems to be justified since school performance in different subjects highly correlates (Pearson's r with plausible in reading = 0.78; Pearson's r with plausible value in science = 0.88). Moreover, it can be assumed that mathematics is the most suitable subject to compare since it is the most "universal" one; it is rather independent from country specific characteristics such as linguistic heterogeneity.

Our central <u>individual level explanatory variable is pupils' social background</u>, which is measured by parents' highest level of education. Following Bourdieu (1983: 186), the transmission of (incorporated) cultural capital in the family is the least transparent, but socially most effective educational investment. In current research familiar cultural capital is still seen as the strongest social class factor of children's educational attainment (Henz and Maas 1995; Schimpl-Neimanns 2000; Rössel and Beckert-Ziegelschmid 2002). Parental educational attainment is a blanket indicator of familiar cultural capital, as it implies certain capacities to transfer special knowledge among generations. Additionally, parental educational attainment also exhibits strong correlations with further proxies for familiar social status, namely with financial resources (Pearson's r with ESCS[8] = 0.78). The parental educational attainment is therefore used in many studies as a proxy for social background (Blossfeld and Shavit 1993; Henz and Maas 1995; Schimpl-Neimanns 2000; Rössel and Beckert-Ziegelschmid 2002; Barone 2006; Georg 2006).

Our explanatory factors on the <u>macro-societal level</u> are the <u>national education systems and policies</u>. For our contextual indicators we chose a point in time prior to 2006 which is relevant for the cohort of PISA 2006 in order to model causality and to avoid endogeneity problems. Concerning the educational context of a country, we distinguish between system variables on the one hand and policy variables on the other. *The education system* is described by a country's tradition to build on preschool arrangements and private schools and by whether there is tracking into several school types during secondary education. The availability of preschool facilities is measured by the average enrolment ratios of children of the relevant age group from 1993 to 1995.[9] Moreover, we use a dummy variable indicating whether more than 75 percent of children are enrolled in preschool (= values of 1) or whether the share of children enrolled is smaller (0). This dummy can account for the fact that the effect of preschool arrangements on both school performance and social inequality of education is possibly not linear: A positive effect on equality of education can be expected only if an education system provides preschool facilities on a broad and encompassing basis. The private school tradition is measured by the average enrolment ratios of pupils in private schools from 2000-2005 compared to all pupils enrolled in public and private schools (ISCED level 1-4).[10] Finally, in order to measure tracking in secondary education a dummy variable based on case studies (Postlethwaite 1995) is constructed: This dummy variable describes if

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[8] ESCS= Index for economic, social, and cultural status in family
[9] Date provided by the UNESCO education statistics
[10] Data provided by Eurostat

there is any tracking into several school types during secondary education (1) or not (0).[11] Furthermore, we integrate three variables into the analyses that describe aspects of *educational policy*, i.e., how schooling is actually implemented and how much money a country invests in its education system. More precisely we use the pupil-teacher ratio, the number of hours taught in secondary education, as well as public education expenditures in order to account for these aspects. The pupil-teacher ratio describes for how many pupils one teacher is responsible in the lower secondary education in 2004.[12] The number of hours taught is measured by the minimal number of school hours taught in secondary education during the school year 2002-2003.[13] This variable can also be seen as an indicator for the development of all-day schools (see chapter 3). We aim to conclude from a low number of school hours taught per year to a low development of all-day school and vice versa. Finally, the public education expenditures for primary and secondary education (ISCED 1-4) are measured as a ratio per capita—expenditures per relevant number of pupils.[14]

In addition to our central explanatory variables, some other potential influencing factors from the macro and micro-levels should be considered as *controlling variables*. On the micro-societal level we control for gender, cultural home possessions, affluent home possessions, the language spoken at home, and migration status. Our controlling variables on the macro-societal level are the fertility rate, income inequality, share of foreigners, ethnic fractionalisation, GDP[15] per capita, the unemployment rate, the share of young people, and the women's employment rate. These are common control variables that describe the economic and societal situation of a country beyond its education system.

Empirical results

Table 3 contains some preliminary estimations and tests that are necessary before testing our central hypotheses. The first pure individual model (model 1 in table 3) shows that pupils' mathematical scores systematically vary not only between individuals, but also between the EU member countries, even if individual effects are controlled for. Roughly 11 percent of total variance in school performance can be found at the country-level. The presence of

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[11] We do not further distinguish for the number of tracks. If there is tracking, most countries in the EU track their pupils between the ages of 11 and 13. An exception is Poland, where pupils are first tracked at the age of 15 (Data delivered by case studies of Postlethwaithe 1995).
[12] Data provided by the UNESCO education statistics
[13] Data provided by www.eurydice.org
[14] Data provided by Eurostat
[15] Gross Domestic Product

contextual variance justifies the application of multilevel analysis (or the modelling of an educational context). Finally, and most importantly, the estimations clearly show that social background influences pupils' school performance: the higher parents' level of educational attainment and the higher cultural and home possessions, the more successful pupils are at school.[16]

Table 3: Individual Model and Basic Contextual Model to Explain Pupils' School Performance

	Model 1 Individual variables	Model 2 Random slope	Model 3 Communist Legacy
Constant	446.83 (5.93)***	439.52 (7.80)***	401.09 (24.83)***
Individual Effects			
Male student	13.50 (0.43)***	13.46 (0.43)***	13.46 (0.43)***
1st gen. foreign pupil	-35.34 (1.28)***	-35.76 (1.28)***	-35.87 (1.28)***
Different language	-7.49 (0.81)***	-7.24 (0.81)***	-7.25 (0.81)***
Cultural possessions	11.39 (0.29)***	11.51 (0.29)***	11.53 (0.29)***
Home possessions	15.01 (0.31)***	14.49 (0.31)***	14.48 (0.31)***
Parents' educational attainments	10.57 (0.16)***	12.22 (1.12)***	9.67 (1.20)***
Contextual effects			
Communist legacy			-68.20 (12.84)***
Populations' education			0.92 (0.37)**
Cross-level interaction			
Communist Legacy * Parents' Education			6.43 (1.90)***
Random effects			
Parents' educational attainment			
- variance		30.22 (8.77)***	20.75 (6.11)***
- covariance		-136.08 (51.43)***	-59.09 (28.47)***
Individual variance	6897.18 (24.90)***	6857.04 (24.76)***	6857.05 (24.76)***
Contextual variance	863.75 (244.48)***	1497.16 (426.85)***	736.99 (213.53)***
N	153449	153449	153449
Number of countries	25	25	25
-2loglikelihood	1791941	1791140	1791116

Note: All models were calculated using the "second order penalized quasi-likelihood" method and RIGLS (Goldstein/Rabash 1996). ** = significant at least on the 5 % level, *** = significant at least on the 1 % level.

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[16] Moreover, the following initial results can be concluded from Model 1: First, male students do better in mathematics than female pupils. Second, first generation aliens and pupils speaking a foreign language at home (a different language than the one of the PISA test) exhibit a below-average school performance.

In the second step we add a random slope for parents' education[17] to the model in order to test whether the influence of parents' educational achievement on pupils' school performance varies among the EU countries. Model 2 (tab. 3) shows that social inequality of education indeed varies among the EU member states. Model 3 (tab. 3) reveals that a considerable part of this context variance is due to differences between former communist countries and the western European states. Social inequality of education seems to be more pronounced in the former communist member states of the EU.[18]

In the following, model 3 (tab. 3) serves as our basic model which is used to test whether the education system and education policy of a country moderate social inequality of education. To this end, the educational system and policy variables are individually added to expand the model and cross-level interactions with parents' educational attainments are modelled.[19] Table 4 presents the results of these calculations, displaying the marginal effects of the educational context variables depending on a pupils' social background separately for the eastern and western European Countries. Our previous finding that inequality of education is distinctly different between former communist and western European countries (model 3, tab. 3) indicates that the mechanism behind social inequality of education, and thus the influence of education system and policy, also could be a different one. Table 4 confirms that the policy effects indeed differ among western and former communist EU member states.

First, table 4 specifies the effect of *preschool enrolment* for former communist and western countries separately. In contrast to our hypothesis a high preschool enrolment fosters educational inequality in the former communist countries. In these countries a high enrolment in preschool facilities implies a high degree of social inequality. Preschool facilities in the western European countries, however, do not moderate the relationship between pupils' social background and their school performance.

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[17] For reasons mentioned above we will focus on the impact of parental educational attainment on pupils' school performance in the following analyses, while we will not further investigate different effects of home possessions and the other individual factors on school performance. This must be subject for further research.

[18] Finally, model 3 further includes the educational level of a country. In further analyses not presented here different models including a number of other potential contextual variables were calculated. The two variables (communist legacy and educational level of the population) proved to be the most important controlling factors and are therefore used for the following analyses. In contrast the fertility rate, an indicator measuring income inequality, the share of foreigners, an index of ethnic fractionalization, GDP p.c., the unemployment rate, the share of young people as well as women's employment rate did not reach statistical significance nor could they improve the explanatory power of the model.

[19] Due to the small number of units at level 2 and some substantial correlations between the policy variables (*e.g.*, Pearson's r between the hours of schooling and the pupil-teacher ratio amounts to 0.55) it is not possible to simultaneously include the educational context variables in one model. Our results have to be regarded against this background.

Second, when referring to *private school tradition*, a somewhat similar conclusion can be drawn: For the former communist EU member states our initial hypothesis is highly supported, as a strong private school tradition promotes school performance of higher social classes and ultimately widens the gap between social classes regarding educational opportunities. For the western EU member states we find a rather consistent positive effect of a strong private school tradition on pupils' school performance for all social groups (except for the very lowest one[20]).

Third, by distinguishing between western and former communist EU countries we find a significant effect of *the all-day school* on social inequality of education. In the western EU member states the number of hours taught at school positively affects the school performance of the lowest social stratum. This provides us with some support for our hypothesis presuming that the enriched environment at school over a longer daily period particularly benefits pupils from lower social classes by balancing different familiar conditions. In the former communist countries this relationship is however reversed. The effect is also significant for the lowest familiar social class only, but it is negative: The longer pupils are taught at school in former communist member states, the poorer the individual math capability of pupils from the lowest social group.

Forth, *education expenditures* do not influence the degree of social inequality of education in the western EU countries. Conversely, pupils in former communist countries do significantly better at school if they live in a country with relatively high investments in education. However, social inequality is only slightly affected, as this promoting effect applies to all social classes but the lowest.

Finally, *whether or not pupils are tracked in secondary education* and the *pupil-teacher ratio* do not significantly influence social inequality of education. This does apply for both the former communist and western EU countries.

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[20] However, since the marginal effect of private school is quite constant across all social classes, this could be due to the relative small number pupils in this group.

Table 4: Marginal Effects of Educational Policy Variables on School Performance for Eastern and Western Countries

Parent's level of education	Preschool attendance 1995		More than 75% of children in preschool		Share of private schools		Tracking	
	Communist Legacy	*Western democracies*	*Communist Legacy*	*Western democracies*	*Communist Legacy*	*Western democracies*	*Communist Legacy*	*Western democracies*
0	-0.03	0.02	2.06	-0.36	0.25	0.52	-5.21	9.59
1	0.12	0.05	10.23	1.21	1.65	**0.51***	0.56	10.23
2	0.24	0.08	18.4	2.77	3.05	**0.51***	6.32	10.87
3	0.37	0.12	26.56	4.34	**4.44***	**0.50***	12.08	11.51
4	0.51	0.14	**34.73***	5.90	**5.84***	**0.50***	17.85	12.14
5	0.64	0.18	**42.89***	7.46	**7.24***	**0.49***	23.61	12.78
6	0.77	0.22	**51.06***	9.03	**8.64***	**0.49***	29.38	13.42

Parent's level of education	Pupil/Teacher Ratio		Hours of school per year		Educational expenditures [a]	
	Communist Legacy	*Western democracies*	*Communist Legacy*	*Western democracies*	*Communist Legacy*	*Western democracies*
0	-10.9	0.81	**-0.12***	**0.14***	0.90	0.10
1	-9.49	1.01	-0.09	0.13	**0.98***	0.06
2	-8.07	1.20	-0.05	0.11	**1.00***	0.01
3	-6.66	1.40	-0.02	0.11	**1.15***	-0.03
4	-5.24	1.59	0.01	0.11	**1.23***	-0.02
5	-3.83	1.79	0.04	0.10	**1.31***	-0.12
6	-2.41	1.98	0.07	0.09	**1.39***	-0.16

Note: * = Marginal effect is significant (at the 10%-level). Separate estimations are shown only for those variables that exhibit different effects between eastern and western countries. [a] = Marginal effects multiplied by 100.

Summing up, we can draw three main conclusions from our analyses: In a first step we found that social inequality indeed differs among EU member states. We identified random slopes for the relationship between individual social background and pupils' mathematic performance in the PISA 2006 test. In a second step we ascertained a serious difference regarding social inequality of education between the former communist and the western EU member states. The effect social background has on school performance systematically varies between the two country groups. In a third step we investigated our main hypotheses about the moderating effects of education systems and policies on the degree of social inequality. In this regard, the main result is that the education system and policy context moderate the degree of social inequality of education in western and former communist EU member states in different ways. For the western EU member states we find some support for our hypotheses concerning the development of the all-day school: Pupils from the very lowest social class significantly benefit from a greater number of hours taught at schools, which in turn means that the effect of social background on school performance is somewhat weakened. In the former communist member states the situation is different. First, in contrast to the western EU member states, our hypothesis on the private school tradition is confirmed for the former communist member states: A strong private school tradition boosts the degree of social inequality of education in those countries. All other hypotheses are not confirmed by our analyses. Some education system and policy conditions that were expected to decrease social inequality of education even exhibit an inverse effect. Particularly in the former communist states, high preschool enrolment and a lower number of hours taught at school tend to penalise pupils from lower social classes, as compared to their wealthier counterparts, thereby increasing social inequality of education. This result can be interpreted to mean that even the access to (beneficial) educational institutions seems to be unequally distributed among social classes, serving to influence inequality of the educational process. We attribute this to the ongoing transformation process in the former communist member states. Figure 2 displays the inverse relationship between societal affluence and educational inequality in eastern and western Europe. While wealthier countries are simultaneously the more equalised societies in the west, this is contrary in the east. It seems that only a minute privileged fraction of the society has benefited from the transformation processes.

Figure 2: Economic Development and Social Inequality of Education
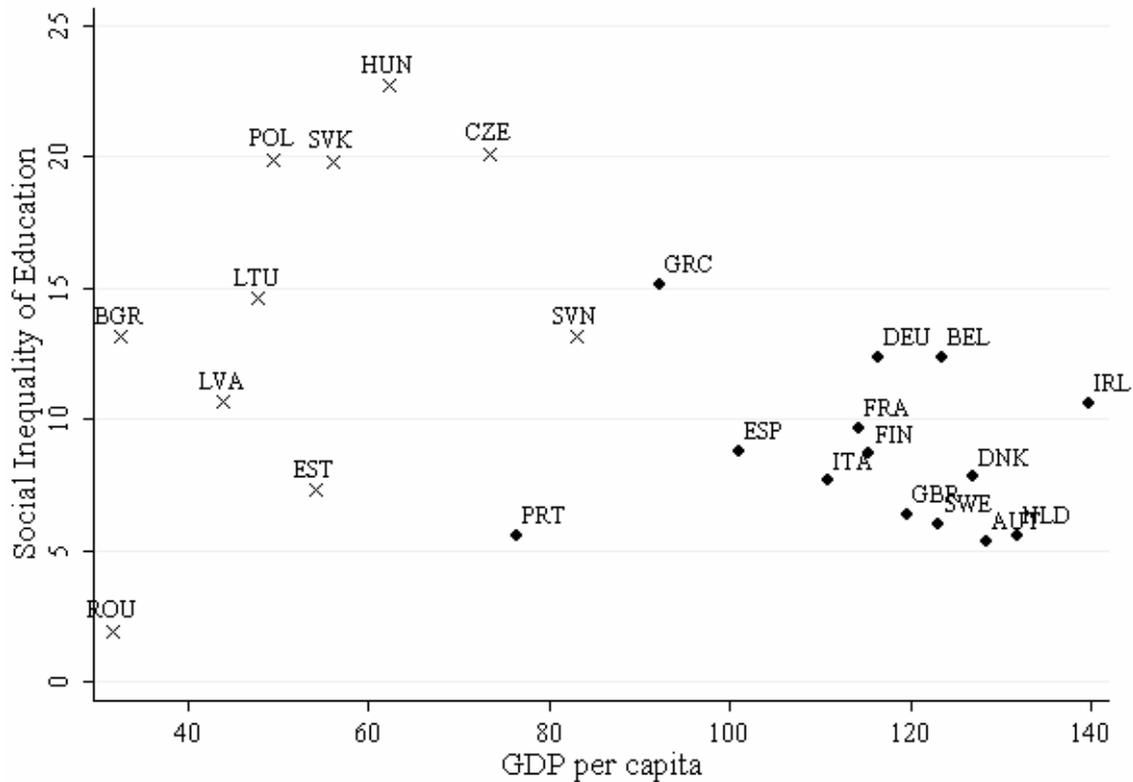
Note: Social inequality of education measured = OLS multiple regression coefficient of parents' educational attainment of school performance. Former communist EU member states are labelled with a cross, while western EU member states are presented by spots.

Conclusion

Based on Globalisation Theory we expect converging national policy outputs and policy outcomes. This assumption should especially hold true for the EU member states, as the EU is a prototype of a supranational organisation (Knill 2005). We apply these assumptions to the field of education policy. Our core questions are whether social inequality of education, as an education policy outcome, persistently varies among the EU member states and, furthermore, if these different degrees arise from lasting differences in national education systems and policies.

Our results indeed indicate substantial differences in the degree of social inequality of education among the EU member states. Using data from the 2006 PISA study, we show that the impact of social background on school performance differs between countries (random slopes). This relationship is apparently more pronounced in the former communist EU

member states than in the western countries. This result implies that the (former) political and economic conditions continue to persist as determinants of present educational structures.

Are persisting differences in national education policies responsible for the varying degrees of social inequality of education? Based on our analysis we have to subsume that the significant effects of educational policy conditions are rare and rather weak. Indeed, we conclude that some education policy conditions are able to moderate the relationship between individual social background and school performance. However, two restrictions must be made. First, the impact of education policies on the degree of social inequality varies systematically between western and former communist EU member states. None of the explored education system and policy conditions similarly affects educational inequality in western and former communist EU member states. None of our hypotheses could be confirmed for the whole geographic scope of the EU. It is thus not only the degree of social inequality of education that varies between western and former communist EU member states, but the mechanisms behind these inequalities as well. Second, in only two cases did our results provide stringent support for our hypotheses at least for one country group: Within the former communist countries a strong private school tradition tends to increase social inequality of education. While relatively high shares of private schools promote school performance of the upper social classes, this is not the case for pupils from the lower social stratum. Moreover, in western countries the number of hours taught at school has a significant positive effect on pupils from the lowest social class, while all other groups of pupils are not substantially influenced by this measure. This can be interpreted to mean that the development of the all-day school may reduce social inequality of education. Where we find additional significant effects of education system and policy variables on social inequality the direction of effects run contrary to our hypotheses. Most importantly, in former communist countries high preschool enrolment rates and all-day school tend to rather enforce high degrees of social inequality of education. We think that these results must be seen against the background of the ongoing transformation processes in these countries. After the breakdown of the communist regime, the eastern countries were characterised by a society artificially equalised from above. During the first years of transformation the situation changed, albeit unequally across social stratums. It was mainly the upper social classes that could rather easily and rapidly adapt to the free market economy and thus improve their (economic) situation. As a result social inequality (in general and of education in particular) is presently more

pronounced in eastern countries compared to the western member states, as not all social stratums have been fully affected by the transformation process.

While we initially started from the puzzling observation that among the EU member states various degrees of social inequality of education are preserved even in the context of globalisation, we now end up with two new quandaries: First, why do educational system and policy measures not produce the theoretically assumed equalising effects? And second, if it is not the educational system and the policy, what then explains the degree of social inequality?

The first puzzle seems to be easier to solve. A preliminary explanation for the missing effects refers to the quality of the data - namely, the features of the education system are very difficult to measure and thus to compare. For instance, even if two countries track pupils in secondary education, the way and the moment of tracking, as well as the number of tracks, may differ. As a result the outcome of tracking will also be a different one. A second attempt to explain the lack of findings follows Mitchell's (1995: 175) critical evaluation of educational policy identifying the widespread "situation of altering everything while changing nothing". More precisely: The success of an educational policy is not determined by whether it is formally implemented or not, but rather on how it is realised. In accordance with findings from other areas of social policy (cp. Stadelmann-Steffen 2008: 400), this indicates that substantial public educational expenditures or relatively high shares of preschool attendance do not automatically reduce social inequality of education; they do so only if these measures are conducted in a way that allows pupils from lower social classes to profit. A study of the Bertelsmann Stiftung (2008) reveals for the German case that the eastern German federal states indeed have more early childcare facilities. However, the quality of these childcare facilities seems to be better in the western federal states. This strongly supports our interpretation that the implementation of supportive institutions does not automatically imply its effectiveness on educational outcomes. Therefore, in order to truly lower social inequality of education, our findings suggest that more specific instruments intentionally aligned with reducing this inequality need to be implemented.

The second puzzle is more difficult. Not only are our results concerning educational system and policy effects quite weak, there is also no other explanatory factor that can convincingly explain differences in social inequality of education. Despite having tested a wide variety of different explanatory factors controlling for economic, societal, political and cultural country

conditions, they barely reached statistical significance in the models. By far the strongest macro-variable in the model is the distinction between former communist and western countries, which mainly captures diverse historical experiences, as well as different degrees of economic and societal development. We thus conclude that the differing amount of social inequality of education can be largely ascribed to the democratic and economic tradition of the EU member states. Nevertheless, a substantial part of the variance between the EU member states remains unexplained. The question as to which factors explain the considerable variance of social inequality of education among the EU member states therefore remains.

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