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What Drives Regional Disparities in Educational Expansion: School Reform, Modernization, or Social Structure?

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Abstract: The aim of this study is to empirically investigate the reasons for regional disparities in educational expansion in Germany (i.e., rising rates of general university entrance qualification) on the basis of theoretically relevant influencing factors: changes in school policies, changes in social structure, or general social modernization processes. We pay special attention to the legal framework of schools, which has changed at different times in the German states. Our analysis is based on data from the National Educational Panel Study and on a database on the development of schooling regulations in the German states after World War II. For the analysis, we use two-way crossed random-effects models. Our analyses show that the modernization of school structures is only associated with increasing individual opportunities to access higher school education. However, this association disappears when controlling for social structure and cohort sequence. Rather, the educational expansion of the recent decades is characterized by a changed social structure and, in small parts, by general social modernization processes. In light of our findings, we argue that educational policy adapts school structures to societal changes, opens up new opportunities, yet at the same time reproduces and exacerbates educational inequality.

Keywords: educational expansion; educational inequality; educational policy; regional disparities; Germany

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1. Introduction

Like many industrialized countries, Germany has seen enormous educational expansion (i.e., rising rates of school leavers with university entrance qualifications), especially after World War II, for example, see [1–6]. Although there is a general trend towards higher educational attainment, (inter-)national comparative studies continue to find regional and social disparities in educational expansion, for example, see [4,7]. Such discrepancies are also notable between the German states. Depending on their theoretical perspective, researchers have identified different reasons to explain the educational expansion and the observed disparities, including the tertiarization of the economy with rising skills requirements, the emergence of welfare and nation states, demographic trends, cultural transformation processes, such as improved equality for women, increased educational aspirations resulting, among other things, from improved living conditions, a desire for intergenerational status preservation, or the desire of higher social classes to distinguish themselves from lower classes. Although the various explanations acknowledge the complex mix of factors, micro-sociological explanations have prevailed in the empirical debate, which consider the cost-benefit trade-offs of students and their families in the demand for education as the essential drivers of educational expansion and the associated disparities. The issue of social modernization and, in particular, the role of the education system, has received less empirical attention. In this paper, we address this research gap. Specifically, the aim of this study is to empirically investigate the reasons for regional differences in educational expansion in Germany on the basis of the theoretically relevant influencing

factors: changes in educational policy (measured as changes in school legislation), changes in social structure (measured as parental educational attainment), or general processes of social modernization (measured as cohort differences). Our investigation is guided by the following basic assumptions: Characteristics of educational policy, social structure and general social conditions can differ between regions and change over time. In order to understand regional differences in educational expansion, it is important to take a closer look at the long-term interplay of the various influencing factors. In this study, we address in particular the variations in educational policy across German states over time. The advantage of this state-level approach is that other relevant policy areas, such as social policy, can be neglected because they are largely regulated at the federal level in Germany. The disadvantage of this approach might be the insufficient variation of educational policy configurations when comparing states.

1.1. Research Context and Relevance

Compared internationally, the school systems of all the German states may be characterized as stratified, standardized, and vocation-oriented, for example, see [8–10]. A closer look at Germany, however, reveals enormous potential for comparative research on school systems. Given its federal structure, the country has more or less 16 different school systems, whose legal frameworks have changed at different points in time [11–15]. That is why Germany is a particularly interesting case for studying (regional) educational disparities and the effects of educational policy reforms. Here are a few cursory examples of regional differences in the stratification of school structures: Since the founding of the Federal Republic of Germany, the (West German) states of Hamburg, Berlin, Bremen, Hesse, North Rhine-Westphalia, Rhineland-Palatinate, Schleswig-Holstein, Saarland, and Lower Saxony, for example, have been de-stratified or modernized to some extent (at least until the 2004/2005 school year). Beginning in the 1970s, these states increasingly established comprehensive schools (Gesamtschulen) as a fourth type of secondary school, as an alternative to the five-year lower secondary school (Hauptschule) and the six-year intermediate school (Realschule), both of which are designed to prepare students for vocational training, and to the eight- or nine-year upper secondary school (Gymnasium), which provides a general education and prepares students for university entrance. In another effort to mitigate inequality resulting from the early tracking of students into different types of secondary school, some German states after World War II introduced an elementary school period of six years (e.g., Berlin, Bremen, Hamburg, Schleswig-Holstein). In the 1950s, however, that policy was abolished again in all states except Berlin. In the 1970s, other states (e.g., Lower Saxony, Bremen) implemented a so-called two-year "orientation phase" following the four years of elementary school. In contrast, the school structures of the populous states of Bavaria and Baden-Württemberg have undergone only marginal reform, if any, and continue to be highly stratified (e.g., four years of elementary school, preservation of the traditional three tracks at the secondary level I: lower secondary school (Hauptschule), intermediate school (Realschule), and upper secondary school (Gymnasium)). The East German states, after German reunification, have increasingly seen the emergence of two-track school systems typically consisting of an academic track (Gymnasium) and a vocation-oriented track.

It is largely unclear whether the pronounced differences between the states in educational outcomes (e.g., the rate of students graduating with a university entrance qualification), their changes over time, and the resulting social inequalities are related to educational policy reforms, general processes of social modernization, or socio-structural changes. These differences can be illustrated based on three aspects, see also [16]. First, the proportion of students graduating with a general university entrance qualification (measured against the resident population of the same age) is around 52 percent in Hamburg (in 2014), 41 percent in North Rhine-Westphalia, and around 28 percent in Bavaria and Baden-Württemberg (StBa, different cohorts, authors' calculations). Second, since 1965, this proportion has increased more than sevenfold in Hamburg and almost sixfold in North

Rhine-Westphalia but only threefold in Hesse (ibid.). Third, with respect to social inequalities, in this case, measured as the proportion of students transitioning to upper secondary school (Gymnasium) after elementary school, the role of socio-economic background (EGP classes) for attending Gymnasium is found to be 3.5 times stronger in Bavaria than in Brandenburg [17].

So far, however, previous studies have looked only at individual reforms, insufficiently considered sociodemographic characteristics, or compared state outcomes in cross-sectional analyses. In longitudinal studies by educational sociologists, for example, differences between the states rarely play a role or refer to individual transition thresholds in students' educational careers [2,18–20]. The focus so far has rather been on socially unequal educational trajectories at the national level [1,21–25]. In addition, although a number of studies do exist that compare the states regarding the effects of individual school policy reforms [26–28], these studies are of limited applicability to the question of how school policy configurations (understood as the totality of school policy regulations) play out between the states as a whole. Considering all the studies on individual educational reforms together does not yield a clear picture of their effects on inequality of educational outcomes between the states, within states over time, and on social differences in the context of educational expansion.

1.2. Theoretical Approaches and Previous Research

Previous research has identified different drivers of educational expansion. Conceptually, researchers distinguish between drivers at the macro, micro, and meso level, which may interact, for example, see [1,29,30]. The interaction of drivers at different levels may also vary over time and by regional context. Theoretically, these spatial differences can be accounted for by, among other things, the interconnection of actions and structures [31]. Thus, individual educational decisions may be influenced by the specific institutional structures of a space at a given time, and vice versa [9,10,16,32–34]. Based on previous research, this means that regional disparities in educational expansion, as observed across German states over time, can be explained by general social modernization processes (macro level), changes in social structure (micro level), and educational policy reforms (meso level). Depending on the theoretical approach, these drivers and their interaction are weighted differently in terms of their influence on educational expansion (see also [2,20,22]).

1.2.1. Macro Level: Social Modernization Processes

At the macro level, modernization theorists, for example, the authors of [1,35–37], view educational expansion—in a nutshell—as a consequence of the rising demand for skilled labor in the context of industrialization, and later tertiarization. Technical innovations in production and its organization lead to rising skills requirements for employees, which in turn may result in a growing demand for education, rising incomes, and even a reduction of educational inequalities. In the literature, however, the role of social modernization processes is discussed controversially, partly because of different approaches and operationalizations of social modernization. Whereas one strand of research thinks of modernization processes primarily in economic terms, as pointed out above, other authors, when talking about social modernization, rather address institutional issues of nation-building, for example, in [38], or improved gender equality and the associated increase in girls' participation in education, for example, see [4,39]. Despite these conceptual differences, modernization processes are also seen as a "significant 'motor' of educational expansion" [1] (p. 164) given the available findings, although there is disagreement on whether they also contribute to the reduction of social educational inequality, for example, in [1,40,41].

(Inter)national studies based on various data indicate that social modernization processes after World War II were instrumental in shaping educational expansion, e.g., [1,2,29,38]. In particular, for those born between the early 1940s and the early 1960s, there was a dramatic increase in Germany both in attending university-preparatory schools (Gymnasium) and

in obtaining a general university entrance qualification. This indicates that the social conditions at that time seem to have been particularly conducive to educational expansion. For subsequent birth cohorts, only a moderate increase can be observed, which suggests that the influence of social modernization processes decreased or applied only to a limited extent. For these cohorts, findings suggest that the (moderate) increase can be explained by the higher educational participation of girls, which is, among other things, related to the higher labor force participation of women [8,39].

Overall, two hypotheses can be derived from these considerations:

Hypothesis 1 (H1). *In the cohort sequence, the probability of higher educational attainment increases for all students.*

Hypothesis 2 (H2). *In the cohort sequence, the educational attainment of women increases disproportionately, given that their educational opportunities used to be limited because of traditional gender roles.*

1.2.2. Micro Level: Changes in Social Structure

At the micro level, educational sociologists often examine and discuss the trend towards higher educational attainment by drawing on rational choice theory [36,42–47]. Educational expansion and educational inequalities, they argue, are the result of class-specific processes of weighing perceived benefits, costs, and probability of success when choosing one or more educational opportunities. Children tend to follow similar educational paths as their parents (transition to secondary school, general and vocational school-leaving qualifications). Children and parents from privileged family backgrounds, in particular, try to maximize their (educational) opportunities to avoid a loss of status (status maintenance hypothesis). In contrast, families from less privileged backgrounds tend to decide against pursuing higher educational qualifications; among other things, because putting their children on this educational trajectory is associated with higher costs.

When it comes to educational expansion, however, these relationships are not static. The growth in higher educational attainment, researchers argue, also results from a combination of earlier phases of educational growth and an improvement in family educational and living conditions brought on by social modernization (higher incomes and educational qualifications), which lead to falling costs and higher educational aspirations for promising educational qualifications. From that point of view, educational expansion continues as a self-driven process, as it were. This mechanism has also been called the "momentum of educational expansion" [25] (p. 9) or the "long arms of the educational expansion" [48] (p. 52).

Studies have shown that educational expansion in Germany is associated with increased educational aspirations, especially among families with an intermediate level of education, for example, see [43]. In the cohort sequence, we see an increase in social structure and a higher demand for higher educational pathways and degrees, which has been beneficial for the educational trajectories of girls, among others [25,48]. However, class-specific inequalities persist, and it is still a matter of debate whether social inequality between classes has become smaller or remained constant over the course of educational expansion, see for example, [21,25], or even increased for those born in the mid-1960s [25,42,49]. Here, conflict and cultural theorists [50–52] also assume that upper social classes, for fear of losing their higher social position, know how to make the most of the educational system (via better cultural, economic, and network resources) and are able to secure promising educational paths for themselves. As a result, there is crowding out between upper and disadvantaged social classes [25,42], with the latter being pushed to the vocational track.

Against the background of these considerations, we derive:

Hypothesis 3 (H3). *Higher educational attainment in the cohort sequence is a consequence of changes in social structure. That is, cohort differences result from the fact that the proportion of children whose parents have higher school-leaving qualifications increases from cohort to cohort.*

1.2.3. Meso Level: Educational Policy Reforms

Conceptually, the meso level usually addresses the role of the government in educational expansion. Since the role of specific configurations of the educational system and their reform is often neglected in most sociological discussions of educational expansion, we will discuss this issue in more detail. Aside from explanations offered by educational sociologists focusing on institutional (educational policy) frameworks, for example, in [1,9,10,12,30,34], explanations addressing this issue are also available in political science and historical education research [14,15,36,53–57]. Both strands of literature assume the government and other cooperative actors to be responsible for a relevant share of educational expansion, mainly through educational policy modernization in the school and education system. These include the expansion of intermediate schools (Realschulen) and upper secondary schools (Gymnasien) in Germany in the 1960s and 1970s, the introduction of comprehensive schools, and the extension of compulsory schooling.

In political science and educational history, the government is understood as an agent of change that can promote or slow down educational expansion through specific educational policies [58]. Government intervention can be proactive, increasing demand for education or facilitating educational pathways through changes in school legislation. However, educational reforms can also be interpreted in reactive terms. In this case, education policy would rather react to social and, in particular, socio-structural developments that affect the education system, attempting to channel impending functional deficits, for example in social or labor market integration. However, transintentional processes also give rise to mixed forms. For example, Nath [55] and Lundgreen [56] assume, based on historical data on education, that school policy, by establishing integrated comprehensive schools, presumably attempted to proactively shape educational expansion towards greater equality of opportunity but ultimately, with respect to the overall structure, responded only to the increasing demand for higher educational certificates (especially by preserving upper secondary schools (Gymnasien)). Furthermore, as Becker and Mayer [1] have shown, educational reforms (expansion of upper secondary schools (Gymnasien)) can be understood as indirect social modernization effects, that is, they are implemented in response to social modernization processes and better labor market conditions.

However, the empirical evidence available for Germany does not allow us to assess the extent to which differences in school legislation have influenced educational expansion in different ways over time and across states. This is mainly due to two research gaps: First, until recently, there were no longitudinal studies that systematically compared relevant school law regulations across states. Second, as discussed in Section 1.1, there are hardly any studies for Germany that analyze in a differentiated manner the significance of reform processes based on school law for educational expansion and the associated educational inequalities.

School Law Regulations

Regarding the first research gap, a detailed systematization of the differences in school law between the German states over time is now available in the form of the typology of school systems by Helbig and Nikolai [12]. It is based on an extensive database of school law regulations and reforms in the German states since 1949. Theoretically, the authors refer to the work of Allmendinger [10], Laska [59], and von Below [60]. They distinguish between the dimension of structure (similar to stratification) and the dimension of regulation of content (standardization). Table 1 provides an exemplary overview of the school law regulations underlying the dimensions.

Table 1. School law typology by Helbig and Nikolai [12], broken down by the dimensions structure and content regulation and featuring examples of individual school regulations (adapted overview by the authors).

Structure	Regulation of Content
Preschool (yes = modernized)	Transition after grade 4 (e.g., strictly based on grades (yes = strongly standardized))
Full-time compulsory schooling period (10 years = strongly modernized	Transition after grade 6 (e.g., admissions test as a criterion (admissions test as the only criterion = strongly standardized))
Years of schooling to complete the general university entrance qualification (Abitur) (12 years = modernized)	Transition after grades 7–9 (e.g., transition is possible (not possible = strongly standardized))
Elementary school duration (6 years = strongly modernized)	Transition after Realschule completion (e.g., second foreign language (not mandatory = de-standardized))
Orientation phase (grades 5/6) (available = strongly modernized)	Standardization of the examinations for the acquisition of the general university entrance qualification (Abitur)(e.g., centralized state-wide Abitur examinations (no = de-standardized))
Support for children with special needs (available = modernized)	Downward transfer from upper secondary school (Gymnasium) After repeating 2 years overall = de-standardized
Elementary schools at a secondary school that does not lead to the general university entrance qualification (Abitur) (no = modernized)	Transition secondary level I to level II Promotion by exam = standardized
Comprehensive schools (available = modernized)	General school-leaving diploma when entering secondary level II Awarded with promotion to secondary level II = de-standardized
Percentage of upper secondary schools (Gymnasien) in all schools that award the general university entrance qualification (Abitur) (below 80 percent = strongly modernized)	Beginning of grading In grade 3 or later = de-standardized
Schools offering multiple educational tracks as the only school type aside from comprehensive schools and upper secondary schools (Gymnasien) (yes = modernized)	Assessment of work habits and social conduct Not provided= de-standardized
General university entrance qualification (Abitur) available at all school types (yes = strongly modernized)	
Alternative pathways to the general university entrance qualification (Abitur) (yes = modernized)	
Tuition fees at upper secondary schools (Gymnasien) (no = strongly modernized)	
Free supply of learning materials (yes = strongly modernized)	

In the structural dimension, school regulations describe the way in which educational tracks are organized. According to Helbig and Nikolai [12], modern structures (e.g., 10-year full-time compulsory schooling period, six years of elementary school, availability of comprehensive schools, general university entrance qualification (Abitur) available at all school types) would enable a high level of educational participation among broad segments of the population. Traditional structures, by contrast (e.g., eight-year full-time compulsory schooling period, four years of elementary school, non-existence of comprehensive schools, non-existence of support for students with special needs), would limit opportunities for pursuing the academic track because of the associated higher costs and would hence reproduce or even exacerbate educational inequality. Over time, all German states except Bavaria, Saxony, and Baden-Württemberg have modernized their school structures, albeit to different degrees.

Aside from policies regulating access to secondary schools, the content regulation dimension also includes regulations on nationally uniform standards for examinations and certificates. Helbig and Nikolai [12] use the content regulation dimension to distinguish between standardized and de-standardized school systems. According to the authors, considering the current state of research, it is still unclear how the degree of standardization in a school system affects social educational inequality. In standardized school systems, eligibility for transitioning to a specific type of secondary school after elementary school is strictly based on a set of required grades, for example. Fixed grade requirements also play a major role in later transitions to an upper secondary school (Gymnasium) (e.g., after grades 7 to 9) in these school systems. The same applies to the requirement of previous coursework in a second foreign language when transitioning to an upper secondary school (Gymnasium) after completing intermediate school (Realschule), or state-wide centralized Abitur examinations. In de-standardized school systems, by contrast, there are no fixed grade requirements when transitioning to upper secondary schools (Gymnasien), students are not required to transfer down to a lower-level school type after repeating two years at upper secondary school (Gymnasium), and the Abitur examinations are not the same for all students in the state. Over time, certain West German states, including Baden-Württemberg, Bavaria, or Saarland, have been marked by a consistently high degree of standardization. Other West German states, including Hesse, Lower Saxony, or North Rhine-Westphalia, de-standardized their school systems in the 1970s and 1980s. Beginning in the 1990s until the mid-2000s, a trend towards re-standardization was notable. The East German states were characterized by rather standardized school systems over time.

Studies on the Impact of School Reforms on Educational Expansion

Regarding the second research gap described above (i.e., differentiated inclusion of educational reform processes in analyses of educational expansion), the studies by Böhner-Taute [18], Becker and Mayer [1], and Schindler and Bittman [61,62] are exemplary. In her study, which adapts the school system typology of Helbig and Nikolai [12], and others, Böhner-Taute [18] shows that both a loose or modern school structure (e.g., six years of elementary school, 10 years of compulsory schooling) and open or de-standardized access to educational tracks (e.g., non-binding elementary school recommendation, no fixed grades for the transition to upper secondary school (Gymnasium) in grades 7–9) have a positive impact on students' transition to an academic track. However, her analyses do not allow for drawing conclusions about the influence of differences in school laws between the German states on both the acquisition of school-leaving qualifications and social educational inequality. Moreover, her analyses refer to the birth cohorts from 1982 to 1993 and thus cover only part of the period relevant for educational expansion. The analysis by Becker and Mayer [1] is limited in this regard as well. Although they do find a decline in educational inequality in the context of educational reforms for the birth cohorts from 1919 to 1986, their operationalization of reforms in the school system only includes the (increasing) number of upper secondary schools (Gymnasien) for the entire (West German) territory. Further evidence is provided in the thoughts and findings of

Schindler and Bittmann [61] and Bittmann and Schindler [62], which are based on analyses of individual educational trajectories over time for (West) Germany. These studies point out that unintended side effects may occur in the course of educational reforms designed to increase the enrollment of children from lower and intermediate social and educational backgrounds in higher-level secondary. Families from these backgrounds who are willing to take a risk and would otherwise opt for the academic track in the transition after elementary school may be diverted from the academic track in reliance on alternative educational pathways to the general university entrance qualification (Abitur) (diversion hypothesis). However, concrete information on the reforms in the individual federal states is not part of the analyses.

In the present study, given the thoughts and findings presented above, we start from the premise that individual partial school reforms do not change the educational behavior of students. Rather, we assume that it is the combination of different legal regulations (structures and/or content) as school policy "regimes" that influences educational trajectories. Jähnen and Helbig [28], for example, examining the transition to secondary schools, find evidence that changes in school law cause not only parents to change their educational behavior but also teachers. As a result, individual school reforms do not change educational pathways. It is only when school legislation changes significantly that changed school policy "regimes" or "cultures" can emerge, which then do change educational trajectories. Overall, this study stands out from other studies of educational expansion because our analysis includes changes in school legislation over time and across states. In our view, the following hypotheses can be derived from the considerations and findings presented here:

Hypothesis 4 (H4). *The modernization of school structures and the de-standardization of access policies (regulation of content) increases the probability of students obtaining a higher educational credential.*

Hypothesis 5 (H5). *In modernized school structures, children from intermediate and lower educational backgrounds are diverted from the classic pathway to the general university entrance qualification (Abitur) (i.e., upper secondary school (Gymnasium)).*

2. Materials and Methods

2.1. Database

The data set we use is the Starting Cohort 6 of the National Educational Panel Study (NEPS), which collects educational and employment histories of adults born between 1944 and 1986 [63]. We linked these data to Helbig and Nikolai's [12] typology of school systems.

2.1.1. Dependent Variables

Our first dependent variable is the transition from elementary school to the university-preparatory Gymnasium. For this purpose, we created a dichotomous variable based on the NEPS data, with 1 indicating persons who transferred to a general education upper secondary school (allgemeinbildendes Gymnasium) and 0 indicating persons who transferred to non-university-preparatory school types. Special needs and remedial schools were excluded from the analysis. For a complementary analysis, we extend the dependent variable to include transfers to comprehensive schools and other integrated school types as well as Waldorf schools, where the general university entrance qualification (Abitur) can also be obtained in the general school system. Our second dependent variable is whether or not students graduate from general education schools (upper secondary school (Gymnasium) or comprehensive school) with a general university entrance qualification (Abitur). Again, we created a dichotomous variable, with 1 indicating successful completion of the Abitur program at a general education school and 0 indicating persons who left the general education school system without a general university entrance qualification. With these two dependent variables, we focus on two key events in students' educational biographies in Germany's general education school systems. Analyzing these transition

thresholds allows us to draw conclusions about educational success and inequalities in the context of educational expansion.

We limit our analyses to the general education school system because we want to analyze the school law regulations in the states developed by Helbig and Nikolai [12]. That creates the limitation that we cannot consider those who earn their university entrance qualification as mature students or from different institutions, such as the vocational schools (e.g., berufliches Gymnasium). On the one hand, this is unfavorable because an increasing share of people obtain their university entrance qualification via an alternative route; thereby levelling some of the social differences [21,64]. On the other hand, there are almost no differences in school law between the states when it comes to subject-specific university entrance qualifications and pathways for mature learners [12] (pp. 110f.). What is more, the debate about growing opportunities for mature students to become eligible for university admission fails to recognize the crucial role that upper secondary schools (Gymnasien) continue to play today. These schools provide a developmental context that is more favorable for students' skills development [65], and they perform far above average in offering certain curricular (e.g., the subject Latin, [66]) or extracurricular learning opportunities (e.g., study abroad programs, [67]) that are rewarded in later working life [68]. Furthermore, the rate of students with a university entrance qualification actually entering university is much higher among graduates of general education schools (not only the upper secondary schools (Gymnasien)) than among graduates of vocational schools.

2.1.2. Independent Variables

As independent variables, we use various indicators established in research on educational participation and inequality and which we assume will allow us to estimate the influence of the drivers described at the macro, micro, and meso level.

Individual Characteristics

These include, first, parents' highest school-leaving qualification (no certificate/lower secondary school-leaving certificate (Hauptschulabschluss), intermediate school-leaving certificate (Mittlere Reife), (subject-specific) university entrance qualifications) as an indicator of social background or respondents' socio-structural position (micro level), e.g., [39]. Second, we use birth cohort membership as an indicator of general social modernization processes (macro level, e.g., changes in gender roles in the sense of hypothesis 2). We thereby assume that birth cohorts reflect different general labor market constellations or political trends with implications for individual educational trajectories, although it can only be an approximation due to the rough measure (see, e.g., [1,13–15,39,57,69]; offering a critical view: [70]). To be able to consider a satisfactory number of observations for the analyses, we created cohorts based on multiple birth cohorts. To create these cohorts, we used quartiles of the available birth cohorts (1944–1955, 1956–1963, 1964–1972, 1973–1986). These cohorts roughly correspond to the cohorts used in other studies on educational expansion and should capture generational differences with respect to social development processes (e.g., [1,21]). For example, the historical analysis by Becker and Mayer [1] shows that the oldest birth cohort (1944–1955) attended school during the founding phase of the Federal Republic of Germany, which was significantly shaped by the first chancellor Konrad Adenauer and his conservative Christian Democratic Union (CDU). In addition to debates about educational reforms, that period was characterized by an economic boom, the so-called economic miracle. The youngest birth cohort (1973–1986) went to school during the period of German reunification and was socialized politically by chancellors Helmut Kohl (CDU) and Gerhard Schröder (Social Democrats). Unemployment rose during this period, especially in the eastern German states but also in the western German states. Another example illustrating cohort membership as exposure to different general social conditions is the study by Helbig [39]. The study shows that in the oldest cohort, the female labor force participation rate, as a measure of gender equality, was relatively low

across (West) Germany and in the individual states, while in the youngest cohort it was significantly higher nationally and regionally.

Other independent variables based on NEPS data include gender, migration background (respondents or parents born abroad), single parents, and school attendance in East Germany (German Democratic Republic) or West Germany (Federal Republic of Germany).

Context Characteristics

We use Helbig and Nikolai's [12] typology with its dimensions of structure and regulation of content to estimate the impact of region-specific education policy on educational expansion (meso level). To create their typology of dimensions, they used quantitative coding judgments for the individual school law regulations (see also Section 1.2.3., Table 1, for the individual school law regulations). They then computed cumulative raw scores from the coding judgments. Based on these scores, they developed a four-point scale for each dimension, with points on the scale representing different types. In this study, we linked the raw scores (i.e., the total scores of the indicators, see Helbig and Nikolai [12] (pp. 359, 371)) for both dimensions with the individual data of the NEPS dataset. For this linkage, we defined the time of transferring to secondary school as the reference point. To ensure an even distribution of respondents across the school system types for the analyses and to be able to better identify possible nonlinear relationships, we created five structure types and four content regulation types based on the distribution of raw scores across respondents (The quintiles for the structure types are distributed as follows: 0 to 4 corresponds to structure type 1 (traditional structures) | 4.5 to 6 corresponds to structure type 2 | 6.5 to 8 corresponds to structure type 3 | 8.5 to 10 corresponds to structure type 4 | 10.5 to 14 corresponds to structure type 5 (modernized structures). The quartiles for the content regulation types are distributed as follows: 0 to 0.21 corresponds to the de-standardized type | 0.22 to 0.44 corresponds to the de-standardized mixed type | 0.45 to 0.49 corresponds to the standardized mixed type | 0.5 to 0.71 corresponds to the standardized type). The distribution for the content regulation types corresponds to the thresholds used by Helbig and Nikolai [12] for their typology (pp. 254, 277 ff.). This means that our data can be used to map the content regulation types developed by Helbig and Nikolai [12]. The school structure types we formed based on the data structure differ from the thresholds used in the typology of Helbig and Nikolai [12]. Specifically, this means that, according to Helbig and Nikolai's [12] content definition, our structure types 1 to 4 correspond to their traditional mixed type and their traditional type. In terms of content, our structural type 5 corresponds to their modern mixed type and modern type. Apart from the fact that this shift must be taken into account when interpreting the results, this circumstance, while not ideal from our point of view, is unproblematic. First, we can represent the full spectrum of school structure characteristics with our data. Second, Helbig and Nikolai [12] themselves point out the challenges of multilevel typing based on the raw data, which they also tried to solve mathematically by using quartile boundaries. Thus, like Helbig and Nikolai [12], we also measure degrees of modernization in the continuum of traditional and modernized school structures with our typology.

2.1.3. Sample

For our analyses, we excluded persons who attended a school abroad for more than 12 months, who moved from one state to another during their school years, and who were born in the former German Democratic Republic before June 1981. For these individuals, no meaningful educational trajectories are available to document the effects of state-specific school policies in the Federal Republic of Germany. For Berlin, only individuals born in and after June 1981 were considered, as there is no comprehensive way to distinguish between school attendance in East or West Berlin. For the analyses, we only considered individuals for whom observations are available for all model variables, resulting in a sample of $n = 9533$. The main reason for excluding respondents from the sample was missing values in the regulation of content dimension ($n = 745$, no raw scores were available here because of gaps

in the database) and missing values for highest level of parental educational attainment (n = 336, most respondents did not know their parents' school-leaving qualification). The latter group is especially relevant with respect to selectivity in the study. However, we believe their share is still within acceptable limits and hence decided not to impute the data. Overall, the sample must be considered relatively small, especially in view of the fact that we analyze differences between the states over time and thus only have a few cases for individual school years. That limitation, however, cannot be addressed given the data currently available for Germany. The small sample size may mean that significant effects are not detected, especially when calculating interaction effects. As a result, the effect sizes become the focus of attention.

2.2. Method

To take advantage of state-specific characteristics in school system development over time and the associated grouped data structure, we perform a multilevel analysis. Specifically, we use two-way crossed random effects models [71] (p. 433ff.). This allows us to estimate associations between educational participation, school law regulations, and individual characteristics. Specifically, crossed random effects models allow for considering a non-hierarchical data structure in the context of multilevel analyses, in which "units are cross-classified by two or more factors, with each unit potentially belonging to any combination of values of the different factors" [71] (p. 433). Thus, when estimating the transition to upper secondary school (Gymnasium) and the completion of the general university entrance qualification, what matters aside from individual characteristics is not only the respective school legislation framework but also a specific time of transition shared by many individuals. The factor time is thus nested within the individual data, which makes transition time appear as an important random main effect in addition to state affiliation. As a result, the random effects are crossed. The data structure may thus be broken down into three levels: individual-level factors, state affiliation, and time of transition. Mathematically, this results in the following term:

$$\mathrm{yij} \;=\; \beta 1 + \beta 2 \times 2\mathrm{ij} + \ldots + \zeta 1\mathrm{i} + \zeta 2\mathrm{j} + \epsilon\mathrm{ij}$$

Here, x2ij represents individual-level factors, such as parental educational attainment, in a state i in the (transition) year j, whereas ζ1i und ζ2j represent random intercepts for states i and transition years j, and vice versa. ϵij is a residual error term.

To better interpret the models, we computed linear probability models. Logit models, used by default for dichotomous variables, confirmed the results of the linear probability models (not shown). We believe a strictly causal analytical approach, that is, analyzing the effects of school law regulations, is not appropriate in this context. The typologies we use represent a broad range of school law regulations and, as Helbig and Nikolai [12] have shown, tend to map gradual rather than abrupt change in the states' education policies. A causal analysis, for instance as part of a difference-in-differences approach, would require the identification of specific reform dates and hence a distinction between pre- and post-treatment periods; we do not think this is useful here.

3. Results

In descriptive terms, we find that cohorts, school policies, and parental social structure are correlated, and the only way to examine which aspects influenced educational outcomes is by performing multivariate analysis.

3.1. Transition from Elementary School to Upper Secondary School (Gymnasium)

The results of the multilevel analyses to estimate the probability of transitioning from elementary school to a general education upper secondary school (allgemeinbildendes Gymnasium) and the related influential factors are shown in Table 2. To better map and identify the effect of the different factors and possible interactions between the factors, we gradually integrate the independent variables into the estimation model.

Table 2. Transition to upper secondary school (Gymnasium) after elementary school/orientation period.

	M1	M2	M3	M4
	b/se	b/se	b/se	b/se
Structure (categorical) Reference: 1—traditional structures				
2	0.103 **	0.055 *	0.048 *	0.048 *
	(0.019)	(0.023)	(0.021)	(0.021)
3	0.137 **	0.071 *	0.079 **	0.079 **
	(0.024)	(0.030)	(0.027)	(0.027)
4	0.181 **	0.092 **	0.094 **	0.100 **
	(0.027)	(0.035)	(0.032)	(0.032)
5—modernized structures	0.174 **	0.065	0.042	0.048
	(0.031)	(0.040)	(0.037)	(0.036)
Regulation of contents (categorical) Reference: 1—de-standardized type				
2—de-standardized mixed type	0.013	0.008	−0.009	−0.004
	(0.020)	(0.020)	(0.018)	(0.019)
3—standardized mixed type	0.000	−0.005	−0.006	−0.001
	(0.023)	(0.023)	(0.021)	(0.022)
4—standardized type	0.012	0.012	−0.002	0.008
	(0.026)	(0.026)	(0.024)	(0.024)
Birth Cohorts (categorical) Reference: 1944–1955				
1956–1963		0.046	0.037	0.034
		(0.025)	(0.023)	(0.022)
1964–1972		0.086 **	0.046	0.043
		(0.029)	(0.025)	(0.025)
1973–1986		0.155 **	0.048	0.053 *
		(0.030)	(0.027)	(0.027)
Parents: Highest parental school-leaving qualification (categorical) Reference: max. lower secondary school-leaving certificate (Hauptschulabschluss) (incl. no certificate/special needs school-leaving certificate)				
Intermediate school-leaving certificate (Mittlere Reife)			0.216 **	0.216 **
			(0.012)	(0.012)
Subject-specific/general university entrance qualification (incl. technical upper school/*Fachoberschule*)			0.460 **	0.459 **
			(0.011)	(0.011)

Table 2. *Cont.*

	M1	M2	M3	M4
	b/se	b/se	b/se	b/se
Gender Reference: male				0.018 *
				(0.009)
Migration background Reference: parents or target person not born abroad				−0.037 **
				(0.014)
Mother or father missing Reference: with parents/stepparents/other persons				−0.064 **
				(0.018)
West German states Reference: East German states (incl. Berlin)				0.052
				(0.035)
_cons	0.198 **	0.186 **	0.079 **	0.028
	(0.034)	(0.032)	(0.028)	(0.045)
var(R.state)	0.002	0.002	0.002	0.001
	(0.001)	(0.001)	(0.001)	(0.001)
var(R.school year)	0.00	0.001	0.001	0.001
	(0.001)	(0.001)	(0.000)	(0.000)
var(Residual)	0.209	0.208	0.177	0.177
	(0.003)	(0.003)	(0.003)	(0.003)
Observations	9533	9533	9533	9533

Notes: Standard errors in parantheses; * $p < 0.05$, ** $p < 0.01$.

Model M1 shows that school structure is significantly related to the Gymnasium transition, albeit to different degrees. For example, students in modernized structures (structure type 5) are 17.4 percentage points more likely to transfer to an upper secondary school (Gymnasium) than students in traditional structures (structure type 1). For the various types of the content regulation typology, we find only a small correlation that is not significant, regardless of whether or not school structure is controlled for (not shown). According to the results of this simple model, without looking at additional factors, educational expansion towards increasing Gymnasium attendance would be associated with a modernization of school structures driven by school policies.

Models M2 and M3 modify this picture, however. Here, birth cohort membership, as an indicator of social modernization, and parental educational attainment, as an indicator of social structure, were included in the estimation. When controlling for birth cohort (M2), the association between school structure and upper secondary school (Gymnasium) transition rates declines significantly but continues to exist (with the exception of modernized structures). However, the birth cohorts themselves are a stronger predictor of higher Gymnasium transition rates beginning with the 1964–1972 cohort. Those born between 1973 and 1986 thus have a Gymnasium transition rate that is 15.5 percentage points higher than that of those born between 1944 and 1955.

However, additionally controlling for parental educational background, as in model M3, once again changes the picture fundamentally. The strength of the association between upper secondary school (Gymnasium) transition and birth cohort membership is sharply

reduced and no longer significant. This indicates that it is not cohort membership but the increase in parent educational attainment over time that is driving the increase in Gymnasium transition rates. Furthermore, of course, we also see a strong connection between parental education and children's transition to Gymnasium. On average, children of parents with a (subject-specific) university entrance qualification have a 46 percentage points higher Gymnasium transition rate than children of parents whose highest educational credential is a lower secondary school-leaving certificate (Hauptschulabschluss). Compared to model M2, there are only minor changes in the connection to school structure. As in model M2, it is striking to see that compared to model M1, the effect size of school structure type 5, in particular, is no longer significant.

The picture hardly changes if additional control variables are considered that might theoretically be relevant (M4). Taken together, the results at this point suggest that general modernization processes did not have an effect on rising upper secondary school (Gymnasium) transition rates. Our analyses also indicate that education policy reforms appear to have resulted in higher Gymnasium transition rates. However, a relatively linear increase in Gymnasium transition rates is only observable up to a certain degree of modernization (type 4). In the dimension of content regulation, we do not see an association with Gymnasium transition rates. Then again, Gymnasium transition rates in states with more modern school structures are considerably lower. The most important driver of educational expansion, however, appears to be changes in parents' socio-structural background. As parental educational attainment increases, so does the education of their children.

How is school policy related to the upper secondary school (Gymnasium) transition rates for each educational group? To investigate this, we estimated interaction effects of both aspects (Table A1, Appendix A). The correlations are only sporadically significant, in part due to the relatively small cell populations. The estimated influence of the combination of school structure and parental educational background on the Gymnasium transition rate is illustrated in Figure 1, following the approach of Kohler and Kreuter [72]. The graph plots the mean predicted values for the different school structure types and for parental educational background. The lines show the likelihood of transitioning to a Gymnasium for each educational group in the different school structure configurations.

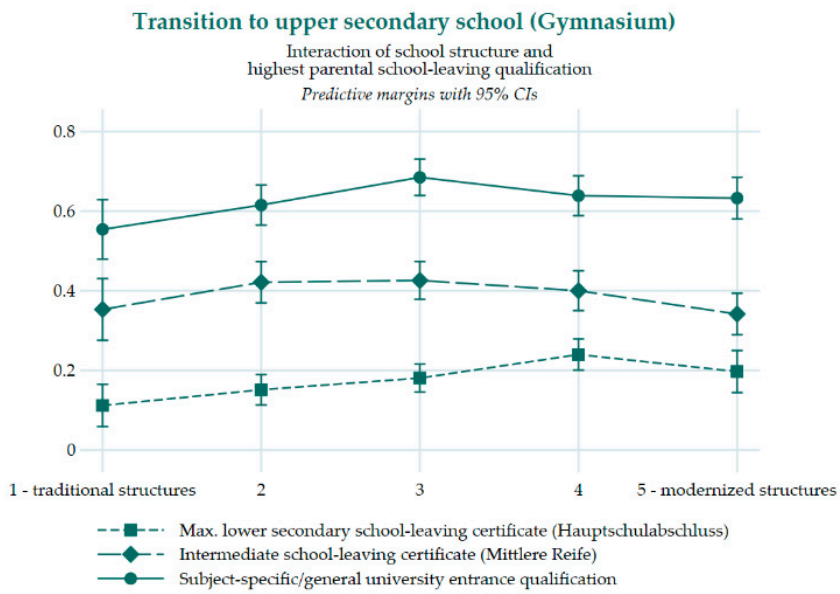

Figure 1. Mean predicted values for transitioning to general education upper secondary school (allgemeinbildendes Gymnasium) after elementary school/orientation period, with special attention to the interaction of school structure and highest parental school-leaving qualification, controlled for all variables as in Table 2.

The first thing to notice is a general trend already suggested in the main effects. The modernization of school structures makes it more likely for all students, regardless of parental educational background, to transition to an upper secondary school (Gymnasium). That said, the differences by educational background vary in the school structure types. Whereas the gap between students whose parents finished no more than lower secondary school and those whose parents hold a (subject-specific) university entrance qualification is diminished in structure type 4 and otherwise remains almost constant, students whose parents hold a middle school leaving certificate become less likely to transition to a Gymnasium as structures become more modernized (types 4 and 5). Their rates come closer to those whose parents hold only a lower secondary leaving certificate. Particularly in school structure type 5, we see a pronounced drop that is already emergent in type 4 for children from homes with higher educational attainment. However, whereas children whose parents have a (subject-specific) university entrance qualification remain at the type 4 level, transition to a Gymnasium becomes less likely for those from backgrounds with medium-level and lower educational attainment. The results show that more modernized school structures are associated with greater educational inequality at the transition from elementary school to Gymnasium.

What might account for this gap and the increase in educational inequality? One possible explanation, in line with the idea of the education system's inherent dynamics, is a change in school choice behavior of children from intermediate and lower educational backgrounds in modernized school structures (cf. Section 1.2.3.; diversion hypothesis). To test this explanation, we expanded the dependent variable to also include transitions to comprehensive schools and other integrated school forms, as well as Waldorf schools, in addition to upper secondary school (Gymnasium) transitions. In the following, only comprehensive schools are mentioned for the sake of readability, although other integrated school types and Waldorf schools are also included. Then we re-estimated the interaction effects (cf. Table A2, Appendix A). Again, only some of the differences are statistically significant. Figure 2 again presents the interaction effects between school structure and parental educational school-leaving qualification, but now for the estimation of the expanded dependent variable.

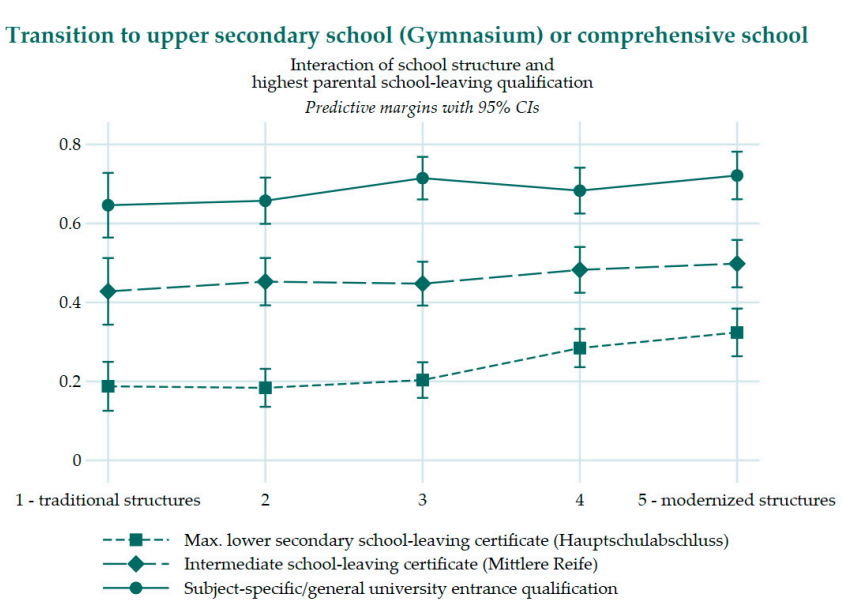

Figure 2. Mean predicted values for transitioning to general education upper secondary school (allgemeinbildendes Gymnasium) or comprehensive school (including Waldorf schools and other integrated school forms) after elementary school/orientation period, with special attention to the interaction of school structure and highest parental school-leaving qualification, controlled for all variables as in Table 2.

Initially, a similar picture emerges as for the interaction effects reported earlier. As school structures become more modern, the likelihood of transferring to an upper secondary school (Gymnasium) or comprehensive school increases, but—when it comes to effect size—from a much higher starting level. Hierarchical differences between educational attainment groups are present as well. It is worth noting, however, that we do not find the previously observed drop and the increase in educational inequality in the modernized structure types 4 and 5. In fact, the results here even suggest the opposite. In more modern school structures, we see a decrease in educational inequality. However—and this is important to note at this point—that decrease occurs in the transition to a Gymnasium or comprehensive school. Taken together with the results on the Gymnasium transition rate, this can be read as evidence of changing student flows in more modernized school structures. The results may be interpreted as a diversion of students with medium-level educational backgrounds from the Gymnasium to the comprehensive school. Whether this effect is induced more by supply or by demand cannot be determined here.

3.2. Graduation with a General University Entrance Qualification at General Education Schools

The key question, however, is whether school structures also influence the acquisition of the general university entrance qualification (Abitur) at general education schools and whether the diversion of children from medium-level educational backgrounds in more modern school structures also has the effect of fewer of them earning the general university entrance qualification (Abitur). In Table 3, we calculated the contexts in which students completed the Abitur examination at general education schools (i.e., at general education upper secondary school (allgemeinbildendes Gymnasium) or comprehensive schools). School law regulations were assigned as in Table 2, meaning that students were assigned to the school law types for the time at which they transferred to secondary school. Doing so involves the risk that changes in school law that are relevant for the respective trajectories occurred after the transition. It is only in this way that we can safely compare the results on transitions and compare the same individuals.

Table 3. Graduation with general university entrance qualification (Abitur) at general education upper secondary school (allgemeinbildendes Gymnasium) and comprehensive schools.

	M1	**M2**	**M3**	**M4**	**M5**
	b/se	**b/se**	**b/se**	**b/se**	**b/se**
Structure (categorical) Reference: 1—traditional structures					
2	0.073 **	0.005	−0.004	−0.003	−0.034 *
	(0.018)	(0.022)	(0.020)	(0.020)	(0.016)
3	0.113 **	0.017	0.021	0.024	−0.029
	(0.022)	(0.029)	(0.027)	(0.026)	(0.021)
4	0.164 **	0.039	0.037	0.047	−0.018
	(0.025)	(0.034)	(0.031)	(0.031)	(0.025)
5—modernized structures	0.210 **	0.056	0.028	0.037	0.003
	(0.029)	(0.039)	(0.036)	(0.035)	(0.028)
Regulation of contents (categorical) Reference: 1—de-standardized type					

Table 3. *Cont.*

	M1	M2	M3	M4	M5
	b/se	b/se	b/se	b/se	b/se
2—de-standardized mixed type	0.014	0.007	−0.011	−0.006	−0.001
	(0.019)	(0.020)	(0.018)	(0.018)	(0.014)
3—standardized mixed type	0.009	−0.001	−0.004	0.001	0.007
	(0.023)	(0.023)	(0.021)	(0.021)	(0.017)
4—standardized type	0.023	0.018	0.002	0.012	0.013
	(0.025)	(0.025)	(0.023)	(0.023)	(0.019)
Birth cohorts (categorical) Reference: 1944–1955					
1956–1963		0.083 **	0.074 **	0.071 **	0.051 **
		(0.023)	(0.022)	(0.022)	(0.016)
1964–1972		0.106 **	0.074 **	0.070 **	0.048 *
		(0.026)	(0.025)	(0.024)	(0.019)
1973–1986		0.186 **	0.083 **	0.085 **	0.058 **
		(0.028)	(0.026)	(0.026)	(0.020)
Parents: Highest parental school-leaving qualification (categorical) Reference: max. lower secondary school-leaving certificate (Hauptschulabschluss) (incl. no certificate/special needs school-leaving certificate)					
Intermediate school-leaving certificate (Mittlere Reife)			0.197 **	0.197 **	0.066 **
			(0.011)	(0.011)	(0.009)
Subject-specific/general university entrance qualification (incl. technical upper school/*Fachoberschule*)			0.447 **	0.447 **	0.169 **
			(0.011)	(0.011)	(0.010)
Gender Reference: male				0.012	0.002
				(0.009)	(0.007)
Migration background Reference: parents or target person not born abroad				−0.034 *	−0.012
				(0.014)	(0.011)
Mother or father missing Reference: with parents/stepparents/other persons				−0.051 **	−0.013
				(0.018)	(0.014)

Table 3. *Cont.*

	M1	M2	M3	M4	M5
	b/se	b/se	b/se	b/se	b/se
West German states Reference: East German states (incl. Berlin)				0.062	0.035
				(0.033)	(0.029)
Transition to the upper secondary school (Gymnasium) after elementary school/orientation period Reference: no transition to upper secondary school (Gymnasium)					0.604 **
					(0.008)
_cons	0.182 **	0.181 **	0.083 **	0.022	−0.001
	(0.030)	(0.030)	(0.027)	(0.043)	(0.035)
var(R.state)	0.001	0.002	0.001	0.001	0.001
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
var(R.school year)	0.002	0.000	0.001	0.000	0.000
	(0.001)	(0.000)	(0.000)	(0.000)	(0.000)
var(Residual)	0.202	0.202	0.172	0.172	0.107
	(0.003)	(0.003)	(0.003)	(0.002)	(0.002)
Observations	9533	9533	9533	9533	9533

Notes: Standard errors in parantheses; * $p < 0.05$, ** $p < 0.01$.

As with the transition to upper secondary school (Gymnasium), increasing levels of modernization in school structures also go hand in hand with an increase in Abitur graduation rates (M1). The difference between traditional and modernized structures is even somewhat larger than for the Gymnasium transition. As with the Gymnasium transition, the regulation of content has no effect on students' likelihood of completing the general university entrance qualification (Abitur). Unlike with the Gymnasium transition, there is no significant statistical connection between school structure and Abitur graduation rates once we control for cohort sequence (M2). Here, we find that Abitur graduation rates increase with each subsequent cohort. Unlike with the Gymnasium transition, a cohort effect remains even after controlling for parental education (M3), but it is primarily a difference between the oldest cohort and the three younger cohorts. A linear increase in Abitur graduation rates in cohort order, as suggested in M2, is no longer detectable after controlling for social structure (M3). This means that educational expansion from the 1964 cohort onward is not a phenomenon of modernization but the result of changes in parental social structure. This is also confirmed after including additional control variables (M4), even though slightly higher Abitur graduation rates emerge among the youngest cohort.

If we control for whether a student transferred to upper secondary school (Gymnasium) after elementary school (M5), our previous finding that school structure has no additional effect on Abitur graduation rates is confirmed (with the exception of school structure type 2, which predicts somewhat lower Abitur graduation rates). Furthermore, we find that the likelihood of Abitur graduation increases in the cohort sequence (when controlling for Gymnasium transition), and it does so regardless of school structure regulation. For the two middle cohorts, the probability of obtaining a general university entrance qualification (Abitur) is roughly 5 percentage points higher than for the oldest cohort while for the youngest cohort, the probability is 6 percentage points higher. Given that school

law regulations are not the reason why Abitur graduation becomes more likely, the rising Abitur graduation rates can only be explained by generally more favorable educational trajectories for the younger cohorts after the transition to Gymnasium. Comparing only the models for Abitur graduation at upper secondary schools (Gymnasien) (not shown) reveals that the cohort effects are almost the same. This means that in the cohort sequence considered here, we do not see more students at comprehensive schools earning the general university entrance qualification (Abitur) (controlling for social structure) but rather that the educational trajectories at the Gymnasium schools have evolved more favorably.

When looking at the cohort effects interacting with gender (cf. Figure 3 and Table A3, Appendix A), we see that boys had significantly lower gains than girls in the cohort sequence.

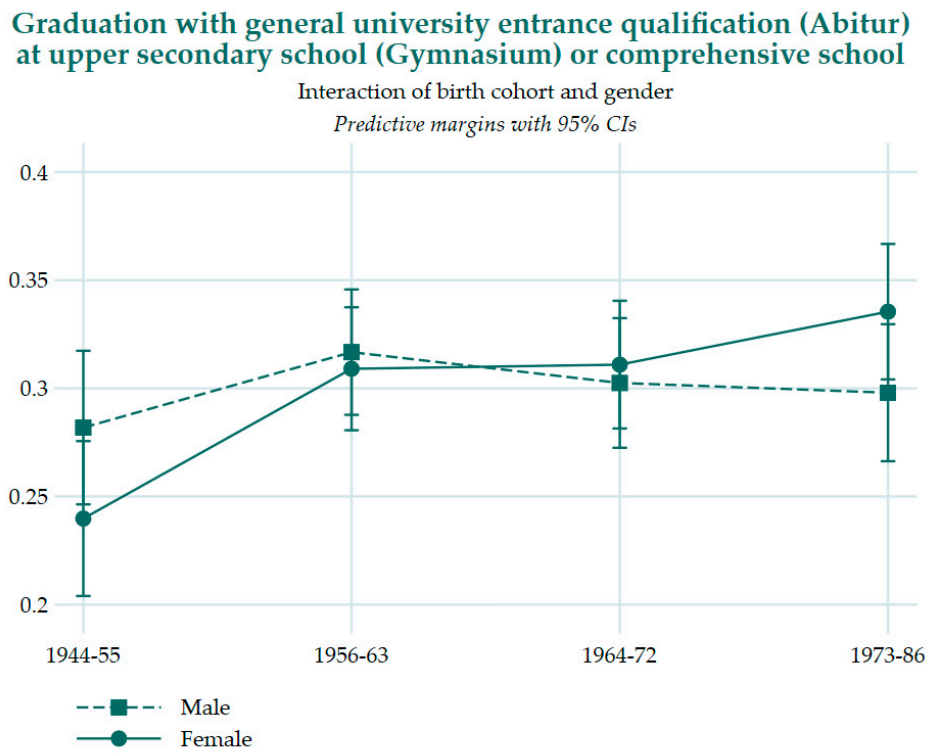

Figure 3. Mean predicted values for obtaining a general university entrance qualification (Abitur) at a general education upper secondary school (allgemeinbildendes Gymnasium) or comprehensive school (including Waldorf schools and other integrated school forms), with special attention to the interaction of birth cohorts and gender, controlled for all variables as in Table 3.

Girls in the youngest cohort are more likely to graduate with an Abitur diploma than girls in the oldest cohort. In particular, girls benefited from changes in upper secondary school (Gymnasium) progression, because girls in the younger cohorts rarely left Gymnasium after grade 10, for example. This was still frequently the case in the older cohorts considered here [39].

Based on our analyses, the increase in Abitur graduation rates in the cohort sequence can be attributed to changing social structure on the one hand and to significantly more favorable secondary education trajectories for girls on the other. In contrast, the Abitur graduation rates of boys increased only slightly from the 1944–1955 cohort to the 1973–1986 cohort. School law regulations, on the other hand, had no effect on the development of educational expansion; likewise, the diversion of students away from Gymnasium schools in modernized school structures is not reflected in Abitur graduation rates (not shown).

4. Discussion

The aim of this study was to investigate which aspects are responsible for the fact that more and more people in Germany obtain a general university entrance qualification (Abitur) in the cohort sequence and that regional disparities can be observed in this development. Against the background of existing theoretical considerations and findings, we assumed that these developments can be explained by various factors at the macro level (general social modernization processes measured as cohort differences), meso level (educational policy measured as changes in school law), and micro level (changes in social structure measured as parental education). Earlier research leads us to suspect some interplay between these drivers. What sets this study apart from others is that we were able to systematically examine the role that differences in school legislation between the German states and over time played in this development. That is, we were able to determine for each state and for each year whether the respective school structures were modernized or remained traditional and whether contents were regulated in a standardized or unstandardized way. What makes our study particularly relevant is that education policy is one of the main arenas of social contention and that the design of education policy is believed to have (strong) effects on educational trajectories.

Our analyses show that Hypothesis 1 can only be confirmed partially. Regarding the transition to upper secondary school (Gymnasium), the transition rate tends to increase only between the oldest and second-oldest cohorts. Regarding the general university entrance qualification, that increase is somewhat stronger and statistically significant. This indicates that transitions to Gymnasium became more frequent, especially between the oldest and second-oldest cohorts and independent of socio-structural changes and school policy, and that more students had more favorable school trajectories after transitioning to a Gymnasium. A special role for comprehensive schools cannot yet be assumed for the second cohort, as not enough graduates earned their Abitur diploma at a comprehensive school.

Furthermore, the results show that the increase in Abitur graduation rates in the cohort sequence is mainly driven by more and more women obtaining the general university entrance qualification (Abitur) (Hypothesis 2). For men, there was no increase in Abitur graduation rates in the cohort sequence (Table A3 in Appendix A). This suggests that social modernization paid off only for women, but not for men, in terms of graduating with a university entrance qualification.

Our micro-level analyses support Hypothesis 3. The increase in the transition to upper secondary school (Gymnasium) can be explained largely by the increase in parental educational attainment. The same is true for the acquisition of the university entrance qualification. This is particularly evident for the increase in Abitur graduation rates in the youngest cohort. Compared with the previous cohorts, their educational expansion can be attributed exclusively to the increase in parental education. Thus, our results support both the status maintenance hypothesis [44] and the analyses of, for instance, Blossfeld [25] and Ziefle [48] on the momentum of educational expansion. Across all states, the changing social structure is the key driver of educational expansion, which thus feeds on itself. In combination with the results of *hypothesis 1*, this suggests that the momentum of educational expansion was initiated by social modernization processes after World War II, such as changes in labor market conditions, a conclusion also suggested by the analyses by Becker and Blossfeld [69].

Our analyses at the meso level show that Hypothesis 4 is not confirmed. The extent to which access regulation is standardized does not influence educational trajectories. The structures do influence educational outcomes at the upper secondary school (Gymnasium) transition to some extent in the expected direction, that is, towards higher transition rates in more modern school structures. However, it is precisely in such more modernized school structures (type 5) that we observe a decline in Gymnasium transition rates. Surprisingly, the rate of students obtaining the Abitur diploma at general education schools is not related to changes in school structures. Our findings only partially confirm the study by

Böhner-Taute [18]. In contrast to Böhner-Taute, we only find an influence of the structural dimension in the transition to an academic track, a discrepancy that may result, among other things, from different methods of operationalizing content regulation or the different birth cohorts considered.

Furthermore, in line with Hypothesis 5, modernized structures (type 5) are more likely than the other types to divert students from upper secondary school (Gymnasium). As expected, this effect is especially notable for students from intermediate educational backgrounds. Accordingly, modernized school structures are marked by higher social inequalities in the transition to Gymnasium. This suggests a diversion of the intermediate education groups from the Gymnasium in favor of higher enrollment at comprehensive schools, thus supporting the diversion hypothesis by Schindler and Bittmann [61,62]. According to this hypothesis, lower and intermediate educational groups are diverted from the (direct) academic track because they rely on alternative educational pathways to the general university entrance qualification (Abitur) in modernized school structures. This result can also be interpreted in light of the thoughts and findings of Nath [55] and Lundgreen [56]: Ultimately, education policy responds to the growing demand for university-preparatory education by establishing comprehensive schools, thereby easing the burden on Gymnasium schools. Likewise, as proposed in cultural studies and conflict theory, for example, in [42], students from higher educational backgrounds may crowd out students from intermediate educational backgrounds. That pattern, however, is no longer evident in the acquisition of the general university entrance qualification. Accordingly, we might speak of a temporary diversion of intermediate educational groups that dissolves as students' progress in their school careers. Without having measured this, this suggests that the diverted students obtain their general university entrance qualification (Abitur) by other means (e.g., via comprehensive schools). The question that follows, then, is whether the different tracks to the general university entrance qualification lead to horizontal inequalities.

Coming back to our initial question—what drives regional disparities in education expansion: school reform, modernization, or social structure? We believe we can give the following comprehensive answer. Educational expansion is driven primarily by changes in social structure and—to a lesser extent—by general social modernization processes; education policy, if anything, only channels the impact of social structure and modernization. Even though we have not explicitly presented this empirically, our results overall suggest that regional differences in educational trajectories can also be explained by the regional social structure and its changes. This means, the state-specific differences in Abitur graduation rates can probably be declared primarily by social differences in the parents' generation. These, in turn, can be explained first by previous educational patterns of the parent generation in a region and second by educational mobility patterns. Accordingly, the states with the highest rates of school leavers with university entrance qualifications are those in which most parents have an academic degree. According to our results, school policy should play a subordinate role in explaining regional educational differences.

Our study has three main limitations. First, in our analysis of the effects of birth cohorts as an indicator of social modernization processes, the influence of demographic fluctuation was not considered in detail. For instance, the expansion of school capacities (well into the early 1970s) for low-birth cohorts from 1965 onward in the states may have created a situation in which more school seats were available for fewer students. As a consequence, upper secondary schools (Gymnasien) and municipalities may have been more concerned with retaining their students to prevent schools from being shut down [73]. As a result, there may have been an additional pull towards the general university entrance qualification (Abitur) [14], which may also help explain the influence of younger birth cohorts on the increased Abitur graduation rates found here. Future studies should look into this in more detail. Second, given the small number of cases, we could not perform an adequate analysis of student streams across school careers. As explained above, we do see a diversion of certain groups of students from Gymnasium enrollment, but we cannot show

when and how this diversion effect dissolves as students' progress in their school careers. As a result, the underlying mechanisms of changing educational outcomes can only be discussed to a very limited extent, see for example [74]. Third, vocational schools were excluded from the analysis. The effect of structural changes in the vocational education system, expanding the range of secondary credentials these schools may award, including the general university entrance qualification at vocationally oriented upper secondary school (berufliches Gymnasium), for example, has only been studied to a very limited extent, for example, in [18]. Such studies may cast a different light on the interrelationships described above. Contradictory evidence of this can be found, for example, in Schindler [21] Buchholz & Schier [75], or Kurz, Lehmann, and Theunissen [24]. However, a systematic analysis of education policy reforms for vocational schools, as we have done here for the first time in a longitudinal approach to the National Educational Panel Study (NEPS), does not exist.

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Appendix A

Table A1. Transition to upper secondary school (Gymnasium) after elementary school/orientation stage—Interaction of school structure and highest parental school-leaving qualification.

	M1
	b/se
Structure (categorical) Reference: 1—traditional structures	
2	0.039
	(0.022)
3	0.069 *
	(0.028)
4	0.128 **
	(0.031)
5—modernized structures	0.085 *
	(0.037)
Birth cohorts (categorical) Reference: 1944–1955	
1956–1963	0.034
	(0.022)
1964–1972	0.040
	(0.025)
1973–1986	0.049
	(0.026)
Parents: Highest parental school-leaving qualification (categorical) Reference: max. lower secondary school-leaving certificate (Hauptschulabschluss) (incl. no certificate/special needs school-leaving certificate)	
Intermediate school-leaving certificate (Mittlere Reife)	0.241 **
	(0.035)
Subject-specific/general university entrance qualification (incl. technical upper school/*Fachoberschule*)	0.442 **
	(0.033)
Gender Reference: male	0.017 *
	(0.009)
Migration background Reference: parents or target person <u>not</u> born abroad	−0.039 **
	(0.014)
Mother or father missing Reference: with parents/stepparents/other persons	−0.065 **
	(0.018)

Table A1. *Cont.*

	M1
	b/se
West German states Reference: East German states (incl. Berlin)	0.028
	(0.035)
Interaction of school structure and highest parental school-leaving qualification Reference: 1—traditional structures X max. lower secondary school-leaving certificate (Hauptschulabschluss) (incl. no certificate/special needs school-leaving certificate)	
2 X Intermediate school-leaving certificate (Mittlere Reife)	0.029
	(0.042)
2 X Subject-specific/general university entrance qualification (incl. technical upper school/*Fachoberschule*)	0.022
	(0.040)
3 X Intermediate school-leaving certificate (Mittlere Reife)	0.004
	(0.041)
3 X Subject-specific/general university entrance qualification (incl. technical upper school/*Fachoberschule*)	0.062
	(0.039)
4 X Intermediate school-leaving certificate (Mittlere Reife)	−0.081
	(0.042)
4 X Subject-specific/general university entrance qualification (incl. technical upper school/*Fachoberschule*)	−0.043
	(0.041)
5 Modernized structures X Intermediate school-leaving certificate (Mittlere Reife)	−0.097 *
	(0.045)
5 Modernized structures X Subject-specific/general university entrance qualification (incl. technical upper school/*Fachoberschule*)	−0.007
	(0.044)
_cons	0.051
	(0.036)
var(R.state)	0.001
	(0.001)
var(R.school year)	0.001
	(0.000)
var(Residual)	0.176
	(0.003)
Observations	9533

Notes: Standard errors in parantheses; * $p < 0.05$, ** $p < 0.01$.

Table A2. Transition to upper secondary school (Gymnasium) or comprehensive school after elementary school/orientation period—Interaction of school structure and highest parental school-leaving qualification.

	M1
	b/se
Structure (categorical) Reference: 1—traditional structures	
2	−0.004
	(0.023)
3	0.016
	(0.029)
4	0.097 **
	(0.033)
5—modernized structures	0.136 **
	(0.039)
Birth cohorts (categorical) Reference: 1944–1955	
1956–1963	0.085 **
	(0.023)
1964–1972	0.102 **
	(0.026)
1973–1986	0.115 **
	(0.028)
Parents: Highest parental school-leaving qualification (categorical) Reference: max. lower secondary school-leaving certificate (Hauptschulabschluss) (incl. no certificate/special needs school-leaving certificate)	
Intermediate school-leaving certificate (Mittlere Reife)	0.240 **
	(0.035)
Subject-specific/general university entrance qualification (incl. technical upper school/*Fachoberschule*)	0.459 **
	(0.033)
Gender Reference: male	0.016
	(0.009)
Migration background Reference: parents or target person <u>not</u> born abroad	−0.043 **
	(0.015)
Mother or father missing Reference: with parents/stepparents/other persons	−0.050 **
	(0.019)

Table A2. *Cont.*

	M1
	b/se
West German states Reference: East German states (incl. Berlin)	0.022
	(0.042)
Interaction of school structure and highest parental school-leaving qualification Reference: 1—traditional structures X max. lower secondary school-leaving certificate (Hauptschulabschluss) (incl. no certificate/special needs school-leaving certificate)	
2 X Intermediate school-leaving certificate (Mittlere Reife)	0.028
	(0.043)
2 X Subject-specific/general university entrance qualification (incl. technical upper school/*Fachoberschule*)	0.015
	(0.041)
3 X Intermediate school-leaving certificate (Mittlere Reife)	0.004
	(0.042)
3 X Subject-specific/general university entrance qualification (incl. technical upper school/*Fachoberschule*)	0.053
	(0.040)
4 X Intermediate school-leaving certificate (Mittlere Reife)	−0.042
	(0.043)
4 X Subject-specific/general university entrance qualification (incl. technical upper school/*Fachoberschule*)	−0.060
	(0.042)
5 Modernized structures X Intermediate school-leaving certificate (Mittlere Reife)	−0.066
	(0.046)
5 Modernized structures X Subject-specific/general university entrance qualification (incl. technical upper school/*Fachoberschule*)	−0.061
	(0.045)
_cons	0.085 *
	(0.041)
var(R.state)	0.003
	(0.002)
var(R.school year)	0.001
	(0.000)
var(Residual)	0.183
	(0.003)
Observations	9533

Notes: Standard errors in parantheses; * $p < 0.05$, ** $p < 0.01$.

Table A3. Graduation with general university entrance qualification (Abitur) at general education upper secondary school (allgemeinbildendes Gymnasium) and integrated school forms—Interaction of birth cohorts and gender.

	M1
	b/se
Structure (categorical) Reference: 1—traditional structures	
2	−0.033 *
	(0.016)
3	−0.026
	(0.020)
4	−0.018
	(0.023)
5—modernized structures	0.003
	(0.025)
Birth cohorts (categorical) Reference: 1944–1955	
1956–1963	0.035
	(0.019)
1964–1972	0.021
	(0.021)
1973–1986	0.016
	(0.022)
Parents: Highest parental school-leaving qualification (categorical) Reference: max. lower secondary school-leaving certificate (Hauptschulabschluss) (incl. no certificate/special needs school-leaving certificate)	
Intermediate school-leaving certificate (Mittlere Reife)	0.067 **
	(0.009)
Subject-specific/general university entrance qualification (incl. technical upper school/*Fachoberschule*)	0.171 **
	(0.010)
Gender Reference: male	−0.042 **
	(0.015)
Migration background Reference: parents or target person <u>not</u> born abroad	−0.012
	(0.011)
Mother or father missing Reference: with parents/stepparents/other persons	−0.014
	(0.014)
West German states Reference: East German states (incl. Berlin)	0.028
	(0.027)

Table A3. *Cont.*

	M1
	b/se
Transition to the upper secondary school (Gymnasium) after elementary school/orientation period Reference: no transition to upper secondary school (Gymnasium)	0.603 **
	(0.008)
Interaction of birth cohorts and se xReference: 1944–1955 X male	
1956–1963 X female	0.034
	(0.020)
1964–1972 X female	0.051 *
	(0.020)
1973–1986 X female	0.080 **
	(0.020)
_cons	0.032
	(0.028)
var(R.state)	0.001
	(0.001)
var(R.school year)	0.000
	(0.000)
var(Residual)	0.107
	(0.002)
Observations	9533

Notes: Standard errors in parantheses; * $p < 0.05$, ** $p < 0.01$.

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