Education, economic inequality, and the promises of the social investment state*

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Abstract

Since the mid-nineties, social policy orientation in advanced societies has moved towards the social investment state model. This transformation of social policy towards preventive (“early”) investment in education rather than (“later”) economic redistribution, or towards social investment rather than “passive” social spending, raises the question of whether, and if so, what kind of associations exist between educational and economic inequalities. This question is addressed in this paper using an international comparison of 20 advanced economies. The results of the analyses suggest that education as an “equalizer” should not be overestimated, and that social investment policy should not be narrowly understood as “education only politics”. Direct redistribution is much more likely than education to combat poverty in advanced societies. Yet, the analyses also show that reducing educational deprivation (as one dimension of inequality of educational outcomes) positively influences the degree of economic inequality. In addition, reducing economic inequalities in the parent’s generation enhances equality in educational outcomes in the children’s generation.

Keywords: Educational inequalities, economic inequalities, poverty, social investment state, vocational education and training

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1. Introduction: Education and social policy

In economics, human capital is seen as one of the most important factors for productivity, economic growth, and social prosperity (cf. Green, Preston, and Janmaat 2008; Reich 1992). Furthermore, human capital is regarded as a solution for a range of social problems. This perspective has been widely adopted in the political arena. In numerous party platforms and political statements, education is now being hailed as a key means of combating poverty and promoting social equality. A recent European Commission strategy paper, for instance, states that “strengthening education is one of the most effective ways of fighting inequality and poverty” (Commission of the European Communities 2009: 5). In such political statements, education and labor force participation are often reduced to the notion of equal opportunities (or equality of life chances). An example for this is the response of the German federal CDU-SPD coalition government to an enquiry submitted by the parliamentary group of the Left Party (Die Linke) in 2006 concerning “the growth of social inequality in Germany”: “The federal government is convinced that poverty, social exclusion, and inequality are first and foremost a problem resulting from a lack of educational and labor market opportunities (…” (Deutscher Bundestag 2006: 2, translated by the author). In addition, the focus on education and the effectiveness of social spending logically conveys “a marked orientation to the future with enhanced opportunities for children” (Perkins, Nelms, and Smyth 2004: 4), by assuming that “starting earlier means ‘greater accumulations’ (Sherraden 2003, p. 3)” (ibid.: 7) and higher returns (Heckman 2006: 1901).

This new orientation of social policy towards preventive (“early”) investment in education rather than (“later”) economic redistribution, or towards social investment rather than “passive” social spending, is what Giddens (1998) has defined as the “social investment state”. Others, more critical of the idea of shifting away from “traditional” social policy measures towards education and equality of life chances, call this approach as “education only politics” (Brown and Tannock 2009: 389) or the “educational welfare state” (Brown 2011: 29).

One of the reasons why this social policy model have gained so much currency might be the fact that promoting education does not touch on controversial issues of material redistribution such as taxing income, wealth, property rights, or inheritances (Keep and Mayhew 2010: 566; Mickelson and Smith 2004: 362). Education is regarded as a means of creating social prosperity, social cohesion, and economic growth in a way that seems to make everyone a winner (Keep and Mayhew 2010: 568). The only losers are those who make no effort for achievement in education and the labor market, and those—naturalizing social inequalities—who are incapable of doing so (for a critical analysis, cf. Breen and Goldthorpe 2001: 81;
Inequalities that result from unequal efforts and abilities are justified—according to meritocratic reasoning—and do not require any compensation (Lefranc, Pistolesi, and Trannoy 2008: 516).

The arguments in favor of the social investment state rest on the proposition that a positive correlation between educational inequalities and economic inequalities exists. In other words, it is assumed that more education leads to increasing labor force participation, which, of itself, will aid to combat social exclusion, poverty, and economic inequality more effectively than “passive” welfare spending. In terms of education, though, it remains mostly un(der)specified which type of educational inequality—inequality of opportunities or inequality of outcomes—is supposed to enhance economic equality. These two interrelated issues are the subject of this paper. With the help of an international comparison, I examine (1) whether reducing educational inequalities leads to a decrease in economic inequalities in society, and (2) which type of educational inequality plays a larger role in this respect.

After defining the relevant terminology (Section 2), I discuss the current state of research (Section 3). Next, I present some theoretical considerations regarding possible associations between educational and economic inequalities and formulate several hypotheses for the international comparison (Section 4). Section 5 is devoted to issues of methodology and operationalization. In the subsequent section, empirical findings are presented (Section 6). The paper concludes with a discussion of the findings with respect to the role of education for social policy (Section 7).

2. Different types of inequality

We have first to distinguish between inequality of educational opportunities and inequality of educational outcomes (or results).\(^2\) The former refers to the unequal opportunities of social groups (in this paper: social origin groups) to access higher educational positions (cf. Heath 2001). The higher the chances of children from higher-class backgrounds in accessing higher educational positions as compared to the chances of those from lower-class backgrounds, the greater is the degree of inequality of educational opportunities in a given society.\(^3\)

Inequality of educational outcomes, by contrast, refers to the structure of the educational positions themselves and their overall distribution, especially to the variance in the educational outcomes achieved. That is, the greater the distance between the highest and the lowest educational outcome (e.g. in the form of acquired degrees or competencies), the

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\(^2\) There is also a third type of inequality (albeit one to which sociology tends to pay little attention): inequality of starting conditions or “levelling the playing field.” Applied to education it means: Whereas equality of opportunity is about reducing the relevance of social differences between families in children’s educational attainment, equality of starting conditions means reducing differences between families as much as possible before children even begin their education: “(...) before the competition starts opportunities must be equalized” (Roemer 2000: 18). In an intergenerational perspective, there is a strong connection between reducing inequalities in children’s starting conditions and parents’ economic (class) inequalities. In that sense, this third type of inequality is (indirectly) included in the present paper (see in Section 4).

\(^3\) Statistical measures are, for instance, odds ratios or social gradients in regression analyses.
greater is the inequality of educational outcomes in a given society. An important dimension of inequality of educational outcomes is the extent of educational deprivation, which is—similar to the definition of (material) poverty—the share of the population whose level of education is insufficient for participating in labor markets or in social life (cf. Solga 2009).

The policy implications of the two types of educational inequalities are quite different. Whereas the former asks for changes in the selection (or sorting) procedures in education systems, the latter embraces changes in the educational structure of degrees and sectors, and alterations of various issues of teaching.

The relationship between the two types of educational inequalities may vary considerably, as “educational opportunities open to each individual separately [equality of opportunity] does not mean ‘open to all’ [equality of outcome]” (Hirsch 1977: 6, insertions added by the author). One possible extreme would be completely equal educational opportunities combined with high degree of inequality of educational outcomes. This would be a society characterized by vast differences in the competencies and/or degrees achieved by its citizens; in which at the same time, though, social origin does not determine who received a high-level education and who received a low-level education. The other extreme would be total equality of educational outcomes (i.e. everybody achieves the same educational outcome), which would necessarily (or logically) come along with equal opportunities. Now, neither total equality of opportunity nor total equality of outcomes will ever exist. The extent to which each of these two types prevail, however, and the nature of the relationship between them, cannot be derived formally by means of logical conclusion. Education is embedded in social structures and developments, and it is these structures and developments, as well as policy-making processes, that determine whether each of these two types of educational inequalities becomes larger or smaller (see Sections 3 and 4).

Keeping in mind our research question, economic inequalities are defined as inequalities in the distribution of disposable incomes in this paper. These distributive inequalities initially result from inequalities in market incomes (i.e. in wages and salaries). However, how pronounced the inequalities in the actual disposable household (net) income (i.e. earnings after taxes and transfer payments) are, eventually depends on the extent of redistribution that occurs as a result of a given country’s social security system. Hence, in our analyses, we need to distinguish between economic inequalities before and after welfare-state redistribution. In addition, poverty, as insufficient economic resources for participating in social life, will be considered as an important sub-dimension of economic inequality as well in the analyses.

3. What do we (not) know?

The relationships between the two types of educational inequalities have hardly been studied
in sociology. In addition, so far researchers have focused on inequality of educational opportunities. Hence, existing education research helps answer the question of who is educationally deprived, but is rather unable to explain the respective proportion of educationally deprived individuals in a given country or a given period. In analogy to social mobility research, relative (educational) mobility opportunities (or, in statistical terms, odds ratios, which are independent of marginal distributions) are studied much more frequently than absolute educational mobility rates or changes in the educational distributions of parents’ and children’s generation. Interestingly, Müller (2001: 9919) arrives at the same conclusion with regard to social mobility research: absolute mobility rates “have been hardly studied.”

The narrow research focus on equal opportunities is astonishing insofar as studies on social mobility have shown that absolute and relative mobility rates (may) evolve in very different ways. Whereas the former represent opportunity structures that govern attainment, the latter map the movements within these (exogenously defined) structures (cf. Erikson and Goldthorpe 2001: 363f.). A simple thought experiment illustrates this fact in the field of education: If—contrary to what is currently the case in Germany—children from different social classes were distributed across the four different types of secondary school degrees (no degree, Hauptschule degree, Realschule degree, or Abitur degree) in proportion to their share in the population, we would have a situation of (total) equality of opportunity; at the same time, however, the percentages of these four degrees would have remained the same and ditto the level of inequality in educational outcomes. An important research question would therefore be to what extent and which educational policies and public investments in education do in fact produce “high levels of education for as many people as possible” (Allmendinger 2009: 4, translated by the author)—a research question that has received far too little attention in sociology of education, yet.

Why is it that sociologists have been paying far more attention to inequality of educational opportunities than to inequality of educational outcomes? Inequality of opportunity violates key justice principles of modern societies. By contrast, inequality of outcomes, if solely based on differences in abilities, effort, and achievement, are not perceived as a problem (of justice)

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4 Exceptions with regard to the top end of the educational hierarchy (the Abitur or university study) include Breen and his co-authors 2010 and Bukodi and Goldthorpe 2011; regarding the bottom end (educational deprivation or less than upper secondary degree) see the contributions in Quenzel and Hurrelmann 2010, and Solga 2005b, 2008.

5 Studies on educational expansion (in the 20th century) have focused on inequality of opportunity as well (e.g. Müller 1998). As a result, the fact that the proportion of educationally deprived individuals has remained unchanged in Germany, has been overlooked in discussion, for example. In the 1960s, there were 20 percent educationally deprived individuals, who mainly consisted of those who dropped out of school without a degree; today, those same 20 percent are the dropouts and the graduates with no more than a Hauptschule diploma (cf. Solga 2009).

6 Exceptions are e.g. Allmendinger (1999), Allmendinger and Nikolai (2010).

7 In addition, studies on inequality of opportunity tend to narrow the focus even further—namely, to individual educational decision-making (Breen and Jonsson 2005: 227). With this focus, research is more about how educational institutions affect educational opportunities, and less about why those institutions, in a certain manner, exist in the first place.
Proposing a different point of view, Young (1958), in his highly critical scenario of a meritocratic society, and Rawls (1971), in his theory of distributive justice, treat talent and social origin as equally arbitrary and as fortunate coincidence of birth. Neither of the two represents individual merit, and hence—in terms of justice—does not have to be rewarded in any special way (cf. Bénabou 2000: 317). Despite these objections, sociologists pay more attention to unequal opportunities (or meritocracy) than to unequal outcomes, and thereby tend to treat the former as the primary source of social inequality and as a positive concept (cf. Heath 2001: 4723). This unequal attention to the two types of educational inequalities, however, increases the risk that inequality of educational outcomes, as well as its impact on social life, is not only treated as a secondary issue in research, but also in political and public discourse (cf. Meyer 1994: 730).

Likewise, the relationships between educational and economic inequalities are mostly studied only in terms of unequal opportunities (e.g. regarding access to higher labor market positions or the risk of unemployment), and not with respect to the degree of inequality in economic outcomes (or income inequalities and poverty rates). The issue of individual returns to education, too, is ultimately one of unequal opportunities—namely, an individual’s opportunities to reach certain income positions in labor market competition, given his/her educational degree and the respective opportunity structure defined by the existing supply and demand for skilled labor (cf. Leggewie and Solga 2012; Müller 2011: 9921).

In summary, at this point, the question of whether reducing educational inequalities will in fact help increase economic equality in society is not being addressed in current sociological research; neither is the question of whether (widely studied) inequalities of educational opportunities or (neglected) inequalities of educational outcomes are of paramount importance in this context.

4. The relationships between educational and economic inequalities in theory

Based on theories, which are widely applied in contemporary sociological research, a number of (partly competing) hypotheses can be generated that either support or question a link between educational and economic inequalities, and that address the role of these two types of educational inequalities.

4.1 Education as a functional prerequisite of economic growth and prosperity

According to functionalist modernization theory, schooling primarily serves socialization functions and, among other things, ensures that the future workforce acquires the necessary

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8 If educational success is conceptualized as the result of talent/intelligence and effort (Young 1958: 4), the latter could serve to legitimize unequal rewards. The notion of “effort”, however, is itself subject to a powerful process of social definition; moreover, by rewarding effort, social origin could regain its importance “through the backdoor” (in cases where differences in family’s socialization contribute to differences in effort) (cf. Roemer 2000: 22f.).

9 More theoretical approaches could be added here to support one hypothesis or another. Due to space restrictions, they have not been included.
skills and qualifications (cf. Durkheim 1972: 50; Parsons 1959). As societies move on to become increasingly post-industrial or knowledge-based economies, acquiring qualifications and education is assumed to become a *functional prerequisite* for entering the majority of labor market positions (cf. Bell 1994; Reich 1992).

According to modernization theory, this growing demand for skilled labor requires other forms of social inequality—namely those that rewards education and achievement in order to create incentives for individuals to strive for upward mobility, thereby activating existing talents and abilities. Accordingly, so the argument goes, education should no longer be an exclusive privilege of the higher classes of society; what is needed, rather, is education for all—regardless of ascriptive characteristics of birth (such as class, race, ethnicity), but within the boundaries of talent, aptitude, and intelligence (Bell 1994: 692; Parsons 1970). What is presumed here, in other words, is an evolutionary trend towards more equality of educational opportunities, which is caused by economic development.

Due to privileged learning opportunities, children from higher-class backgrounds have usually been able to transform their learning potential into educational achievement, also in times of unequal educational opportunities, whereas children from lower-class backgrounds mostly have not. That is why the reservoir of talents required for further economic development is believed to reside with the latter group. Creating greater equality of educational opportunities is thus intended to increase the participation of children from lower-class backgrounds in higher education, which then raises the general level of educational attainment in society.

In summary, the basic assumption is that modern societies, faced with the imperatives of economic developments and technological progress, will evolve into societies characterized by a high level of education, and in which the distribution of both educational and labor market opportunities is based on performance and meritocratic principles (cf. Bell 1994; Blau and Duncan 1967; Parsons 1971). From these thoughts we can derive two hypotheses regarding educational inequalities:

**H1:** Equality of educational opportunities should be first and foremost a *means* of increasing the average level of education (the actual *objective*). We therefore expect to find empirically: the lower the level of inequality of educational opportunities, the higher should be the average level of education in society.

Moreover, even under conditions of total equality of educational opportunities, differences in people’s abilities and motivation should produce unequal educational outcomes, the extent of which should vary, however, depending on the achieved degree of equality of educational opportunities. The reason for this is that—according to modernization theory—the goal of raising the average level of education ultimately means a decrease in the proportion of people with low education, and an increase in the proportion of people with high education. Hence,

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10 The underlying theory of stratification is the status-attainment model (cf. Blau and Duncan 1967; Sewell, Hauser, and Portes 1969).
the reduction of inequality of educational opportunities should not be accompanied by
downward mobility among the higher classes; rather, it should primarily be accomplished by
upward mobility among the lower classes as they access higher educational positions. This
leads to the second hypothesis:

H2: A higher degree of equality of educational opportunities should come with a lower
degree of inequality of educational outcomes—and that with regard to both the
distribution of educational outcomes and the proportion of the lowest-level educational
attainment group.

What effects would this have on the degree of economic inequality? Functional sociologists
assume that setting incentives for educational achievement in order to fully exploiting and
develop individual educational potentials, calls for competition (based on a strong link
between individuals’ level of education and the occupational positions they achieve) and
unequal rewards, and thus unequal incomes (cf. Bell 1994; Davis and Moore 1945; Parsons
1971). Nevertheless, income inequalities may be reduced—namely due to a decrease of
inequality of educational outcomes (especially educational deprivation). According to the
underlying productivity assumption, a greater proportion of better-educated workers should
result in an increasing share of (employed or employable) workers with higher wages (and in
a lower poverty rate). In addition, an upgrading of the job structure in terms of more highly-
qualified (and thereby higher paying) jobs may occur due to the possibility of technological
development at a greater pace. We can thus formulate as hypothesis 3:

H3: The lower the level of inequality of educational outcomes (especially of the proportion
of educationally deprived individuals), the lower should be the degree of inequality in
market incomes.

To prove that such a positive effect of reducing inequalities of educational outcomes on
economic inequalities does in fact exist, hypothesis 4—considering the causal order—would
have to be true:

H4: The lower the degree of inequality of educational outcomes within one birth cohort,
the lower should be (later) the degree of inequality in market incomes among that
cohort.

The confirmation of these four hypotheses would support the aforementioned arguments in favor
of the social investment state model: more equality of educational opportunities would
lead to an increase in educational attainment in society and a decrease (although not
elimination) of inequality of educational outcomes, which, in turn, would lead to a reduction
of economic inequality (in the labor market)—even if the latter, according to the functionalist
perspective, should never be abolished entirely.

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11 Even Rawls (1971) saw economic inequalities as a necessary incentive—combined, however, with a call for
simultaneously maximizing the welfare of the most disadvantaged members of society (Bénabou 2000: 317).
4.2 Education as status competition

In conflict theories, hypotheses claiming a positive link between education and economic inequality warrant a fair amount of skepticism. Here education is regarded as a key means for the social reproduction of status groups or social classes (cf. Bourdie 1984; Parkin 1982). According to this view, the formation and transformation of educational institutions is not the result of economic developments, but rather of political conflict and social struggles for the redistribution of resources. That is why conflict theories do not presume that there is an evolutionary trend towards more equality of opportunities and outcomes in the educational system.

Conflict theorists focus their thinking on the question of how education can serve as a legitimate means of reproduction, or, in other words, how it is accomplished that “the transmission of cultural capital is no doubt the best hidden form of hereditary transmission of capital” (Bourdieu 1986: 246), and continues to remain so. A well-known explanation for this phenomenon has been provided by the concept of credentialism (Collins 1979). Unlike functionalist modernization theory, here the widespread use of educational credentials as a key recruitment criterion is not because of economic necessities but rather due to the fact that, in democratic societies, the allocation into the limited number of higher-status and better-paid labor market positions has to be widely accepted as objective, rational, and fair (Bills and Brown 2011: 1; Brown 2011: 21; Weber 1994). At the same time, recruitment into these positions need to be done in a way that legitimately allows for the continued intergenerational transmission of status positions and privileges (cf. Collins 1979; Parkin 1992; Themelis 2008).

Educational certificates fulfill both of these functions: like private property, they are deemed a legitimate criterion for distributing social positions (Parkin 1982: 178), and they can be passed on from parents to their children by providing favorable learning opportunities and economic resources in the family (Sørensen 2000: 1548). It is this dual function that Weber had in mind when he wrote as early as 1921: “When we hear from all sides the demand for an introduction of regular curricula and special examinations, the reason behind it is, of course, not a suddenly awakened ‘thirst for knowledge’ but the desire for restricting the supply for those positions and their monopolization by the owners of educational certificates. (…) As the education prerequisite to the acquisition of the educational certificate requires considerable expense and a period of waiting for full remuneration, this striving means a setback for talent in favor of property.” (1991/1921: 242f.)

These thoughts lead to the following hypotheses, which challenge the functionalist perspective. Since a higher level of education (regardless of the distance to the lowest educational group in society) may be used as a legitimizing means to monopolize the higher labor market positions, there should—contrary to what is claimed in hypotheses H3 and H4—H3*: neither be a positive correlation between the degree of inequality of educational outcomes and economic inequalities (in the labor market),
H4*: nor should a lower degree of inequality of educational outcomes within one birth cohort lead (later) to a lower degree of inequality in market incomes among that cohort.

Thus the underlying assumption is that the degree of inequality in educational outcomes does not affect income inequalities, because if any difference in educational attainment exists, it can be used for status reproduction. If these two hypotheses can be confirmed, orienting social policy more towards education would rather serve to legitimize economic inequality than to reduce it—especially if social policy is understood as “education only politics,” and welfare-state redistribution is being scaled back as a result.

4.3 The primacy of job structures and welfare-state redistribution

In addition to conflict theory, we may also draw on labor market and welfare-state research for further explanations of the limited power of education to level economic inequalities.

Labor market researchers have questioned the interrelatedness of changes in the distribution of educational outcomes and changes in job structure, as claimed by functional sociologists. A prominent example of their criticism is the so-called *displacement hypothesis* (cf. Blossfeld 1983). Here, the returns to individual educational outcomes are presumed to depend on the quantitative and qualitative relationship of labor supply and demand. According to the vacancy chain (or job competition) model (cf. Sørensen 1977; Sørensen and Kalleberg 1994; Thurow 1975), this relationship becomes relevant first and foremost via the type and number of job vacancies. Whether, when, and where such vacancies occur, however, as well as for whom and at what salaries, is determined primarily by the labor market and by workplace regulations. Consequently, changes in the distribution of educational outcomes do not necessarily entail changes in the status of jobs.

From this point of view, the degree of economic inequality (in market incomes) is not determined by the educational system but by the existing job structure. Based on this causal reasoning (and considering the arguments advanced by conflict theorists), we might—with respect to hypothesis 4—derive a reverse pattern of causation concerning the relationship between educational and economic inequalities, with labor market competition being the cause of competition in the educational system (Brown, Lauder, and Ashton 2011: 156; Erikson 1996: 99). That is, a more egalitarian salary structure (i.e. fewer labor market inequalities\(^\text{12}\)) might serve to ease competition in the educational system, thus enabling educational policy interventions and changes that favor a higher degree of equality of educational opportunities and outcomes. Empirically, we might therefore expect to find:

H5: The lower the degree of market income inequality, the lower should be the degree of inequality of educational opportunities and outcomes in subsequent generations.

\(^{12}\) This might have an additional effect in terms of inequality of starting conditions (see footnote 2): fewer economic inequalities in the parents’ generation might bring on greater equality in the children’s generation with respect to learning opportunities and educational aspirations—resulting in fewer inequalities of educational opportunity and outcome (cf. Blossfeld and Shavit 1993).
Regarding the social investment state model, confirming this hypothesis would suggest that reducing the differences in the potential earnings in the labor market could also be an effective contribution to education policy towards more equality—by helping to reduce status competition in and through the educational system.

Concerning welfare-state redistribution, Boudon (1974) as well as Jencks and his co-authors (1972) were among the first to point out that redistribution and labor market regulation have a direct and, thus, should have a greater impact on economic inequalities in society than promoting equal educational opportunities. Similar arguments can be found in recent scholarship on poverty and the welfare state (e.g. Butterwegge 2011; Butterwegge, Klundt, and Belke-Zen 2008), as well as in macro-sociological education studies (e.g. Brown 2011; Brown, Lauder, and Ashton 2011; Brown and Tannock 2009; Keep and Mayhew 2010).

Adopting a welfare-state point of view, however, does not mean denying the inclusion of education policy aspects into social policy (cf. Allmendinger and Nikolai 2010). If policymakers acknowledge that social risks (e.g. illness, unemployment, poverty) cannot be protected against by higher levels of education alone, then welfare states that combine redistribution and the reduction of educational inequalities could be more successful in reducing economic inequalities by pursuing a policy of “double protection” than welfare states that only rely on redistribution (cf. Allmendinger 2009: 5; Allmendinger and Nikolai 2010). The reduction of educational inequalities might (indirectly) lead to a reduction of market income inequalities. Picking up on the thoughts of hypotheses 3 and 4, this indirect effect could result from increased participation in the labor market in society, especially due to a lower proportion of educationally deprived individuals. In addition to (direct) welfare-state redistribution, this may help reduce the income inequalities that remain after taxes and transfer payments.13 The corresponding hypothesis would be:

H6: The higher the level of welfare-state redistribution and the lower the inequality of educational outcomes, the lower should be the degree of economic inequality after taxes and transfer payments.

Regarding the potential of reduced inequality of educational opportunities, two different hypotheses can be formulated. First, a higher degree of equality should not—in addition to redistribution—affect the level of economic inequality, because given its primacy, the job structure (including the salary structure) might be remain unchanged even with fewer inequality of educational opportunities. The hypothesis would be:

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13 In the hypotheses that follow—in contrast to previous hypotheses—economic inequalities after taxes and transfer payments have to be taken into account, since the extent of redistribution itself should have little influence on the differences in market incomes. Accordingly, based on the data used here (see Section 5), no significant correlations between the indicators of redistribution and the income inequalities before taxes and transfers could be found.
H7: A higher degree of equality of educational opportunities should not—in addition to the extent of redistribution—reduce the degree of economic inequality after taxes and transfer payments (also controlling for the level of inequality of educational outcomes).

On the other hand, more equal educational opportunities might be just an “indicator” of less competition in the labor market and/or a more egalitarian salary structure\textsuperscript{14}—in addition to a higher extent of redistribution of wealth from top to bottom in a given society—and, therefore, do “contribute” to (but not cause) a positive correlation with less economic inequalities. This idea leads to hypothesis 8:

H8: The higher the level of welfare-state redistribution and of equality of educational opportunities, the lower should be the degree of economic inequality after taxes and transfer payments (controlling for the level of inequality of educational outcomes)).

5. Research design and data

To test these hypotheses, we will use an international comparison that allows for variation in the degrees of the different types of inequality. We will include only advanced economies, since the discussion about the social investment state is not framed as a comparison between poor countries (e.g. in Africa) and rich countries such as Germany or the United States; neither is it framed as a historical comparison of developments within single countries. Rather, the discussion is about comparing today’s advanced economies. That is why the analysis refers to the 1990s and the 2000s.

For an appropriate comparison, it is important to ensure that the information on educational inequalities and educational attainment are, in fact, comparable. Regarding educational credentials, this is only possible to a very limited extent—even if we use the International Standard Classification of Education (ISCED) provided by UNESCO (cf. Schneider 2008). An upper secondary degree, for example, represents a general education degree in countries without an elaborate vocational training system, whereas in countries that do have a strong vocational training system (such as Germany or Switzerland), it is an occupation-specific degree (i.e., a skilled worker’s degree).\textsuperscript{15}

Similar limitations apply to international comparisons of the extent of educational deprivation (as one dimension of unequal educational outcomes): In Portugal and Spain, for example, 70 and 48 percent of the 25-to-64-year-olds, respectively, had not attained an upper secondary degree in 2009, whereas in the United States and the Czech Republic, that proportion was

\textsuperscript{14} This could explain why, contrary to conflict theory, less inequality of educational opportunities—against the resistance of the higher classes—might have been accomplished in the first place.

\textsuperscript{15} Similar difficulties arise for the comparison of the respective percentage of the population holding a tertiary (or university) degree. Depending on the kind of the vocational training system, educational credentials for certain careers (e.g. nurses, kindergarten teachers, or a number of technical occupations) are awarded either through vocational training programs or at colleges and universities. Whether the quality of training in these occupations is higher at universities than it is in non-university vocational training programs, or whether it should be regarded as equal, continues to be a matter of debate (cf. Bosch and Charest 2010).
11 and 9 percent, respectively (cf. OECD 2010b). As a consequence, persons with less than upper secondary education would have to be called “educationally deprived” in countries such as the United States and the Czech Republic, but not in Portugal or Spain, where their level of educational attainment does not fall below the respective national mean.

That is why *measurements of competence* (e.g. in reading proficiency or document literacy) are used in this paper. This approach has many advantages, including the following two: first, competence measurements are metrical measurements, allowing to calculate different distributional measures of educational distribution. Second, they provide a comparable categorical measurement of (absolute) educational deprivation—namely, that group of persons who consistently score at the lowest competence level. In the literature, this group is referred to as “functional illiterates”, because even though they do have basic reading skills, these skills “do not stand the practical test in many everyday situations” (Deutsches PISA-Konsortium 2001: 363, translated by the author).

Due to differences in countries’ educational systems, the timing of competence testing is critical. Measurements at the end of compulsory schooling or of lower secondary education (i.e., in adolescence) map inequalities in the general schooling system, but not inequalities in the educational system as a whole. Because of the vast diversity of educational options and participation rates following the period of compulsory schooling, it is essential to also compare adult competencies (i.e. after individuals have more or less completed their educational biographies). That is why the following analysis will draw on data referring to 15-year-olds, taken from the OECD Program for International Student Assessment (PISA) 2000 and 2009, as well as on data from the OECD International Adult Literacy Survey (IALS), carried out between 1994 and 1998. The latter study provides fewer countries for the comparison than the PISA studies used.

For the analysis, only those OECD countries will be considered which are classified as advanced economies, which participated in PISA 2009, and which have no more than two missing values in the factors that are of interest here (excluding the IALS indicators). In total, data from 20 countries are available (see Appendix Table A1); for the analysis using the IALS indicators, the total is 17 countries. This is a small sample; however, it is the maximum number of countries, which are of interest for this comparison and for which data are available. Although the comparison does not rest on a random sample of countries, significance test will be applied for assessing the strength of the correlations. Due to the small sample size, a significance level of $p<0.1$ is used. For some of the analyses involving the IALS indicators in combination with those of economic inequality, the total number of countries would fall below 15. This sample size was deemed too small for conducting these analyses.

All of our hypotheses represent statements at the macro level. Moreover, a macro-level empirical approach is called for here because the presumed effects of education (i.e. the *distribution* of educational outcomes and of educational opportunities) cannot be observed at
the individual level, but become visible only at the aggregate level. The individual-level processes underlying these macro distributions are not the subject of this paper. Studying individual behavior—against the backdrop of the findings from the macro analysis—would be a task for future research (see Section 7).

Some of the hypotheses assume only correlations between two distributions; others assume a causal direction. To address the issue of endogeneity in case of the latter, data from different time periods will be employed (see Table 2).

Table 1 displays the indicators used to measure the various dimensions of educational and economic inequalities, as well as the extent of welfare-state redistribution. To generate more robust results, multiple indicators for each factor are utilized. The measures used to determine economic inequalities are based on the equivalent household income (see comment in Table 1). On the one hand, this imposes a restriction on the analysis, because the theoretical considerations presented in Section 4 referred to the distribution of individual incomes. On the other hand, this restriction has also an advantage with regard to international comparison, allowing us to take into account country variations in household sizes (its possible influence on politically determined wage scales).

Given the small sample size, we use the level of economic development or prosperity (measured by the natural logarithm of the gross domestic product16) as a parsimonious control for the ceteris paribus conditions (level of economic and technological development, economic structure and job structure, as well as related differences in social structure).

6. Empirical findings

We start with findings on the development of educational inequality in the 20 countries since the 1990s, including the comparison of the two points of measurement (youth and adult age). We then examine the correlations between educational attainment and inequality in educational opportunities (hypothesis 1) and the two types of educational inequalities (hypothesis 2), followed by the findings on the relationship between education and economic inequalities (hypotheses 3 to 5), and on the role of education combined with welfare-state redistribution (hypotheses 6 to 8).

Development of educational inequality

--- Insert Table 1 here ---

--- Insert References 16 here ---
Contradicting the claims of functionalist modernization theory, the comparison of the social gradient within the countries in the PISA studies 2000 and 2009 reveals that there is no evolutionary trend towards more equality of educational opportunities (see Appendix Table A1). Although the gross domestic product (as an indicator of economic wealth) increased in all countries between 1998 and 2010, inequality of educational opportunities declined in only eight of the 20 countries. In five countries the social gradient did not change, whereas in seven countries it even increased. The same is true for inequality of educational outcomes. The proportion of low-competence students (PISA-% level I)—or educationally deprived youth—increased in eight countries and, so did the relative proficiency advantage of the ninth decile over the first decile (PISA D9/D1) in five countries as well.

Comparing the educational indicators of the 15-year-olds (i.e. typically at the end of lower secondary education) with those of the adult population yields two interesting differences with regard to the relationship between the level of economic development and of educational inequality. First, the correlation between the social gradient of the 2009 PISA study (as an indicator of equality of educational opportunities) and the (logarithmic) GDP of about ten years earlier (1998) is not significant.\(^{17}\) The social gradient of the IALS study, in contrast, does correlate significantly with the GDP of 1998 (r=-0.45, p=0.07) and, moreover, the correlation is not positive but negative—contrary to what is assumed by functionalist modernization theory. Countries characterized by a higher degree of inequality of educational opportunities among the adult population thus more often have reached a higher level of economic prosperity. The seven countries out of 17 that are marked by an higher-than-average GDP in spite of having a higher-than-average social gradient include the United Kingdom, New Zealand, and the United States, as well as the three countries with an elaborate vocational training system (Denmark, Germany, and Switzerland), plus Norway, which has a mixed vocational training system.

Second, the proportion of low-competence adults (IALS-% level I) correlates very strongly with the GDP of 1998 (r=0.67, p=0.01), whereas there is no such correlation for low-competence 15-year-olds (PISA-% level I; r=0.02).\(^{18}\) What is more, the countries in which the proportion of low-competence adults is lower than that of low-competence youth once again include, in particular, countries with an apprenticeship or mixed system of vocational training (such as Denmark, Germany, Norway, Switzerland, and the Czech Republic), as well as Belgium and Sweden, which have a school-based vocational training system. In addition, those are the countries with the lowest proportions of low-competence adults.

These two different results with respect to educational inequalities among the youth and the adult population suggest, first, that the level of economic development in advanced economies is more relevant to educational participation and inequalities after the period of compulsory

\(^{17}\) Measured at different points in time, so that economic growth may potentially have had an impact on the educational system and the educational outcomes of subsequent generations.

\(^{18}\) Calculated as the correlation between the logarithmic GDP (1998) and PISA-% level I (2009).
schooling. Secondly, individual’s final educational attainment and, thus, inequalities of educational outcomes are more likely to be determined by educational options after the period of compulsory schooling.

Furthermore, these findings illustrate that looking at adolescents is insufficient for studying educational inequalities. Especially when drawing international comparisons, which have to take account of the wide-ranging differences between national vocational training and higher education systems, it is important to look at educational inequalities after people have gone through the entire educational system. That is why, whenever possible, in this paper education indicators of both at the end of compulsory schooling (PISA data) and of adults (IALS data) will be used for testing the hypotheses.

Educational attainment and the two types of educational inequality

For the adolescent population, the evidence for hypothesis 1 is mixed. We do find that the lower the degree of inequality of educational opportunities, as expressed by the social gradient (PISA 2009), the higher is the average level of educational attainment (PISA-mean 2009). Yet, there is no significant correlation between the mean attainment (2000) and the odds ratios (2000). Also the findings for the adult population (IALS indicators) reveal that hypothesis 1 cannot be confirmed. Contrary to H1, countries with a higher degree of inequality of educational opportunities (IALS-SG) are more likely to produce a higher level of educational attainment (IALS-mean) in their adult populations.

The findings for hypothesis 2 continue in the same vein. As expected, the correlations between a low degree of inequality of educational opportunities and a low degree of inequality of educational outcomes are significant for the different indicators for the youth population (PISA indicators), whereas for the adult population (IALS indicators) the correlations once again go the opposite (and “wrong”) direction. For the latter, countries with larger inequality of educational opportunities (IALS-SG) are more likely to have less inequality of educational outcomes (IALS-mean). These countries once again include Germany, Denmark, Norway, and Switzerland—that is, mostly countries with a strong company-based apprenticeship system. This lower degree of inequality of educational outcomes is one reason—despite more inequality of educational opportunities—why there is a relatively high average level of competence among the adult population (see findings for hypothesis 1). This finding points to the complementary effect of well-developed vocational training systems—serving as a safety net as well as a mechanism of social closure (Shavit and Müller 2000).

As a result, neither the functionalist hypothesis on the nexus between inequality of educational opportunities and population’s mean level of educational attainment (H1) nor the one on the nexus between educational inequalities of opportunities and of outcomes (H2) can be generally confirmed.
By testing hypotheses 3 and 4 as well as 3* and 4*, we now answer the first “social investment state” question—namely whether a lower degree of inequality of educational outcomes translates into less economic inequality (see Table 2). For the adult population, according to hypothesis 3 (and contrary to H3*), the findings show the expected positive correlation between the size of the Gini coefficient before taxes/transfers (as indicator of economic inequality in labor markets) and the proportion of educationally deprived individuals (IALS-% level 1), but economic inequality does not correlate with the variance in educational outcomes (IALS-2 SD). Moreover, we find support for hypothesis 4*, but not for H4. None of the indicators of inequality of educational outcomes at the end of lower secondary education (PISA-D9/D1 or PISA-2 SD, 2000) correlates significantly with the indicators of economic inequality (Pre-Gini or Pre-poverty, late 2000s), meaning that inequalities of educational outcomes at the end of lower secondary education do not have an impact on future economic inequalities in the labor market.\textsuperscript{19} Taken together, these findings suggest that, in line with the functionalist hypothesis 3, a decrease in inequality of educational outcomes (especially in educational deprivation) might lead to higher employment rates, while at the same time, reducing the variance in the distribution of educational outcomes nevertheless leaves the potential of the higher-educated to monopolize access to higher (income) positions in labor markets untouched—as expected in conflict theory hypothesis 4*.

Now, the question remains of whether we find support for a reverse pattern of causation between educational and economic inequalities, as expected in hypothesis 5. Does a reduction of economic inequalities (e.g. connected with less labor market competition or smaller differences in family learning environments) lead to a decrease in inequality of educational opportunities and outcomes? With regard to the poverty rate, the findings—presented in Table 2—show the expected positive correlation between poverty (Pre-poverty, mid-1990s) and inequality of educational outcomes (PISA-D9/D1, 2009). A decrease in the poverty rate during the 1990s is very likely to have contributed to less inequality of educational outcomes in 2009. Moreover, that correlation cannot be found for poverty rates after taxes and transfer payments (OLS coefficient not significant). This may suggest that it is first and foremost an increase in employment (with wages above the poverty line) in the parents’ generation that produces this positive, inequality-reducing effect in the children’s generation. Regarding the Gini coefficient (Pre-Gini, mid-1990s), no significant influence exists. What is more, neither

\textsuperscript{19} Using the Gini coefficient for the 25-to-29-year-olds (rather than the 18-to-65-year-olds) would have been more appropriate for testing hypotheses 4 and 4*. This coefficient is not available, however. Nevertheless, an analysis using the Gini coefficient for the working-age population should at least display a tendency towards a positive impact of unequal educational outcomes on economic inequalities. That is not the case, even if we disregard the level of significance. On the one hand, for the different indicators, there were positive as well as negative effects of a low degree of inequality of educational outcomes; on the other hand, standardized effects, with a maximum of 0.16, were quite small.
a lower degree of income inequality nor a lower poverty rate (mid-1990s) resulted in less inequality of educational opportunities in 2009. In this sense, one might argue that less labor market competition does not lead to less status competition in the educational system. In sum, hypothesis 5 may only be confirmed in part.

The positive findings on H3 for the adult population and on H5 for inequality of educational outcomes partly support a social investment state strategy—a strategy, however, that should be geared more towards reducing inequalities of educational outcomes, rather than inequalities of educational opportunities. On the one hand, less inequality of educational outcomes correlated with less economic inequalities (presumably as a result of higher rates of labor force participation). On the other hand, achieving a lower degree of market income inequalities in the parents’ generation is helpful for reducing inequality of educational outcomes in the (following) children’s generation.

Can education serve as an “added protection”?

Finally, to which extent can indirect, education-based measures supplement direct measures of welfare-state redistribution to help reduce economic inequalities? Table 2 displays—as expected—that a higher degree of (direct) welfare-state redistribution (Re-Gini and Re-poverty, late 2000s) has a significant and highly positive impact on the level of economic inequality (Post-Gini and Post-poverty, late 2000s).

Yet, looking at education, hypothesis 6 cannot be confirmed. Reducing inequality of educational outcomes (PISA-% level I or PISA-D9/D1, 2000) does not additionally reduce economic inequalities (after tax/transfer). This finding is in line with our finding regarding hypothesis 4. Moreover, also a lower degree of inequality of educational opportunities does not contributes to a reduction of economic inequalities—as expected in hypothesis 7, but contrary to H8.

In the light of these findings, it hardly comes as a surprise that first and foremost the type of welfare state regime—each with its specific mix of redistribution policies and its respective orientation, on the one end, towards equality of opportunities (like the liberal welfare states) and, on the other end, towards equality in outcomes (like the social democratic welfare states), with the mediterranean and conservative welfare states in between—rather than education has a major influence on economic inequalities. Social democratic welfare states, for example, are typically characterized not only by less economic inequalities before taxes/transfer but also by a comparatively high level of welfare-state redistribution via taxes and transfer payments—both contributing to a lower degree of economic inequalities in disposable

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20 The effects of the education indicators are not “suppressed” by a correlation with the indicators of redistribution. They are insignificant for all of the education indicators in H6 to H8 (and far from p<0.1).

21 The results are the same without the two control variables (which, because of the small sample size, might cause an overestimation of the model).

22 Because of their system transformation since the 1990s, the post-socialist countries are treated as one category, despite the differences in welfare state regime.
household income (see Appendix Table A1). Moreover, social democratic welfare states are also marked by successful (lifelong) education policies leading in most of these countries to lower rates of educational deprivation (see Appendix Table A1). Denmark, Finland, Norway, and Sweden (besides Germany) had a much smaller proportion of low-competence adults (IALS-% level 1). Considering the confirmation of hypothesis 5 and the non-confirmation of hypothesis 4 (or the confirmation of H4*), we may presume the existence of a mutually reinforcing interplay between egalitarian structures in the labor market and in the educational system, which help make educational processes and policies less “competitive”. This is why social democratic welfare states may be regarded as prototypes of a social investment state “standing on two legs” (Allmendinger 2009: 1, translated by the author).

7. Conclusion: “Social protection cannot be secured through education alone.”

The main research question of this paper has been: To which extent are education and a reduction of educational inequalities effective means of fighting poverty and reducing economic inequalities? This question is linked with two issues concerning educational inequalities themselves. First, what are the empirical relationships between inequality of educational opportunities and inequality of educational outcomes? And, second, is it justified that sociology of education devotes much more attention to the former than to the latter?

The results of the analysis have shown that the relationship between the two types of educational inequality is far from clear, and strongly dependent on the time in the life course at which it is studied. As expected in hypotheses 1 and 2, a positive correlation between the two types of educational inequality, and with the average level of education, could be found for students at the end of lower secondary education. By contrast, the findings for the adult population, who have passed through the entire educational system, suggest that a higher degree of inequality of educational opportunities may well be accompanied by a lower degree of inequality of educational outcomes (especially regarding educational deprivation). The key factor here is whether there are upper secondary education tracks embedded in a strong vocational training system, or whether the educational options from the upper secondary level onwards are characterized by a polarized skill formation regime (which divides the population between “some college” or “no further education participation”). In other words, less inequality of educational opportunities does not automatically lead to a reduction of educational deprivation.

The findings on hypotheses 3 to 8 suggest that the role of education should not be overestimated as means of fighting poverty and reducing inequalities in society (cf. Allmendinger and Nikolai 2010; Themelis 2008: 428). Direct measures of welfare-state redistribution are far more effective in this respect than indirect measures involving the educational system. This interpretation is further supported by the finding that reducing

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poverty in the parents’ generation can help to reduce inequalities of educational outcomes in the children’s generation (H5). Moreover, only less inequality of educational outcomes, strictly speaking of educational deprivation, had a significant and positive effect on the lowering of economic inequality (H3)—presumably through a higher level of labor market participation resulting from more equal educational outcomes (cf. Green, Preston, and Janmaat 2008: 14). The degree of inequality of educational opportunities, by contrast, had no significant effect here (H7).

This latter finding should by no means lead us to conclude that reducing inequality of educational opportunities is irrelevant: after all, a significant positive correlation between inequality of educational opportunities and inequality of educational outcomes does exist at least at the end of lower secondary education (H2). Nevertheless, if the aim is to reduce economic inequalities and to enable more people to participate in society and the labor market, preference should be given to reduce inequalities of educational outcomes (H3). In the wake of such a policy, inequalities of educational opportunities might decrease as well (cf. Allmendinger 1999; Quenzel and Hurrelmann 2010). Thus, for the social investment state to have positive effects, we need educational policies that aim at “providing high levels of education to as many people as possible”, as well as “achieving high levels of effectiveness and equality of outcomes” (Allmendinger 2009: 4, 5, translated by the author). That is why educational deprivation, as a distinct dimension of poverty (cf. Allmendinger 1999) and as an infringement on individual freedoms and people’s opportunities for self-fulfillment (cf. Sen 1985), should not be a “secondary” concern to educational sociologists. Its importance with regard to justice and social cohesion is as “primary” as that of inequality of opportunity.

Furthermore, given the differences in the findings for the two different points of measurement (at the end of lower secondary education and at adult age), it is to stress that countries, due to variations in their educational systems (especially regarding vocational training), have different options to address the issue of educational deprivation.

What do these findings mean with regard to the social investment state model? On the one hand, a narrow social policy focus on equality of educational opportunities may serve to reinforce the idea of competition (cf. Cavanagh 2002; Solga 2005a), and may thus prevent education policies designed to reduce inequality of educational outcomes. The latter would require a reinforcement of social solidarity rather than competition (cf. Green, Preston, and Janmaat 2008: 138), because such education policies “would be contrary to the interests of voters and the desires of the welfare state clientele”, and likely to “trigger conflicts over the distribution of wealth” (Allmendinger 2009: 5, translated by the author).

On the other hand, pursuing an “education only politics” would involve the risk that other strategies (such as redistribution, living wages, or increasing employment), which are sometimes more effective for solving social and economic problems, may fall into oblivion (cf. Bénabou 2000: 337; Brown, Lauder, and Ashton 2011: 15ff.; Brown and Tannock 2009: 389; Della Fave 1986: 477; Keep and Mayhew 2010: 565–66; Mickelson and Smith 2004:
Achieving a good balance between education and social protection against social risks, as realized in the Scandinavian welfare states (at least in the past), is therefore necessary.

Yet, even if the social policy effects of education are smaller than many may expect, the analyses in this paper are by no means intended to question the social importance of education. More education is a value in and of itself, which may have many positive effects in society, ranging from aspects of culture, civic engagement, health, and motivation to questions of subjective well-being and positive approach to life (e.g. Brown 2011: 30; Desjardins and Schuller 2006: 15). But again, it is not education alone that matters here; rather, it is education in concert with a variety of other factors that foster these positive outcomes (Desjardins and Schuller 2006: 15).

Finally, it is important to emphasize that the analyses of this paper are only a first step towards an overdue collaboration of sociology of education, labor market and social policy research. In-depth (i.e. historical) country studies are needed to explore which combinations of education and redistributive policies have been particularly successful in reducing economic inequalities. Futures research will also have to look at processes at the micro level, e.g. how, exactly, reducing economic inequalities in the parents’ generation helps to result in lower educational inequalities in the children’s generation, but also how such a positive effect may be undermined and thus rendered insignificant.
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Table 1: Indicators for the operationalization of the hypotheses

<table>
<thead>
<tr>
<th>Construct</th>
<th>Variable name</th>
<th>Indicators</th>
</tr>
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<tbody>
<tr>
<td>Mean level of education</td>
<td>Mean level of education</td>
<td>PISA-mean</td>
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<tr>
<td>Adults</td>
<td>IALS-mean</td>
<td>Mean IALS score, document literacy, 16-to-65-year-olds, 1994-1998</td>
</tr>
<tr>
<td>Inequality of educational outcomes</td>
<td>Inequality of educational outcomes</td>
<td>PISA-D9/D1</td>
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<tr>
<td>Adults</td>
<td>IALS-2 SD</td>
<td>Difference of IALS document literacy scores between one standard deviation below and one above the mean, 16-to-65-year-olds, 1994-1998</td>
</tr>
<tr>
<td>Inequality of educational opportunities</td>
<td>Inequality of educational opportunities</td>
<td>PISA-D9/D1</td>
</tr>
<tr>
<td>Adults</td>
<td>IALS-mean</td>
<td>Mean IALS score, document literacy, 16-to-65-year-olds, 1994-1998</td>
</tr>
<tr>
<td>Economic inequalities</td>
<td>Economic inequalities</td>
<td>PISA-SG</td>
</tr>
<tr>
<td>Adults</td>
<td>IALS-SG</td>
<td>Social gradient of IALS document literacy (measured as mean test score difference per parents’ year of schooling), 26-to-65-year-olds, 1994-1998</td>
</tr>
<tr>
<td>Pre redistribution</td>
<td>Pre redistribution</td>
<td>Pre-Gini</td>
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<tr>
<td>Pre-poverty</td>
<td>Poverty rate before taxes and transfers (max. 60% of the median equivalent household income), mid-1990s and late 2000s</td>
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<tr>
<td>Post redistribution</td>
<td>Post redistribution</td>
<td>Post-Gini</td>
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<tr>
<td>Post-poverty</td>
<td>Poverty rate after taxes and transfers (max. 60% of the median equivalent household income), mid-1990s and late 2000s</td>
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<tr>
<td>Extent of redistribution</td>
<td>Extent of redistribution</td>
<td>Re-Gini</td>
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<tr>
<td>Re-poverty</td>
<td>Percentage reduction of pre-poverty compared to post-poverty: ((\text{Pre-poverty}–\text{Post-poverty})/\text{Pre-poverty}^*100), late 2000s</td>
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<tr>
<td>(Economic) Prosperity</td>
<td>(Economic) Prosperity</td>
<td>GDP</td>
</tr>
</tbody>
</table>

ed. = education

The sources for these data are shown in Appendix Table A1.

a) Calculations are based on the equivalent household income, equivalized using the square root scale (cf. OECD 2008). Here, the household income is divided by the square root of household size.

b) The Gini coefficient is an equal-interval scaled coefficient (between 0 for no inequality and 1 for maximum inequality). There is an extremely high correlation of 0.994 between the Gini coefficient (before taxes and transfers) and the proportion of incomes in the highest income quintile (top 20 percent) (Nielsen 1995: 331). Thus it is a suitable tool for mapping market inequalities.

c) Higher scores indicate a higher degree of redistribution.

d) The data sources for expenditures are more reliable than those for income components, which is why the GDP is used according to the “expenditure approach” rather than the “income approach” (U.S. Bureau of Economic Analysis 2009: 2-11).
Table 2: Empirical results (OLS regressions)

<table>
<thead>
<tr>
<th>Year</th>
<th>Variable(s) X</th>
<th>Variable(s) Y</th>
<th>Control variable(s)</th>
<th>Expected correlation</th>
<th>Not stand. coeff.</th>
<th>Stand. coeff.</th>
<th>p</th>
<th>n</th>
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<tr>
<td>H1: Inequality of educational opportunities &amp; level of educational attainment</td>
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</tr>
<tr>
<td>2009</td>
<td>PISA-SG</td>
<td>PISA-mean</td>
<td>ln(GDP 2010)</td>
<td>negative</td>
<td>-1.25</td>
<td>-.48</td>
<td>.05</td>
<td>20</td>
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<tr>
<td>2000</td>
<td>PISA-OR</td>
<td>PISA-mean</td>
<td>ln(GDP 1998)</td>
<td>negative</td>
<td>n.s.</td>
<td>.58</td>
<td></td>
<td>20</td>
</tr>
<tr>
<td>1994-98</td>
<td>IALS-SG</td>
<td>IALS-mean</td>
<td>ln(GDP 1998)</td>
<td>negative</td>
<td>6.54</td>
<td>.45</td>
<td>.03</td>
<td>17</td>
</tr>
</tbody>
</table>

| H2: Inequality of opportunities and outcomes in the educational system |
| 2000 | PISA-OR       | PISA-D9/D1    | ln(GDP 1998)        | positive             | .09               | .38          | .12 | 20  |
|      |               | PISA-2 SD     | ln(GDP 1998)        | positive             | 12.34             | .34          | .16 | 20  |
|      |               | PISA-% level 1| ln(GDP 1998)        | positive             | 5.65              | .41          | .06 | 19  |
| 2009 | PISA-SG       | PISA-D9/D1    | ln(GDP 2010)        | positive             | .01               | .83          | .00 | 20  |
|      |               | PISA-2 SD     | ln(GDP 2010)        | positive             | 1.37              | .66          | .00 | 20  |
|      |               | PISA-% level 1| ln(GDP 2010)        | positive             | .49               | .71          | .00 | 19  |
| 1994-98 | IALS-SG   | IALS-2 SD     | ln(GDP 1998)        | positive             | n.s.              | .35          |     | 17  |
|      |               |               |                     |                      |                   |              |     |     |

| H3: Inequality of educational outcomes & economic inequality (market incomes) |
| 1994-98 | IALS-2 SD | Pre-Gini (mid-1990s) | ln(GDP 1998) | positive | n.s. | .38 | 15  |
|      |           | Pre-Gini (mid-1990s) | ln(GDP 1998) | positive | .002 | .65 | .02 | 15  |

| H4: Inequality of educational outcomes => economic inequality (market incomes) |
| Timing 1) | PISA-2 SD (2000)  | Pre-Gini (late 2000s) | ln(GDP 2010) | positive | n.s. | .60 | 20  |
| Timing 1) | PISA-% level 1 (2000) | Pre-Gini (late 2000s) | ln(GDP 2010) | positive | n.s. | .51 | 20  |

| H5: Economic inequality (market incomes) => Inequality of opportunities and outcomes in the educational system |

| H6: Inequality of educational outcomes & welfare-state redistribution => Economic inequality after tax/transfer |
| Timing 1) | PISA-D9/D1 (2000) & Re-Gini (late 2000s) | ln(GDP 2010) | positive | n.s. | -.004 | -.73 | .00 |
| Timing 1) | PISA-2 SD (2000) & Re-Gini (late 2000s) | ln(GDP 2010) | positive | n.s. | .004 | -.78 | .00 |
| Timing 1) | PISA-% level 1 (2000) & Re-Gini (late 2000s) | ln(GDP 2010) | positive | n.s. | .22 | -.84 | .00 |

| Abbreviations: stand. = standardized, coeff. = coefficient, ln = natural logarithm |
| Bold: p < 0.1; for estimates p < 0.2, coefficients are shown as well; n.s. = not significant |
| Timing = measured approx. 10 or 15 years apart, so that: 1) educational attainment may have influenced the labor market or economic inequalities in the labor market may have influenced educational competition in the next generation. |
## Appendix Table A1: Data

<table>
<thead>
<tr>
<th>Variable name</th>
<th>PISA-mean</th>
<th>PISA-% level I</th>
<th>IALS-mean</th>
<th>IALS-% level I</th>
<th>PISA-OR</th>
<th>PISA-D9/D1</th>
<th>PISA-2 SD</th>
<th>IALS-2 SD</th>
<th>PISA-SG</th>
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Sources:
- PISA-mean, PISA-% level I, PISA-D9/D1, PISA-2 SD: OECD 2010a (pp. 146–49).
- IALS-mean, IALS-% level 1, IALS-2 SD, IALS-SG: OECD 2000 (pp. 135, 137, 143).
- Re-Gini and Re-poverty: own calculations, see Table 1.