Path Dependency, Demographic Change, and the (De-)Differentiation of the German Secondary School System

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Summary: Current sociological debate on the effects of demographic change on education systems still swings between the extremes of "demography as destiny," which conceives of demographic change as a phenomenon with immediate impact, and "demography as ideology," which questions any relevance of demographic factors at all. This article adopts a Durkheimian perspective and checks whether changes in the division of labor moderate the effects of demographic change. This hypothesis is tested by analyzing panel data at the regional level of counties on the differentiation of the German secondary school system for the years 1995–2010. In addition to demography, the effects of path dependency, party politics, and German re-unification are modeled as well. The analysis shows a moderate effect of demographic change on the (de-)differentiation of the German secondary school system.

Keywords: Demographic Change; Immigration; Division of Labor; Differentiation; School System.

Zusammenfassung: Der soziologische Diskurs über die Folgen des demographischen Wandels für Bildungssysteme schwankt immer noch zwischen den Extremen „Demographie als Schicksal", was Bevölkerungsveränderungen unmittelbare Folgen zuschreibt, und „Demographie als Ideologie", was die Relevanz demographischer Faktoren grundsätzlich in Frage stellt. Der vorliegende Aufsatz nimmt eine Durkheim'sche Perspektive ein und prüft, ob Veränderungen der Arbeitsteilung die Folgen des demographischen Wandels moderieren. Diese Hypothese wird mit Hilfe von Paneldaten über die Differenzierung des deutschen Sekundarschulsystems auf der regionalen Ebene der Kreise für die Jahre 1995–2010 analysiert. Zusätzlich zu demographischen Veränderungen werden auch Effekte von Pfadabhängigkeit, Parteiideologie und der Wiedervereinigung modelliert. Die Analyse zeigt einen moderaten Effekt des demographischen Wandels auf die (Ent-)Differenzierung des deutschen Sekundarschulsystems.

Schlagworte: Demographischer Wandel; Immigration; Arbeitsteilung; Differenzierung; Schulsystem.

1 Introduction

Demographic change is perceived to be a challenge to modern societies because inherited social structures tend to become inadequate when populations change significantly in size, age, or ethnic composition. Almost all developed countries face ageing and many – especially several European and Asian countries – declining populations as well. For the public sector, these population trends are expected to raise expenditure for pensions, health, and care, whereas education expenditure and unemployment benefits might decline (European Commission & Economic Policy Committee 2009: 26). Lower expenditure for education could contribute to offsetting higher costs in other policy areas (e. g., pensions and care) or be reinvested to improve the quality of educational services. In this view, demographic change could bear opportunities for society. Is this, however, really the case? The aim of this article is to investigate whether demographic change contributes to a reorganization of the secondary school system in Germany. Of special interest here is how demographic decline and immigration affect the degree of differentiation of school infrastructure. Path dependency, party politics, and regional differences are most likely to render opposite effects. A strong version of path dependency would state that institutional structures are independent of demographic change, whereas party ideology

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and regional differences are intervening factors which reinforce change. The approach adopted here uses panel data on a regional scale to check how these structural elements influence the schooling opportunities available to children of lower secondary school age.

In the following section, the article elaborates theoretically the relationship of path dependency, demographic change, and the differentiation of the school system. It goes on to present the data and methods of analysis: aggregated panel data at the regional level of German counties and cities with county status (for the period 1995–2010), which are analyzed using fixed effects and hybrid regression models. The results obtained are described and subsequently discussed against the theoretical backdrop of the article while also considering the implications for coping strategies in the face of projected demographic change.

2 Determinants of the (de-)differentiation of the secondary general school system

2.1 Path dependency and the system of general secondary education in Germany

The analysis starts from the assumption that the differentiation of the secondary school system in Germany represents a historically institutionalized social structure that is characterized by path dependency (North 1990; Pierson 2000). In general, theories of path dependency claim that after some initial, perhaps even coincidental, choices, system change becomes increasingly unlikely. Attempts at change come with progressively growing transaction costs as more and more investments in the system are made and identities and ideologies are built around them. As opposed to path dependency theory, sociological neo-institutionalism in line with world society theory (Meyer 2010) claims that national traditions are being replaced by models copied from accepted epistemic models in world society, which are proposed and propagated by international organizations, non-governmental organizations, and epistemic communities. Korpi's analysis shows that welfare state institutions in Germany are highly path dependent due to effectively "segmenting interests and identities in the dependent labor force to focus on occupation rather than on class" (Korpi 2001: 269).

Secondary education is compulsory in Germany as in many other countries. The roots of compulsory schooling date back to the 18th and 19th century when emerging nation states strived to gain a monopoly in educating citizens (Ramirez & Ventresca 1992). Contrary to the global trend towards a combination of centralized and local responsibility for education (Meyer & Ramirez 2012), competency for school legislation in Germany rests with the individual federal states. Therefore a description of the structure of the education system has to abstract from concrete legislation and concentrate on common features. After four years of comprehensive primary schooling, pupils are scheduled to make the transition to the secondary school level.[1] The transition is selective in nature insofar as pupils are assigned to different schooling careers according to their perceived abilities. The traditional structure of the tripartite German secondary school system consists of three education programs each of which is attached to a specific type of school leading to a specific leaving certificate: basic-track school (*Hauptschule*), intermediate-track school (*Realschule*), and advanced-track school (*Gymnasium*). Although these three education programs might also be taught as distinct programs in integrated schools, schooling in separate schools represents the traditional German way of providing school education.

H0: Due to high transaction costs of changing the system of secondary education, no change in the differentiation of the general secondary school system is to be expected (path dependency hypothesis).

In an institutionalist framework, political conflict over ideas has the potential to initiate change (Peters et al. 2005). After World War II the political aim of providing 'education for all' began to become institutionalized as part of world culture (Meyer & Ramirez 2012), with many nation states increasingly introducing structures of comprehensive schooling. The institutionalization of this political aim seemed to herald a global shift from 'sponsored' to 'contest mobility' norms (Turner 1960) in society. Especially Social Democratic governments strived to substitute comprehensive school systems for multipartite ones. However, this project yielded quite diverse results across Europe. While the Scandinavian countries introduced an entirely compre-

[1] To facilitate the argument, it is neglected at this point that primary school in Germany is not entirely comprehensive; there is a strong tradition of separate special education (Powell 2011). Berlin and Brandenburg have a primary school of six years. In some states primary school is followed by a two-year orientation stage *(Orientierungsstufe)* (Wiborg 2009: 199).

hensive secondary school system, the Germanic countries, Belgium, and the Netherlands basically stuck to selective secondary school systems, and Great Britain, France, and Italy realized a mixture of both (Benavot 2006: 3f.).

Only during the early 1970s were there reform attempts to restructure the German secondary school system that concentrated on introducing comprehensive schools (*Gesamtschulen*) as a universal form of schooling. These reforms became highly politicized by professional associations, parents, and political parties, which had the effect that only German states governed by the Social Democratic Party (SPD) introduced comprehensive schools on a significant scale (Wiborg 2009). But even in these cases some observers state that comprehensive schools merely supplemented the tripartite secondary school system rather than substituting it completely (Köller 2008). How does party ideology affect the differentiation of the school system?

H1: SPD governments reduce the number of school types (party ideology hypothesis).

Most theories of path dependency imply the continuity of a given system. However, sometimes systems merge. If equally powerful systems do so, one would suspect this to be a juncture for a possible path switch for at least one of the systems. If asymmetrical systems merge, one would suspect the emerging system to evolve along the path of the more powerful one. A closer look at highly asymmetrical relations (e. g., between colonial powers and colonies) though reveals that in addition to the prevailing adaptation to the models of the more powerful system, we also observe some instances of cultural hybridity as local traditions creatively "translate" dominant models to local situations (Burke 2012; Czarniawska & Sévon 2005).

In the case of German re-unification, one would expect the more powerful system (West Germany) to proceed along a path-dependent line of development, whereas the weaker part (East Germany) would adapt. Indeed the GDR's comprehensive school system was abolished, and the differentiated system of the West adopted. However, this did not happen without introducing some elements of cultural hybridity as East German states creatively adapted the highly differentiated structures of the West German school system after re-unification (Sackmann 2010: 179). One innovation of the transformation process consisted in the creation of so-called multiple-track schools (*Schulen mit mehreren Bildungsgängen*) that integrate basic-track and intermediate-track programs. This type of lower secondary school is labeled differently in every state (see Table A4). However, this move toward institutional integration did not trigger broader debate about comprehensive schooling (Köller 2008: 444). Instead, East Germany de facto became a two-tier school system including multiple-track schools on the one hand and advanced-track schools (*Gymnasium*) on the other. Is this still a regional peculiarity or have the school systems of the German states converged in the meantime (see Table A1 in the online appendix for a list of secondary school reforms)?[2]

H2: The number of school types is lower in East Germany than in West Germany (cultural hybridity hypothesis).

2.2 Demographic change and the differentiation of the school system

Most literature on the consequences of demographic change for social systems such as the education system subscribes either to the idea that "demography is destiny," i. e. demography is an immediate cause of change, or to a constructivist perspective according to which discourse on population developments and their effects is merely an ideology serving other interests (for an extensive discussion of these opposing views, see Rademacher 2013). In our view, the social mechanisms linking population developments to social structure are still poorly understood (Mayer 2008). We will discuss the demographic argument in two steps. First we want to theorize on the effects of population decline (mostly due to a drop in fertility rates). Then we want to reflect on the direct and indirect impact of immigrant minorities on school differentiation.

2.2.1 Population numbers and the secondary school system

As population decline is a rather new phenomenon, there are hardly any theories on how societies cope with this situation. If one does not simply want to rely on pragmatic or political observations, one can turn to classical sociology which once had been confronted with rapidly increasing populations. At the time, Durkheim postulated (2004: 314ff., 401ff.) that population size and population density are central determinants of the division of labor in society (or of social differentiation in general;

[2] The online appendix includes Tables A1–3 and Figures A1–2. It is available for download at www.zfs-online.org.

Alexander 1990). With population growth and concentration, the density of social interaction and the competition for resources increases. The mechanism of competition eliminates some of the competitors as they are not able to acquire sufficient resources to sustain themselves. At the same time, it also spurs innovative adaptation. Observation of competition for the same resources creates collective self-awareness among the competitors and catalyzes differentiation in the division of labor. Individuals or social units with formerly similar tasks create new niches of sustenance. So for Durkheim, as opposed to Malthus, the effect of population growth on competition is not a direct one, but one that can be mediated and alleviated by the degree of differentiation in society. For him, coping with demographic change is a mediating factor that can potentially lessen "demographic burdens."

If we attempt to apply a theory of demographic competition to a situation of a shrinking population, we might conclude that reducing the degree of differentiation is a possible way of coping with a declining population. At first sight this seems to be a counter-intuitive argument since some authors think, in the line of Spencer, that modernity is characterized by an ever-increasing degree of differentiation. Schimank (2007), however, has already shown that societies are characterized by parallel developments both in the direction of differentiation and de-differentiation. Whereas Durkheim argued mainly from a macro-sociological perspective of nation states, the argument has recently been applied to different levels of society: world society (Münch 2011), regional societies (Feinman 2011), municipalities (Kasarda 1974), and organizations (Blau 1970). It is well known that today there are tendencies in both directions. In a world society marked by an increasing population, there are structural forces pushing in the direction of more differentiation. On the other hand, some societies have already entered a phase of declining populations, pulling in the direction of de-differentiation. In order to disentangle these contradicting forces (and to avoid over-generalization), the analysis in this article focuses on the regional level at which declining populations are more pronounced than on a larger scale. Furthermore, in the context of schooling, with its mainly territorially defined jurisdictions, the region seems to circumscribe most of the schooling options available to the resident population (in secondary school age).

H3: The differentiation of school types in a region will decrease with smaller cohort sizes and lower population density (demography hypothesis).

2.2.2 Immigration and the secondary school system

Despite the fact that migration has become a striking feature of many contemporary societies, theorizing migration is often neglected in demographic research (Coleman 2000: 31). Similarly, traditional theories on the division of labor implicitly assume a closed society with no population exchange across borders or other exit options (Schimank 2007: 40). Present advanced societies are characterized by a considerable share of immigrants. As immigrant populations tend to be younger than the autochthonous populations, they constitute a higher share of the school population. Schools are one field in which integration is contested. Some see them as a means of inclusion by allowing second (and third) generations of immigrants to participate in social mobility. Autochthonous parents, on the other hand, might prefer to keep their children from attending schools with larger shares of immigrant children. And sometimes even immigrants might prefer to choose separate schools. If the latter two tendencies prevail, the differentiation of schools will increase with a higher share of immigrants in a region.

During the 1960s social inequalities in the German education system became a public issue. Among the most underprivileged groups were women, Catholics, rural populations, and the urban working class (Peisert 1967). In the 1970s comprehensive schools were therefore mainly established in areas with a high share of working class inhabitants in order to facilitate upward social mobility. Since comprehensive schools avoid the attribution of status differences until the end of the school career, they can be interpreted as a mechanism of reducing conflicts among the members of this broad status group (Parsons 1949: 24). Immigration to West Germany not only compensated fertility decline numerically (from the 1970s onwards) but also brought large social groups with low education into the country. These immigrants typically entered the social hierarchy at its lower end (Hoffmann-Nowotny 1987), taking up residency in working class areas with affordable housing. The institutional logic of the stratified secondary school system made a dominant placement of their children in the lower-track schools (especially in the basic-track) most likely. The complementary establishment of comprehensive schools allowed immigrants with high educational aspirations to choose this more open channel of mobility, hence stabilizing and supporting this contested school form (Horstkemper et al. 1982: 88). This arrangement contributed to containing the potential for conflict between autochthonous

and immigrant students within the broad status group of comprehensive school students. Furthermore, the traditional clientele of the advanced-track schools did not perceive the leaving certificates of comprehensive schools as competitive enough to endanger their reputed superior educational status position. The flipside of this "creaming" process is that the basic-track school has lost ground in the competition for enrollment; it increasingly has become a place for the schooling of immigrant children (Leschinski 2008). Hence, across time, immigration seems to increase the differentiation of secondary school structures by strengthening otherwise weak school types in the competition for enrollment.

H4: A rising share of foreign pupils will increase the differentiation of the secondary school structure (immigration hypothesis).

3 Research on demographic change and the school system

When cohort sizes decline, it is recognized that schools and school types compete for enrollment in order to survive (Klemm 1980). Yet there are no systematic accounts on how demographic change affects the differentiation of the school system. Some valuable hints on the relationship between demographic change and the differentiation of the school system can nevertheless be derived from previous research. According to the literature on educational planning, questions of economies of scale and scope are relevant in formulating and implementing education policy (Frank 2011: 38f.) and are becoming even more so as demographic change progresses (Weishaupt 2009; Budde 2007). In this context, it seems to be relevant that public sector organizations typically calculate their goods and services directly per capita (Bartl 2011a). In the absence of the signaling function of market prices, public organizations apply administrative criteria of in-kind calculation in order to control the costs of education infrastructure (for example, Wagener 1974: 336ff.). Administrative regulations traditionally contain thresholds for minimum school sizes, albeit they vary considerably among the German states (BMVBS 2010). When enrollment numbers continuously stay below these thresholds, individual schools are in danger of being closed or merged by superordinate authorities (Frank 2011: 58f.). The international emphasis on new public management (Pollitt & Bouckaert 2011) might foster stricter application of these criteria. The school forms of a multi-tier system, on the other hand, are probably not all affected evenly by demographic decline due to rising educational aspirations. Schools offering (also) higher leaving certificates can be expected to better resist population decline compared to secondary schools offering (only) basic and intermediate leaving certificates.

At the local level, provision of upper secondary education infrastructure has become a competitive advantage that is decisive for the attractiveness of a location (Jungmann 2008: 129). This being the case, political strategies of coping with declining cohort sizes might opt for creating integrated school forms in order to realize economies of scale on the one hand while opening up options to obtain higher leaving certificates on the other (Tillmann et al. 1979). There is some evidence that preferences for integrated school forms are higher in less densely populated areas (Wiechmann 2011a, 2011b). In addition, the local level seems to be more innovative (Zymek et al. 2011: 505; Berkemeyer 2011) than the traditional conflicts of party politics at the state level would suggest. This is especially relevant as in most German states, cities and counties are responsible for planning 'external' school matters such as location and size. Provided the approval of supervising state authorities, municipal and county administrations are entitled to set their own priorities in terms of placing greater emphasis on providing either tripartite or comprehensive school infrastructure. In fact, there is even reason to suspect that the well-known arguments of social justice, which speak in favor of a more inclusive school system, have gained the silent but effective support of demographic change (Rösner 2008).

Nevertheless, there is also some evidence speaking against the plausibility of the *demography hypothesis*. Previous situations of decreasing cohort sizes of school-age children usually came with rising expenditures per student (Baum & Seitz 2003; for an overview, see Kempkes 2009: 24f.). Observers considered costs for education buildings to be the strongest factor in accounting for the demographic inelasticity of supply (Kempkes 2009: 49ff.). This could indicate that school closures were averted. In the 1980s ad-hoc changes of administrative thresholds in response to the mobilization of affected groups in some cases offset the decrease in enrollment in West Germany (Weishaupt 1988: 226); in other cases administrative decisions to rise minimum thresholds further aggravated the impact of demographic decline (Frank 2011: 163). Local and county governments are highly inter-

ested in keeping local schools open because education infrastructure attracts new residents and thus contributes indirectly to generating public revenue. When the last local school is in danger of being closed, local governments tend to display great creativity in finding ways to maintain it; in one instance, for example, by mobilizing the support of local enterprises for this purpose (Bartl 2011b: 208f.).

4 Operationalization, data, and panel analysis

The following section describes how the differentiation of the secondary school system and the proposed hypotheses are operationalized, introduces plausible control variables, and presents the strategy of analysis.

4.1 Units of analysis

Empirical studies on the relationship between demography and the education system have to specify the level to which this relation should apply. Some studies investigating the influence of party ideology on ability tracking used data at the state level (Kempkes 2009: 59ff.). However, the diversity of demographic change and school structures is far more pronounced on a smaller scale. The smallest administrative scale in Germany would be municipalities, but pupils are increasingly mobile across municipal borders (Zymek et al. 2011) while educational mobility across county borders is usually of limited importance. Furthermore, the federal structure of Germany makes it impossible to find comparable data on the development of school structures at the local level for all of Germany. For this reason, the analysis does not focus on the local but on the county level.

Data on enrollments and the number of public and private schools at the county level are available from the Regional Database Germany provided by the statistical offices of the states.[3] As the present article is mainly interested in changes over time, we created a macro-panel data set with information aggregated (mostly) at the county level. It comprises 407 counties and cities with county status, for each of which 16 observations (1995–2010) are available.[4] Consequently, the total number of observations in the data set is 6,512.

[3] Available online at www.regionalstatistik.de.

[4] The number of focal units includes the three city-states Berlin, Bremen, and Hamburg. For the cities Hannover and Saarbrücken, no consistent data was available. In two cases subject to territorial reforms (Saxony and Saxony-Anhalt), the most recent territorial demarcation of counties was used. However, in Saxony-Anhalt continuous data was available only for 8 of the currently 14 counties, and, for some years, school data had to be corrected based on data from the Statistical Office of Saxony-Anhalt. In two other cases of territorial reforms (Mecklenburg-Western Pomerania and *Stadtregion* Aachen), the old territorial demarcation of counties was used. In these regions, the GDP at the county level for 2010 was extrapolated based on data at the state level. The years mentioned in this article refer to the beginning of the school year: 1995 refers to the school year 1995/96, 1996 to the school year 1996/97, etc.

4.2 Measuring differentiation: The effective number of school forms

Theories on the division of labor have spurred a lively methodological debate about how this concept could be operationalized. One problem arises especially from the fact that it encompasses two dimensions of differentiation that are both considered to be relevant: structural and distributional differentiation (Gibbs & Poston 1975). In order to analyze both dimensions simultaneously, it is necessary to build one single variable containing adequate information about the two dimensions at the same time. Similar problems in other disciplines have led to the development of so-called "diversity measures" (Hill 1973). The index of the effective number of parties, for example, contains information on both the absolute number of parties in a political system and their fraction of the total vote (Laakso & Taagepera 1979). Expressed in more general terms, the degree of structural differentiation is set by the number of categories being distinguished; the degree of distributional differentiation is determined by the dispersion or concentration of social elements over these categories (Gibbs & Poston 1975). In the context of school systems, it seems to be especially relevant to consider both dimensions since formally there may be more regular school forms defined by law (at the state level) than are relevant in practice (at the county level).

In the present article, the differentiation of the secondary school system is measured using the index of effective diversity (Hill 1973) established in other academic fields. Accordingly, the effective number of school forms is calculated as

$$N_2 = 1 \Big/ (p_1^2 + p_2^2 \ldots p_n^2) \qquad (1)$$

Table 1 The index of the effective number of school types and the distribution of enrollment across the existing school types for three representative observations across the sample period (1995–2010)

	County of Schweinfurt (2000)	**County of Tübingen (2004)**	**County of Kaiserslautern (1998)**
Index	**1.18** (Minimum)	**2.94** (Median)	**5.25** (Maximum)
Basic-track school	0.92	0.23	0.22
Intermediate-track school	0.08	0.31	0.16
Advanced-track school	–	0.44	0.16
Comprehensive school	–	–	0.21
Multiple-track schools	–	–	0.22
Waldorf School	–	0.03	0.04

with n being the number of school forms in a county and p their fraction of pupil enrollment in the seventh grade (see Hill 1973: 429; Laakso & Taagepera 1979: 4). Capturing two dimensions of school differentiation in one variable is not possible without a certain loss of information (Smith & Snow 1976: 522). As the fraction of enrollment in each school form enters the index via a squared transformation, the school forms with larger fractions of pupil enrollment are weighted higher. Small fractions of enrollment have a comparatively lower impact on the index. However, the measure chosen shows a coarse-grained picture of the differentiation of the school system that is intuitively tangible. Theoretically it varies from 1 to 8; in reality it is limited upwards by the number of official school types. The index equals the total number of formally existing school forms only if the fractions of enrollment are evenly distributed across all categories.

Because of educational federalism, school types in all-German statistics are defined according to the classification standards of the *Kultusministerkonferenz,* a coordinating body of the German states in the field of education. Five types of public and private secondary schools are classified: basic-track school *(Hauptschule)*, intermediate-track school *(Realschule)*, advanced-track school *(Gymnasium)*, comprehensive school *(Integrierte Gesamtschule)*, and multiple-track schools *(Schulen mit mehreren Bildungsgängen)* which integrate basic- and intermediate-track educational programs. Additionally, Waldorf schools, which are privately run only, are considered to be different from these five categories because they subscribe to the philosophy of Rudolf Steiner (Statistisches Bundesamt 2013: 8f.). Following the categorization practice in official statistics, six public and private school types of general secondary education are distinguished in the present article.[5] Hence, the theoretical maximum index value of the effective number of school types is 6.

In order to illustrate the properties of the index, we describe three exemplary observations (Table 1). The lowest effective number of school forms (1.18) can be observed in the county of *Schweinfurt* in 2000. In this year, 92 percent of the total enrollments in grade 7 attended basic-track school and 8 percent intermediate-track school.[6] To obtain higher leaving certificates, students probably had to go to an advanced-track school in the city of *Schweinfurt*. The highest effective number of school forms (5.25) can be observed in 1998 in the county of *Kaiserslautern*. In this year, 22 percent of the pupils attended basic-track school, 22 percent a multiple-track school, 21 percent a comprehensive school, 16 percent an intermediate-track school, 16 percent an advanced-track school, and 4 percent a Waldorf school. The observation closest to the mean index value of 2.94 is the county of *Tübingen*

[5] Other studies follow this practice of categorization as well (Weiß 2011: 22). At the county level, it is even more important not to exclude Waldorf schools from the analysis as they might be of greater importance in single counties than on the all-German scale. Special needs schools are excluded from the analysis because of data inconsistencies in some states. Furthermore, it has to be mentioned that school types in the statistical sense do not entirely correspond to organizational units. For example, there are certain integrative school types (such as *cooperative* comprehensive schools) that are not counted as such in some states, while the education tracks they offer are counted instead. Hence, the data used here underestimate the degree of integration to a certain extent.

[6] The effective number of school forms in the case of the county of Schweinfurt (2000), for example, is calculated as follows: $1.18=1/(0.92^2+0.8^2)$. The small discrepancies between the results of a 'manual' calculation and the index values of the counties *Tübingen* and *Kaiserslautern* in Table 1 are due to the rounding of enrollment shares.

in the year 2004. At the time, 23 percent of the enrollments were in basic-track school, 31 percent in intermediate-track school, 44 percent in advanced-track school, and 3 percent in a Waldorf school.

4.3 Operationalization of independent variables and descriptive statistics

Starting from the null hypothesis of a stable and path-dependent development of the secondary school system, four alternative hypotheses need to be operationalized.

Party ideology hypothesis (H1): Comprehensive schools, as the legitimate schooling model of world society, have been promoted mostly by Social Democratic governments (Benavot 2006). In Germany, school laws are issued at the state level. Hence, the dominant party ideology of the governing coalition at the state level is measured using a dichotomous variable indicating the largest ruling party by year and state (SPD = 1).[7] Note that in the present context our main focus is especially on *changes* in government as they might lead to changes in school legislation. In some states, however, the largest ruling party did not change during the period under consideration.[8]

Cultural hybridity hypothesis (H2): As a consequence of German re-unification, major changes in the structures inherited from the GDR occurred during the decisive transformation phase in the early 1990s. West German school structures were creatively adapted during this process, leading to significantly different school structures in East Germany compared to West Germany. Hence, for the period analyzed the *cultural hybridity hypothesis* proposes stable differences in school structures between groups of counties located in either East or West Germany. The geographical location of a county is measured using a dichotomous variable (East Germany = 1).

Demography hypothesis (H3): Durkheim's theory of the division of labor identifies population size and population density as determinants of competition and hence of social differentiation as a means of mediating competition. While individuals compete for education opportunities, school types compete for enrollment and other resources. In the seventh grade most students are 13 years old. For this reason, and due to the data provided by the Regional Database Germany, cohort size was defined as the resident population aged 10 to 14. Cohort size is measured in thousand persons. Another variable used to test the demography hypothesis is population density at the county level. It is measured as the total number of inhabitants per square kilometer. Note that in the present article our main interest is in *changes* in cohort size and population density as they might trigger piecemeal changes in school structures at the county level.

Immigration hypothesis (H4): In contrast to excessively narrow definitions of demographic change, the present paper considers immigration as a possible determinant of secondary school structures as well. Increasing shares of immigrants are expected to contribute to a more differentiated secondary school system as the dispersion of competing social groups across diverse mobility channels tends to minimize conflicts among immigrant and autochthonous groups. The immigration hypothesis is operationalized using the percentage of pupils with foreign citizenship among all pupils in a county as an indicator. Note that in this case again our focus is on *changes* in the share of foreign pupils.

In order to control for changes introduced by educational reforms independently of party ideology (H1), integrative educational reforms during the period analyzed were coded using two dichotomous variables (see Table A1). The variables take on the value of 1 for each year and state in which the reform had been in place. Both variables indicate a specific type of integrative reform. The first type of reform integrates two types of education programs in one school form; typically the lower secondary programs of the basic- and intermediate-track schools were integrated to form a multiple-track school. Integrated schools of this type are named differently in the respective German states (Table A1). The second type of reform integrates three education programs in one school type – resembling largely the comprehensive schools introduced in Germany during the 1970s. Even so, the newly created school type is not called *Gesamtschule* as in the 1970s but labeled differently in the respective states (e. g. *Gemeinschaftsschule*) in order to avoid the well-known ideological debates.

[7] The reference category is the Christian Democratic Union (CDU; in Bavaria, Christian Social Union [CSU]). No other party became the largest party of a ruling coalition during the period analyzed. Sources: 1990–2006 (Völkl 2009: 110 f.), 2007–2010 from www.election.de [retrieved on April 14, 2011].

[8] Baden-Wuerttemberg, Bavaria, Brandenburg, Bremen, Rhineland-Palatine, Saxony, and Thuringia. The exact pattern is documented in a working paper (Bartl 2012: 32–36).

Last but not least, two additional structural features of regions are controlled for. First, the economic situation of regions is included via the gross domestic product (GDP) at the county level. Second, possible differences in school structure due to rural-urban disparities are controlled for by a dummy taking on the value of 1 for cities with county status.

4.4 Descriptive analysis

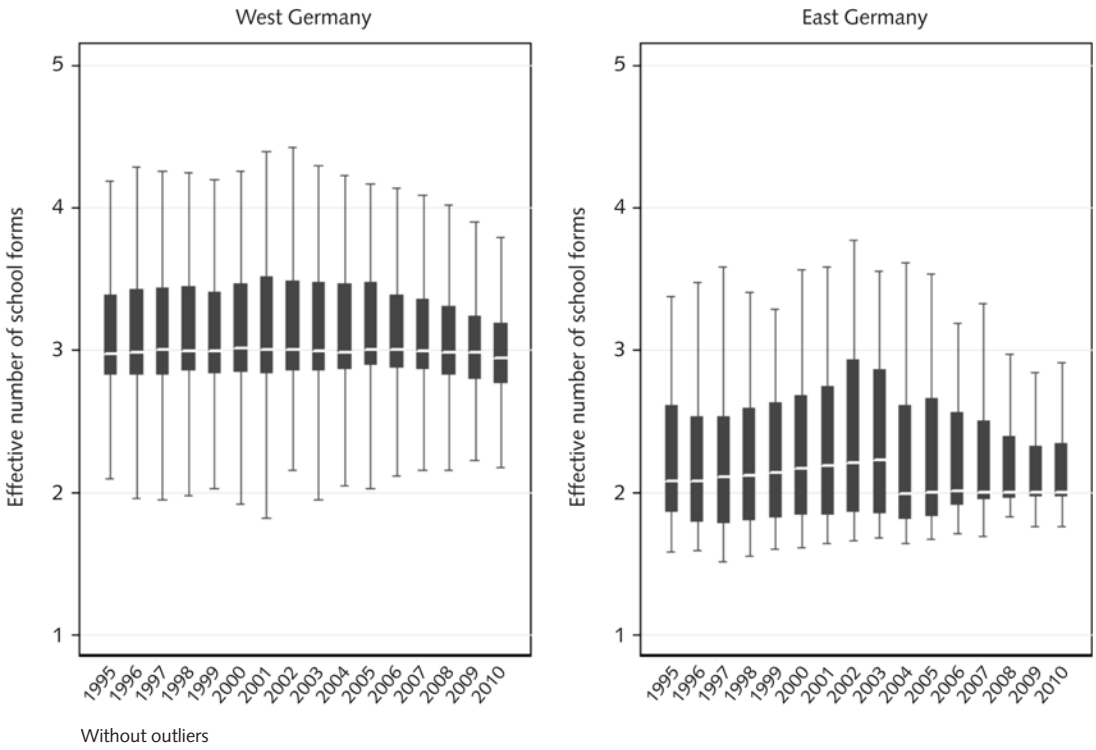
The present section analyzes the data from a descriptive point of view. First, we present summary statistics of the compiled variables. In a second step, we describe developments over time and differences among subgroups of the territorial units.

The effective number of school forms has a mean value of 2.94 across the 6,512 observations of the sample (Table 2). The standard deviation is 0.59 index points, of which the larger part is due to variation between units and 0.21 index points are due to variation within units (Table A2 in the online appendix). Hence, there seems to be enough variation within counties and cities with county status to enable analyzing change. However, the mean effective number of school types is 0.87 index points lower in East than in West Germany. The population aged 10 to 14 has an average value of 10,590 inhabitants and a standard deviation of similar size. The mean cohort size is 3,390 children smaller in East than in West Germany while the standard deviation is larger in East Germany indicating demographic changes of a greater magnitude in this part of the country (Table A2). The observations in the sample have a mean population density of 528 inhabitants per square kilometer; East German regions are significantly less densely populated than their counterparts in West Germany. On average, the counties and cities in the sample have 7.14 percent foreign pupils enrolled in their schools. East German counties show far below-average shares of foreign pupils. In the period analyzed, we observed an overall decrease in the share of foreign students (Figure A2 in the appendix), which is more pronounced in

Table 2 Effective number of school forms and structural features of counties and cities with county status in Germany (1995–2010)

	Mean	SD	Min.	Median	Max.
Total (N = 6512)					
Effective number of school forms	2.94	0.59	1.18	2.94	5.25
Population aged 10 to 14*	10.59	10.65	1.05	8.17	185.42
Population density**	528.22	673.84	37.09	204.18	4355.28
Share of foreign pupils ***	7.14	5.92	0.03	5.71	37.73
GDP (county level) ****	5.28	7.85	0.74	3.32	98.75
Cities with county status	0.27	0.45	0.00	0.00	1.00
West Germany (N = 5232)					
Effective number of school forms	3.11	0.48	1.18	2.99	5.25
Population aged 10 to 14*	11.26	11.48	1.67	8.48	185.42
Population density**	576.73	712.25	40.32	232.05	4355.28
Share of foreign pupils ***	8.60	5.71	0.85	6.89	37.73
GDP (county level) ****	5.86	8.59	0.79	3.58	98.75
Cities with county status	0.28	0.45	0.00	0.00	1.00
East Germany (N = 1280)					
Effective number of school forms	2.24	0.46	1.51	2.04	3.77
Population aged 10 to 14*	7.87	5.40	1.05	6.60	31.50
Population density**	329.95	433.28	37.09	121.57	2094.39
Share of foreign pupils ***	1.18	0.99	0.03	0.90	6.62
GDP (county level) ****	2.90	2.18	0.74	2.15	15.51
Cities with county status	0.26	0.44	0.00	0.00	1.00

* Thousand inhabitants, ** inhabitants per square kilometer, *** percent, **** billion euros



Sources: Regional Database Germany, our own calculations

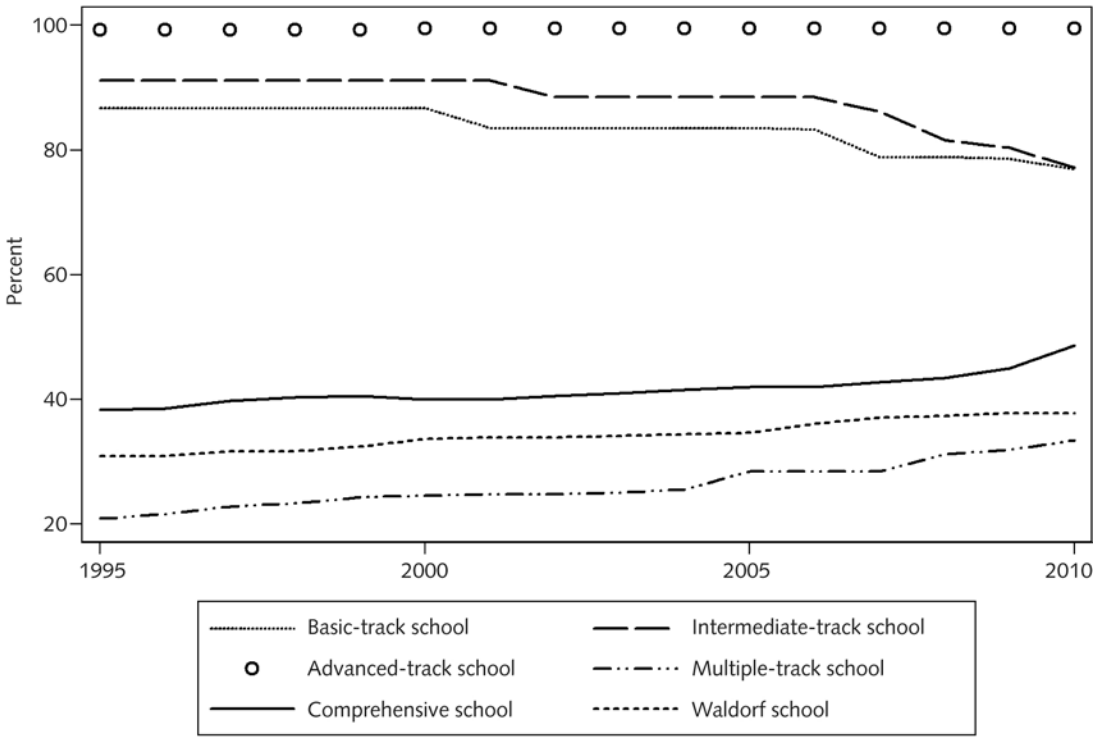
Figure 1 Effective number of school forms at the county level in West and East Germany (1995–2010)

large agglomerations such as city states. Further analysis will show how some of these variables developed over the sample period and how East German regions differ from their counterparts in West Germany.

Looking at the development of the effective number of school forms in West and East Germany separately (Figure 1), it becomes clear, first, that the median value of the index is lower in East Germany than in West Germany throughout the period analyzed. According to Hypothesis 2 this can be attributed to the creative adaptation of the tripartite West German secondary school system during the transformation process (Sackmann 2010: 179). Second, the interquartile range of the index decreases in both parts of the country from 1995 to 2010. Third, the median decreases slightly in both parts of the country especially in the later years of the period under analysis. Fourth, the median in East German regions increases during the early 2000s and decreases rather sharply from 2003 to 2004. The observed decrease can probably be attributed largely to the implementation of an integrative school reform in Mecklenburg-Western Pomerania after 2002. In order to better understand the overall decrease of the interquartile range in the effective number of school forms, a brief look at the development of its two dimensions might be clarifying.

Concerning distributional differentiation, there were significant changes in the shares of enrollment in the different types of school (Figure A1). Most obvious are the increase in the "market" share of the advanced-track schools after 2005 and the complementary decrease in the share of the basic-track schools. More generally, a growing share of enrollments in school types offering higher leaving certificates (advance-track schools, comprehensive schools, and, at a lower level, Waldorf schools as well) could be observed during the last years of the period analyzed.

Concerning the structural differentiation of the regional secondary school system, the overall picture is even clearer (Figure 2). The advanced-track school was the most widespread type of school, present in virtually every German county (except



Sources: Regional Database Germany, our own calculations

Figure 2 Shares of counties providing particular school types in Germany (1995–2010)

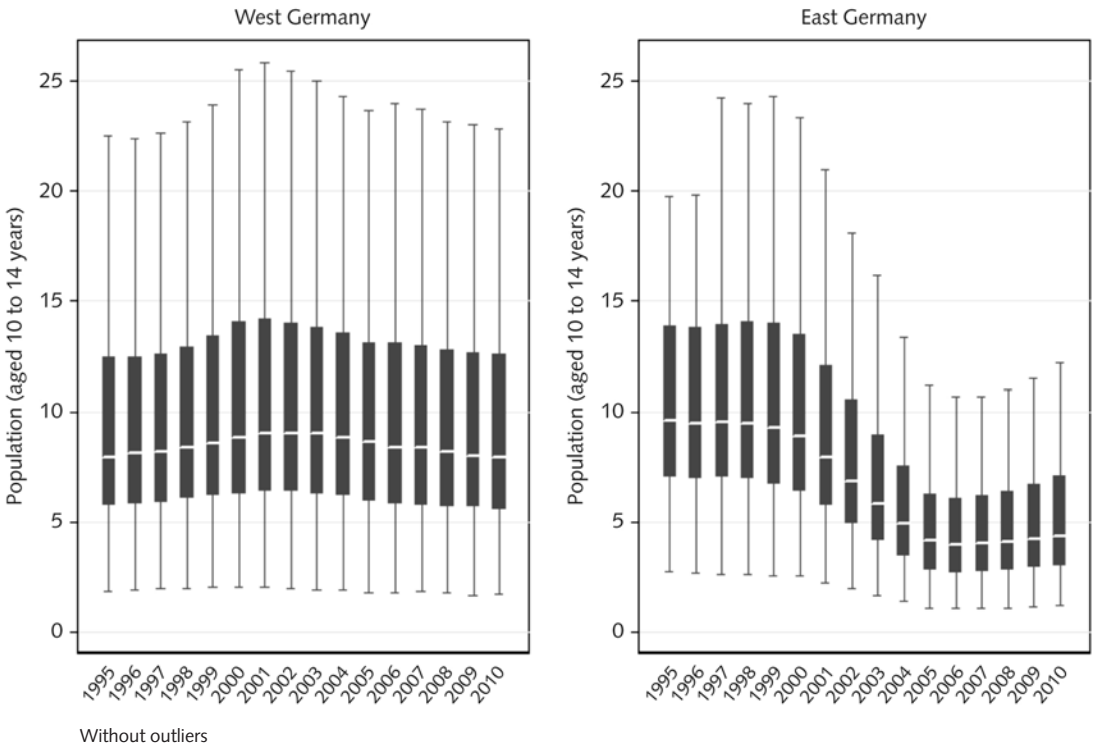
for two counties in Bavaria). The other two ramifications of the traditional tripartite school system were on the decline (especially the basic-track school) while the integrative school forms (including the private Waldorf schools) gained ground during the period analyzed.

Regarding the development of cohort size, remarkable differences between West and East German counties become evident (Figure 3). Whereas the median cohort size in West German counties was quite stable throughout the period analyzed, with a slight increase during the 1990s and a decreasing tendency in the 2000s, the East German counties recorded a significant decline in the median cohort size during the same time. The latter is attributable to the unprecedented fertility decline in East Germany after re-unification with "lowest-low" fertility levels in the years 1993 and 1994 (Kohler et al. 2002). Declining cohort sizes are, however, not a purely East German phenomenon. While 64 percent of the East German observations document declining cohort sizes during the sample period, this is the case for at least 49 percent of the West German observations as well. In the years to come, significantly declining cohort sizes of secondary school age are projected especially for West German regions (Autorengruppe Bildungsberichterstattung 2010).

We need to bear these differences between East and West German regions in mind when we turn to more detailed regression analyzes.

4.5 Panel analysis

Three of the proposed hypotheses (H1, H3, H4) claim to account for changes over the sample period. Based on the data used in the present article, the *cultural hybridity hypothesis* (H2) posits stable differences across the sample period. Hence, the empirical strategy will have to take into account variations both within the territorial units analyzed as well as stable differences between the units. When focal units are measured at several points in time, as in the compiled dataset, the observations of each territorial unit can no longer be treated as



Sources: Regional Database Germany, our own calculations

Figure 3 The population aged 10 to 14 years in German counties by county location (1995–2010)

independent ones like in ordinary least square regressions (OLS). Otherwise the effects of independent variables would be misrepresented due to unobserved differences among focal units (in the present context, say, for example, differences between the city state *Hamburg* and the county *Saalekreis*). The most comprehensive control for heterogeneity can be achieved using fixed effects models with a clear focus on changes within observations of the same macro unit (Allison 2009). Stable characteristics of macro units are removed from the equation by group-mean centering; observed values of a macro unit are demeaned and only deviations from the group mean enter the equation. This way the unobserved unit-specific error is eliminated from the model (Brüderl 2010: 973):

$$y_{it} - y_i = (x_{it} - \bar{x}_i)' \beta + (\varepsilon_{it} - \bar{\varepsilon}_i). \quad (2)$$

For the analysis of change, the use of within estimators is considered to be the most appropriate strategy (Gießelmann & Windzio 2012). However, fixed effects models eliminate time-constant variables from the equation, which is problematic in the context of the present article. The *cultural hybridity hypothesis* (H2) postulates that the location of territorial units in the eastern or the western part of the country should be indicative of differences in regional school structures. Therefore, cross-sectional covariance has to be taken into account in the analysis. Random effects models allow for the integration of time-invariant variables but (often unrealistically) assume that individual heterogeneity is distributed randomly in the sample (Brüderl 2010: 974). Given unobserved heterogeneity, random effects estimators are inconsistent and therefore inadequate. A third way of analyzing panel data are so-called hybrid models. They are considered to be the state of the art when changes across time *and* the effects of time-constant variables are of theoretical interest, as in the present article. The use of hybrid models is still rare in sociology (Halaby 2004). The hybrid model used here is a combination of fixed effects and random effects models (Allison 2009). The equation for the hybrid model is the following (Brüderl 2010: 977):

$$y_{it} = (x_{it} - \bar{x}_i)' \beta + \bar{x}_i \gamma + z'_i \delta + \alpha_1 + \varepsilon_{it} \quad (3)$$

In this case z_i denotes the vector of the time-constant variables. Parameters are estimated using generalized least squares (GLS) as in random effect models. The within component (β) reproduces the fixed effects estimator while the between component (g) is usually not of theoretical interest because it is inconsistent in the case of unobserved heterogeneity. Only if $\gamma = \beta$ is there no unobserved heterogeneity. The special attractiveness of hybrid models results from the fact that they not only reproduce the coefficients from fixed effects models but also report estimators for time-constant variables (δ). Contrary to random effects models, these estimators are not biased since the model perfectly controls the effects resulting from variance across time (Brüderl 2010: 977). Therefore, as the adaptation of the West German secondary school structure in East Germany is considered to be relevant but took place before the period under analysis, hybrid regression models will be used in addition to fixed effects models in the analysis presented in following chapter.

5 Determinants of the effective number of school forms

The analysis begins with checking the *demography* and *immigration hypotheses* (H3 and H4) and then proceeds to two more complex fixed effect models. The second model includes dummy variables of the kind applied in the *party ideology hypothesis* (H1) and control variables for education reforms that have occurred independently of changes in government. The third model additionally includes an interaction term conditioning the effect of cohort size on the geographic location of regions and the regional GDP as control variables. Last but not least, the *cultural hybridity hypothesis* (H2) is tested using a hybrid panel regression model. This fourth model also controls for differences in settlement structure between counties and cities with county status.

In a first fixed effect regression model containing three demographic variables of the administrative region, the population aged 10 to 14 years shows a positive influence on the effective number of school forms in a county (Table 3, Model 1). As expected, the effective differentiation of the school system is predicted to decrease when cohort sizes decline and vice versa: for every additional thousand youngsters, the value of the index increases by 0.0075 points; or more relevant to the German case, for every thousand pupils less, the effective number of school forms declines by 0.0075 points. While competition for education opportunities decreases with fewer cohort members, it increases from the point of view of schools and school types (Klemm 1980). As the descriptive analyses have shown, educational expansion moderates the slow de-differentiation process: increasingly more territorial units lack basic- and intermediate-track schools; at the same time, school forms offering higher leaving certificates (advanced-track school, comprehensive school, Waldorf school) and multiple-track schools witness higher enrollments (Figure A1). Furthermore, the first model tests a second mode of operationalizing the *demography hypothesis;* it analyzes the influence of the change in population density on the differentiation of the secondary school system in a county. This coefficient, however, is statistically not significant. The first model additionally uses the share of foreign national pupils in order to check the *immigration hypothesis*. As expected, the model predicts the differentiation of the secondary school system to grow by 0.0372 index points as the share of foreign national students increases by 1 per cent. Although the historical differentiation of the secondary school system certainly cannot be attributed to changes in the share of immigrant pupils, the results suggest that during the period analyzed their growing share might fuel the further differentiation of an already highly differentiated secondary school system or contribute to its de-differentiation in the case of a decreasing share. Robustness checks show that to a substantial degree this positive effect seems to rest on the influence of the immigrant share in total enrollment on basic-track school enrollments. The (generally decreasing) share of basic-track schools in total enrollment increases significantly with the share of immigrant pupils in a region.[9] Overall, the first fixed effects model supports the *demography* and the *migration hypotheses*, with the within estimators explaining 2.65 percent of the total variance in the sample and an overall explanatory power of the model of 24.21 percent.

Interestingly, when a dummy variable for the ideology of the largest ruling party (*party ideology hypothesis*) and dummy control variables for integrative education reforms are introduced in a second fixed effects model, the *demography* and *immigration hypotheses* are further supported. Model 2 also yields a surprising result: In states where the

[9] Detailed results can be obtained from the authors.

Table 3 Determinants of the effective number of school forms in German regions

	(1) FE	(2) FE	(3) FE	(4) Hybrid
Population aged 10 to 14	**0.0075*****	**0.0051*****	**0.0106*****	**0.0106*****
	(0.0014)	(0.0015)	(0.0021)	(0.0021)
Population density	**0.0001**	**–0.0000**	**0.0001**	**0.0001**
	(0.0001)	(0.0001)	(0.0001)	(0.0001)
Share of foreign students	**0.0372*****	**0.0337*****	**0.0269*****	**0.0269*****
	(0.0030)	(0.0032)	(0.0035)	(0.0035)
Ideology of the largest ruling party (SPD = 1)		**0.0469*****	**0.0465*****	**0.0465*****
		(0.0091)	(0.0094)	(0.0094)
Reform type 1 (integrating 2 education programs)		**–0.1191*****	**–0.1337*****	**–0.1337*****
		(0.0150)	(0.0155)	(0.0155)
Reform type 2 (integrating 3 education programs)		**0.1947*****	**0.2283*****	**0.2283*****
		(0.0558)	(0.0560)	(0.0560)
East Germany * population aged 10 to 14			**–0.0143*****	**–0.0143*****
			(0.0029)	(0.0029)
GDP (county level)			**–0.0104****	**–0.0104****
			(0.0034)	(0.0034)
East Germany				**–0.5184*****
				(0.0761)
Settlement structure (city with county status = 1)				**–0.0954**
				(0.0627)
Constant	**2.5377*****	**2.6587*****	**2.6619*****	**2.5804*****
	(0.0788)	(0.0795)	(0.0801)	(0.0378)
Observations	6512	6512	6512	6512
R^2 within	**0.0265**	**0.0400**	**0.0449**	**0.0449**
R^2 between	0.2745	0.2969	0.3795	0.7238
R^2 overall	**0.2421**	**0.2627**	**0.3351**	**0.6354**

Standard errors in parentheses; * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$
Model 4 controls for between effects of the time-varying variables. Those effects are not reported here since they are of no theoretical interest and space is limited; coefficients can be made available upon request.

Social Democrats take over government, secondary school structures are predicted to become effectively more differentiated by 0.0469 index points than under conservative rule (no matter if control dummies for integrative reforms are included or not). This is contrary to the assumed negative effect of the *party ideology hypothesis*. The unintended effect of SPD governments in Germany, documented in the literature on the introduction of comprehensive schools, is further strengthened with every change in government. Instead of substituting the tripartite school system, the SPD only managed to supplement it by adding an additional school type, failing to break the highly mobilized resistance of the mainly academic clientele of the advanced-track schools. During the period analyzed, newly established SPD governments that strengthened comprehensive schools type (and hence a more even distribution of enrollment) accounted for the observed effect especially in West Germany (Table A3; see also Kempkes 2009: 59–133).

The control variables for integrative education reforms work only partially as expected. The estimator for reform type 1 indicates that the laws for the integration of basic- and intermediate-track secondary schools decreased the effective number of school forms by 0.1337 index points. The estimator for reform type 2, on the other hand, shows that there was an increase in the effective number of school forms. This latter type of reform was introduced only in three states in 2010 (Berlin, Hamburg, and Schleswig-Holstein). In the first two states the absolute number of school forms indeed declined. In Schleswig-Holstein, despite an intended system change towards a fully comprehensive or at least bipartite school system (Wiechmann 2011b), the old school forms will continue to exist

statistically next to the new ones for a few years until all of their enrollment will have left the school system. The somewhat artificial effect of Schleswig-Holstein gains more weight due to the higher number of territorial units in this state. This raises the explanatory power of Model 2 for changes over time to 4 percent.

Due to the marked differences in the development of cohort sizes between East and West German counties, which have become evident in the descriptive analysis (Figure 4), we will investigate if the location of a county in one or the other part of the Germany moderates the observed influence of the cohort size. A moderating effect exists when the effect of a predictor variable on the dependent variable is conditioned by a third variable (Lohmann 2010). Model 3 incorporates an interaction term for the population aged 10 to 14 and an indicator variable for the county location. Note that the indicator variable itself is not included because of the property of fixed effects models to eliminate time-constant variables (Gießelmann & Windzio 2012: 40ff.). The conditional effect of the cohort size can nevertheless be interpreted. Furthermore, the third model includes the GDP at the county level as a control variable since there are also marked economic differences between regions in Germany. For West German counties the effect of the cohort size is greater than in the unconditioned model and is directly visible in Table 3. For every decrease by 1,000 inhabitants aged 10 to 14, the effective number of school forms is predicted to drop by 0.0106 index points. The statistical significance of the interaction term indicates that the observed difference is not due to chance. In East Germany, by contrast, the effective number of school types even seems to increase slightly with the decrease of the relevant age group (b = – 0.0037).[10] The negative effect indicates certain political limits of further reducing the effective number of school types in East Germany when cohort sizes decline. Robustness checks based on an East German subsample show a positive but statistically not significant effect (Table A3). The dimension of structural differentiation is indeed reduced with declining cohort sizes; therefore the lacking significance must be due to a more equal distribution of enrollment across the (remaining) school types.[11] For example, advanced-track schools were nowhere completely abolished as part of the regional school infrastructure. On the contrary, their enrollment share rose during the period analyzed. Furthermore, in East Germany, the distribution of enrollment across the (remaining or even newly established) school types became more even with the advanced-track schools and (originally) relatively small school types (comprehensive school; Waldorf school)[12] gaining ground. At the same time, multiple-track schools had begun to lose their more dominant role during the 1990s.

Model 3 additionally indicates that controlling for the economic development of a region does not fundamentally change the results obtained so far. The positive effect of the share of pupils with foreign citizenship is somewhat lower in this model. Furthermore, the model estimates a negative effect of the economic development of a region on the differentiation of the secondary school system. If the GDP of a county rises by one billion euros, the effective number of school types is estimated to decline by 0.0104 index points. More detailed analyses show that the influence is mediated by both the structural and the distributional dimension of the effective number of school types. This means that economically growing regions to a significant extent abolish basic- and intermediate-track schools. Where these two school types remain present, they lose part of their share in enrollment while advanced-track schools gain ground. Since it is known that the latter are especially strong in urban areas, we will also control for the settlement structure in the following model.

Fixed effects models are considered to be a methodologically sound solution when longitudinal effects are of central interest. However, the *cultural hybridity hypothesis* requires checking whether the transformation process in East Germany produced enduring differences in secondary school structures between the western and eastern German macro regions. The postulated interregional differences have to be captured by a cross-sectional design in the period analyzed while integrating the results obtained so far. Hybrid models reproduce the within estimators of fixed effects models but additionally allow including time-constant variables (Allison 2009: 23ff.). These models follow the random effects logic but control for unobserved heterogeneity by including between estimators for time-varying vari-

[10] Calculate 0.0106 + (–0.0143 * 1) = –0.0037 (Lohmann 2010). Other theoretically possible interactions with the geographical location were statistically and practically insignificant when calculated for the whole sample.

[11] Detailed results can be made available on request.

[12] This interpretation is supported by studies showing that private schools emerge especially in demographically shrinking areas, partially offsetting public school closures (Kühne & Kann 2012).

ables. Model 4 reproduces exactly the coefficients of Model 3 concerning the within estimator of each continuous variable but additionally indicates that in East Germany the effective number of school forms is estimated to be an average 0.5184 index points lower than in West Germany. Hence, the adaption of West German school structures during the transformation process in East Germany proves to be still the most significant change in the effective number of school types introduced during the last 25 years. The comprehensive school system of the GDR, which was in line with the dominant schooling model of world society, did not overrule the path dependency of the West German school structure. Nevertheless, the decisive education policies of the early 1990s moved a significant part of the German secondary school system close to a bipartite school system which some observers deem to be a possible future model for the entire German school system. During the period analyzed there were still stable and significant differences between these two German macro regions. The dummy control variable for settlement structures is statistically not significant. Model 4 shows an explanatory power of 4.49 percent within units and an overall explanatory power of 64 percent.

To conclude the empirical part of this article, the regression results shall be illustrated based on demographic projections in order to make them intuitively more tangible. Does demographic change influence the differentiation of secondary school systems in Germany? Current projections for lower secondary schools in Germany assume a reduction of enrollment by 22 percent from 2008 to 2025 (Autorengruppe Bildungsberichterstattung 2010: 171). These changes are projected to be more pronounced in rural areas than in large agglomerations. Starting from an average cohort size of 10,590 children for all of Germany (Table 1), an assumed change of 2,500 children and youths is considered to be a plausible example to illustrate a more detailed interpretation. According to Model 4, a decrease in cohort size by 2,500 children would imply a de-differentiation of the mean regional school system from 3.11 to 3.08 index points in West Germany. In East Germany, by comparison, a further decrease in cohort size by 2,500 children would leave the effective number of secondary schools largely untouched at 2.24 index points. Hence, the de-differentiation of the secondary school system to be expected due to demographic decline seems to be highly significant but rather moderate in volume. However, the positive effect of immigration, as a second demographic factor, has to be considered as well. Since immigration has been fluctuating in recent years and naturalization procedures have been simplified, it is rather probable that decreasing shares of pupils with foreign citizenship will contribute similarly to the de-differentiation of the secondary school system as declining cohort sizes do. Furthermore, these results control only for reforms implemented in the past. Since reforms are still underway in a number of states or at least have been announced to be implemented soon, the bi-partite school system is expected to become the standard model in 11 out of 16 German states (Autorengruppe Bildungsberichterstattung 2010: 64). One can conclude that the moderate direct effect of demography on the decreasing effective number school forms induced by pure numerical decline is reinforced by the demographic effects on plurality as well as by institutional reforms pulling in the same direction.

6 Discussion: Demography is relevant – to a certain degree

To summarize the results of our analysis, it can be stated that during the period under consideration there was a moderate tendency towards a less differentiated regional secondary school system in Germany. Nevertheless, the path-dependent differentiation of secondary school structure still dominates the overall picture. Only in East Germany a significantly more integrated school system exists which was established mainly after re-unification (*cultural hybridity hypothesis*). During the period analyzed important effects towards more integrated school structures originated from integrative educational reforms (especially from reform type 1). Smaller de-differentiating effects were due to declining cohort sizes and, in the later years, also due to declining shares of pupils with foreign citizenship. As opposed to these factors, the then newly established Social Democratic governments (*party ideology hypothesis*) contributed to the further differentiation of the effective number of school types. The latter seems to have been an unintended and theoretically unexpected effect of party ideology. As the SPD supported the – overall fairly low – enrollment in comprehensive schools, their growing enrolment share increased the effective number of school types.

How fruitful is the chosen theoretical perspective for the central question of demographic change? The attractiveness of Durkheim's reasoning is that it allows departing from positions subscribing ei-

ther to the idea that "demography is destiny" or that demographic discourse provides an ideological smokescreen concealing and distracting from the "true" problems of society. Unlike Malthusian propositions, Durkheim opens up the perspective that "demographic burdens" and competition for resources might be eased by changes in the division of labor. While declining cohort sizes generally suggest lower competition between individuals for education opportunities, the competition of educational institutions for enrollments intensifies in this situation. Interestingly, a less differentiated (or even a fully comprehensive) secondary school system seems to create a win-win situation for individuals and organizations alike: the school system would probably become less socially selective and more comprehensive schools, targeting broader social groups, would probably be economically viable even with smaller cohort sizes. Furthermore, from a pedagogical point of view, integrated organizational solutions are better equipped to maintain a high quality of instruction (Klemm 1980). Regarding full comprehensive schooling, the de-differentiation of the German secondary school system still meets the resistance of the traditional clientele of advanced-track schools. Neither of the integrative reforms in Germany has so far touched upon the autonomy of the *Gymnasium*. In none of the territorial units analyzed has the *Gymnasium*, as the leading institution of the tripartite school system, been substituted completely by comprehensive organizational solutions. This notwithstanding, the comprehensive schools might be on the verge of gaining a competitive advantage in the near future as demographic decline unfolds, as some case studies suggest (Zymek et al. 2011).

The political focus of education policy in Germany rests on the state level, also with regard to institutional reforms. The data analysis has shown that variance and developments at the regional level below that of the state seems to be empirically more important than political debates would suggest. As demographic change produces accentuated regional differentiation, local agency should not be neglected. Especially in rural areas, less differentiated school structures could contribute to the accessibility of attractive education programs, increase the social integration of working-class pupils, and, last but not least, reduce the remaining costs (Seitz 2006) of spare education capacities in a tripartite school system. The latter is especially important from the point of view of intergenerational equity. In Schleswig-Holstein, for example, especially rural areas have opted for establishing fully comprehensive schools labeled *Gemeinschaftsschule* (Wiechmann 2011a, 2011b).

The differentiation of the regional school system was operationalized by means of a two-dimensional index: the effective number of school types captures, first, the absolute number of existing school types (structural differentiation) and, second, the distribution of enrollment across these school types (distributional differentiation). As a consequence, interpretations require more caution than in case of a one-dimensional variable. Yet, it is questionable whether a one-dimensional operationalization of differentiation, for instance based on the absolute number of school types, would have yielded more tangible results. If we operationalize differentiation in this way, the existence of school forms with only marginal shares of enrollment would distort the index. We therefore performed robustness checks with structural differentiation as the dependent variable to differentiate between the two dimensions of the index.

Since our findings largely support the *demography hypothesis*, there is some evidence that declining cohort sizes will contribute to more integrated secondary school structures especially in West Germany. The practically inexistent effect of cohort sizes on the effective number of school types in East Germany and a projected stabilization of cohort sizes for this part of the country (Autorengruppe Bildungsberichterstattung 2010: 171) suggests that no major changes of school types are likely to occur in the middle range. However, this seeming stability of school structures in East Germany conceals massive waves of school closures that have changed the spatial differentiation of the regional secondary school system significantly. It is likely that the spatial adaptation process of secondary school structures in East Germany is not over yet.

The positive effect of immigration (*migration hypothesis*) on the differentiation of the school system might indeed work in the same direction as cohort sizes can be expected to decrease in the years to come if the share of foreign national pupils continues to decline as it has done during the latter years of the period analyzed. The share of foreign national students is decreasing due to easier naturalization procedures. The effective number of school forms increases significantly in regions with a growing share of foreign national students and decreases with lower shares of such students. This is probably attributable to a latent function of a highly differentiated secondary school system, which is to contain possible conflicts between au-

tochthonous and immigrant populations. Since growing shares of pupils with foreign citizenship have contributed to higher shares of enrollment in basic-track schools, this school type will probably lose further ground in the future.

7 Conclusion

The guiding question of this article has been whether demographic change has an effect on the differentiation of the school system (the division of labor). The results of the data analysis confirm the general neo-Durkheimian assumptions of this relationship. However, the demographic effects are more complex than commonly perceived. Demographic trends do not have a direct impact; rather they are moderated by forms of institutional coping of which (de-)differentiation is one form. Demographic effects rest not only on the number and age structure of a population but also on its ethnic heterogeneity. As institutional changes are part of the moderation of demographic effects, institutional reform initiatives and party ideologies are important too. The panel data analysis has shown that the interplay of these variables caused a drop in the effective number of school forms in Germany during the last two decades in reaction to demographic decline at the regional level.

It would seem to be worthwhile to check whether this neo-Durkheimian approach in analyzing the effects of demographic change is also fruitful in similar fields of infrastructure. For instance, is there a similar drop in effective medical or legal specialization in regions with demographic decline? Whether the observed relationships can be generalized across countries also remains an open question. Are these effects just specific to the very special situation of the German re-unification process only? Or are they comparable in size and tempo to other regions in countries with shrinking populations such as Japan or Poland?

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