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Department of Economics
University of Munich

Volkswirtschaftliche Fakultät
Ludwig-Maximilians-Universität München

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Educational expansion and social composition of secondary schools: evidence from Bavarian school registries 1810-1890

Alexandra Semrad[§]

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Abstract

This paper studies the relationship between social class, educational attainment, and social mobility. While educational expansion has been shown to increase educational attainment and social mobility in contemporary countries, the 19th century has received little attention. The German state of Bavaria experienced an enormous expansion of secondary education in the course of the 19th century, also due to the introduction of modern secondary education (Gewerbeschule). In this context, it is asked whether educational expansion (1) led to changes in the association between social class and educational attainment, and especially so after the introduction of the Gewerbeschule; (2) weakened the link between social class of origin (father's occupation) and class of destination (son's occupation) and thereby increased social mobility? Employing a unique dataset based on annual school reports of 21 Bavarian cities covering the 19th century, the analysis of occupational background information on students by the use of HISCO/HISCLASS reveals that introduction of the Gewerbeschule increased self-selection of the upper class into traditional and the middle class into modern education. Even though educational expansion did not increase participation of lower social classes, the prospect of social mobility for underprivileged classes was high especially in the Gymnasium.

[§] Munich Graduate School of Economics, University of Munich, Ludwigstr. 33, 80539 Munich, Germany. Email: alexandra.semrad@econ.lmu.de

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1 Introduction

Education plays an important role in studies on social mobility since it can serve as a mediating device between an individuals' social background and the social class she will reach during her life time. The expansion of education may then not only change the social composition in schools, but also help to improve the chances of social mobility for underprivileged parts of society.

In fact, 19th century Bavaria experienced a substantial degree of educational expansion: in less than 90 years, the share of secondary students in total population increased more than tenfold. Although much of this increase was demand-driven, it can also be ascribed to the introduction of a new form of secondary schooling, i.e. the Gewerbeschule, in 1829, which was later replaced by the Realschule. Both schools were supposed to provide an alternative to the humanist Gymnasium – the predominant type of secondary education. While the curriculum of the Gymnasium focused on the classics and liberal arts, the focus of the Gewerbeschule/Realschule was on modern languages, applied mathematics, and natural sciences. Hence, its introduction was greatly welcomed by trade and industrial organizations as well as by the commercial and industrial middle class. Since the Gymnasium understood itself as an institution for the elite, the introduction of an applied alternative form of secondary education can be supposed to have encouraged educational participation of the remaining social classes, particularly the middle class.

In this context, the following questions arise: did expansion of secondary education in 19th century Bavaria (1) lead to changes in the association between social class and educational attainment, in particular after the introduction of the Gewerbeschule; (2) weaken the link between social class of origin (father's occupation) and class of destination (son's occupation) and thus increase social mobility? To answer these questions, annual school reports of Bavarian secondary schools throughout the 19th century are employed. These reports provide information on the social background of students by including the father's occupation. In order to allocate occupational titles into social classes and obtain a dataset that is consistent across time (1810-1890) and space (Bavarian regions), this paper adopts the HISCO/HISCLASS system (van Leeuwen and Maas 2011; van Leeuwen et al. 2002). While the analysis of school registries based on HISCO/HISCLASS yields profound insights into the relationship between social class and education, the role of education in social mobility is explored by employing related studies on occupational careers of graduates. Results indicate that the Gymnasium became less elitist until the introduction of the Gewerbeschule; however, once this applied form of secondary education had been introduced, especially artisanal middle class children began to select into the Gewerbeschule/Realschule whereas higher classes chose the Gymnasium. Throughout the 19th century, there is no indication that expansion of secondary education increased participation of lower social classes. However, the chances of social mobility especially for children of lower classes attending a Gymnasium were high since a degree of this institution enabled entry into civil service

positions. But also the Gewerbeschule/Realschule provided the possibility of social advancement, as a related study on the background of entrepreneurs and industrialist reveals (Kaelble 1973).

The literature on the importance of education and its expansion for economic growth is vast, both for current and past societies.[1] This is also the case for research on intergenerational mobility[2] and the role of education in mediating the relationship between social origin and social destination.[3] For example, models on the transmission of earnings between parents and children in the spirit of Becker and Tomes (1986) emphasize the role of government spending on education for the degree of intergenerational mobility. However, according to Iyigun (1999) public investments in education have to be large enough to outweigh the positive impact of educated parents on educational attainment of children. On the empirical side, international comparative studies reveal that educational attainment is highly dependent on social background[4] and academic credentials for class allocation become more important the more bureaucratic the state is (Ishida et al. 1995; Müller et al. 1989). Both links were especially pronounced in 20th century Germany which Müller, et al. (1989, p. 25) claim to be a result of "*its early selection procedures, its class-bound three-tier system, and its historically deeply-rooted links between the educational system and the class system*". Furthermore, studies on German educational expansion during the 20th and early 21st century show that even though overall participation increased, class-specific inequality in the transition to upper secondary education (Gymnasium) and to university education persisted (Becker 2003; Blossfeld 1993).[5] Hence, the role of education in social mobility in the course of the 20th/21st century has been extensively investigated primarily by sociologists.[6] However, studies for earlier periods focusing on the historical role of educational expansion on social mobility in Germany and also other countries are less abundant. The studies of Ringer (1980) for Germany and Rauscher (2015) for the U.S. provide valuable exceptions. Ringer (1980) studies the social composition and intended careers of students in Prussian secondary education during the final decades of the 19th century. According to his findings, the Gymnasium

[1] See for example Easterlin (1981) or the studies by Goldin (1999), Goldin and Katz (2000), and Parman (2011) on the expansion of the American High School at the beginning of the 20th century. In respect to human capital inequality, Crayen and Baten (2010) show that lower inequality in numeracy increased economic growth in the US towards the end of the 19th century.

[2] Solon (1999) and Black and Devereux (2011) provide an extensive overview on the intergenerational mobility literature. Historical studies on intergenerational mobility have traditionally focused on vital registers such as marriage records. See for example van Leeuwen and Maas (2010) for an overview or Miles and Vincent (1993) for a European comparison. An exception is the recent study by Long (2013) who is able to link British census data across the second half of the 19th century. His analysis reveals that both inter- and intragenerational mobility was surprisingly high in Victorian Britain.

[3] This is known as the 'OED triangle': O (social origin) influences E (educational attainment) which in turn determines D (social destination). The direct impact of O on D – which remains and is not mediated through E – completes the triangle (Goldthorpe 2014).

[4] A recent historical contribution is provided by Paik (2014). In analyzing Korean exam and census data he finds that that educational attainment in 1985 and 2000 is positively influenced by the social status of an individual's ancestors living between 1392 and 1897.

[5] This conclusion is challenged by studies revealing decreasing class differentials in educational attainment through the course of the 20th century in Germany. See for example Jonsson et al. (1996) and Müller and Haun (1994).

[6] See Breen and Jonsson (2005) for a review of sociological studies on education and social mobility.

enabled social mobility through preparation for academic careers and civil service positions. Rauscher (2015) focuses on primary educational expansion induced by the introduction of compulsory schooling laws between 1852 and 1918 in the U.S. Her results show that these laws raised school attendance rates, thereby leading to a higher proportion of skilled and non-manual occupations and consequently enhanced social mobility.

By increasing the chances of social mobility, educational expansion might have also contributed to a more equal distribution of incomes. Starting with the seminal work by Kuznets (1955),[7] a growing number of empirical studies has revealed that especially the early 20th century experienced a rapid decline in income inequality.[8] In Germany, the corresponding drop was most severe after WWI (Atkinson et al. 2011), and thus followed educational expansion of the 19th century. Indeed, various theoretical and empirical analyses stress the importance of an equal distribution of educational opportunity and attainment in the population for reducing income inequality.[9]

Hence, this paper complements to the research of the association between social background and educational attainment in the 19th century and further relates it to social mobility. Although this paper is not the first one to employ data provided by annual school reports in order to study the social composition of students, it provides the first comprehensive investigation into the social composition of Bavarian secondary schooling throughout the 19th century.[10] In contrast to other studies focusing only on occupational background of students, this analysis adopts sociological methods to obtain a profound picture of the relationship between social class and educational attainment.

The remainder of the paper proceeds as follows: Section 2 provides a brief overview on the Bavarian secondary schooling system during the 19th century. Section 3 explains how occupational data from annual school records is coded in order to allocate students into a coherent social class scheme. Section 4 summarizes educational expansion in 19th century Bavaria. Section 5 presents the results on the link between students' social class and their participation in secondary schooling, followed by a discussion on the implications of education and educational inequality for social mobility. Section 7 concludes.

[7] According to Kuznets, income inequality follows an inverse U-shaped curve during the course of economic development (Kuznets 1955).

[8] See Piketty and Saez (2014) for a review on income and wealth inequality in Europe and the U.S.

[9] For example, Becker and Chiswick (1966) find that in the U.S. of the 1960s income inequality tended to rise with schooling inequality but fell with the average level of education. Sylwester (2002) shows that countries with higher public education expenditures in the 1960s were associated with lower levels of income inequality in subsequent years. See also Psacharopoulos (1977) or De Gregorio and Lee (2002) for further cross-country analyses, among others. For a theoretical model on the relationship between education and income inequality, see for example Saint-Paul and Verdier (1993).

[10] These studies usually focus on one single institution. See for example, Kraul (1976) who focuses on the Gymnasium Minden 1822-1847 or Müller (1975) who studies reports of Munich's oldest Gymnasium at the end of the 18th century. Stocker (1911) provides the most comprehensive of these analyses by focusing not only on one but on all Bavarian secondary institutions in 1910.

2 Historical background: Bavarian secondary education[11]

Up to 1833, the Bavarian secondary school system consisted of one institution, i.e. the (humanist) Gymnasium. This school type has a long history in Germany reaching back to 1526 when the first Gymnasium was opened in the Bavarian city of Nuremberg (Keyser 1971, p. 412). The purpose of the Gymnasium was to prepare children for university studies by providing general, religious, and moral education (*Ministerialblatt* 1874, p. 327). Correspondingly, the curriculum of the Gymnasium focused on classical languages (i.e. Old Greek and Latin), the liberal arts, and an abstract teaching of mathematics. Hence, a widespread point of criticism concerned the absence of practical subjects in the curriculum. According to general perception, the Gymnasium was an elitist institution unable to prepare students for commercial or industrial professions (Stocker 1911, p. 4).[12] An increasing number of critics consisting for example of industrial and mercantile representatives, polytechnic, industrial, and agricultural associations began to lobby for the introduction of a 'modern' form of secondary education (Buchinger 1983, pp. 93-112; Hamann 1993, pp. 95-6; Ringer 1967, p. 128).

Finally, in 1829, Bavarian King Ludwig imposed a structural and substantial reform of the Bavarian schooling system by introducing a new kind of secondary school, i.e. the Gewerbeschule[13] (Döllinger 1838, p. 1691). This school type was supposed to provide an alternative to the Gymnasium by teaching so-called realistic or practical subjects, i.e. modern languages such as French and English, applied mathematics such as commercial arithmetic, and natural sciences. In 1833 the first Gewerbeschulen were founded in several Bavarian cities. These new schools enjoyed increasing popularity and by 1877 there existed 40 Gewerbeschulen all over Bavaria. In 1877, all Gewerbeschulen ware transformed into Realschulen. Hence, after 1833 modern secondary education in form of the Gewerbeschule and later Realschule provided an alternative in secondary education to the traditional kind of secondary education, i.e. the Gymnasium. Yet the Gymnasium remained the predominant form of secondary schooling throughout the 19th century.

Children entered both forms of secondary education with age 11 (Gymnasium) or 12 (Gewerbeschule) (Döllinger 1838, pp. 1691-2; *Ministerialblatt* 1874, p. 344). In case of the Gymnasium, educational attainment of the Lateinschule (Latin school) was a prerequisite (Ringer 1979, p. 33; *Regierungsblatt* 1830, p. 923).[14] Duration of education differed not only between modern and traditional education but also within both school types over time: until 1874 the Gymnasium comprised four years, afterwards nine years (*Ministerialblatt* 1891, p. 239; *Ministerialblatt* 1874, p. 327; *Regierungsblatt* 1830, p. 908). However, overall school time did not change since the mandatory four-year Lateinschule was incorporated into Gymnasien in 1874 (*Ministerialblatt* 1874, pp. 323-7). In

[11] See Semrad (2015) for summary of the 19th century Bavarian school system.
[12] See for example Kraul (1976) and Müller (1977, pp. 25-36) for discussions on contemporary perceptions on German secondary institutions.
[13] Gewerbeschulen were originally called 'Landwirtschafts- und Gewerbeschulen' since most schools also included agricultural departments until 1864 (Semrad 2015, p. 8).
[14] Entry from private schooling was possible if the admission examination to the Gymnasium had been passed successfully (*Regierungsblatt* 1830, p. 923).

case of modern secondary education, there were actually profound changes in schooling duration: starting as a three-year institution in 1833, it was extended into a six-year school with the transformation into Realschulen in 1877 (Döllinger 1838, pp. 1691-2; *Ministerialblatt* 1877, pp. 197-255). Since the Realschule took in children around age 11 – as in the Gymnasium – graduates were on average 19 years in the Gymnasium, 15 in the Gewerbeschule, and 16 in the Realschule. Only a degree of the Gymnasium (i.e. *Abitur*) entitled to general university studies. However, graduates of modern secondary education could continue to technical middle schools (i.e. Polytechnische Schule until 1868, and Industrieschule afterwards) preparing them for consecutive studies at the Technische Hochschule (*Regierungsblatt* 1868, pp. 1698-1700). Thus, both secondary school types entitled to university studies.

Furthermore, Realgymnasien existed as a third secondary school type since 1864. These institutions can be considered as a compromise between traditional and modern secondary education (*Regierungsblatt* 1864, pp. 538-44). However, they played a rather minor role in Bavarian secondary schooling since only a small number of cities had a Realgymnasium.[15] Consequently, the subsequent analysis will focus on the main forms of secondary schooling, i.e. the Gymnasium and Gewerbeschule/Realschule.

3 Coding occupational data of annual school reports into a social class scheme

To analyse the relationship between social class and educational choices, this paper employs data from Bavarian school registries (*Jahresberichte*) in 1810, 1830, 1850, 1870, and 1890. Schools were supposed to issue annual reports containing information on the curriculum, teaching staff, and students. Student records include name, place of birth, father's occupation[16] and place of residence, and in most instances also the student's grades. However, it is the father's occupation that provides valuable information about the student's social background.

In order to evaluate whether the association between social class and schooling choice changed over time and especially after the introduction of modern secondary education in 1833, a sample of Bavarian cities is constructed in the following way. First, all cities with operating Gymnasien throughout the 19th century, (here: between 1810 and 1890) are chosen (i.e. 25 cities). It was necessary to disregard seven cities – i.e. Eichstätt, Erlangen, Freising, Hof, Metten, Schweinfurt, and Zweibrücken – from the analysis since annual school reports of these cities are not available prior to 1820.[17] Since the city of Neuburg opened a Gewerbeschule several years after 1835 (in 1870), it was also excluded. Second, all cities with Gewerbeschulen opened between 1833 and 1835 and which had

[15] Realgymnasien were opened in Augsburg, Munich, Nuremberg, Regensburg, Speyer, and Würzburg (*Regierungsblatt* 1864, p. 539). However, schools in Regensburg and Speyer were closed in 1880 and 1883, respectively (Keyser 1974, p. 594).
[16] In case the father has deceased or left the family the occupation of the mother or of the grandfather is listed.
[17] It remains unclear whether this lack of data is due to reports lost or to other reasons.

not been excluded from the Gymnasium sub-sample, are selected into the sample (i.e. 19). Hence, the sample contains a total of 21 cities. These cities are listed in Table A1 in the Appendix.

Note that due to data availability, it was in some cases necessary to employ annual reports issued a few years before or after the respective time period (see Table A2 in the Appendix for details). In some cities – i.e. Augsburg, Bamberg, Munich, Nuremberg, Regensburg, and Würzburg – additional Gymnasien were opened between 1820 and 1890. These Gymnasien are also included in the sample.[18]

In total, employed school reports provide information on 18,090 students and their occupational backgrounds. Table A3 in the Appendix lists student numbers of all Bavarian secondary schools and compares them to the selected sample schools.

In the next step, each of the 18,090 students has to be allocated into the appropriate social class, based on his social background. In order to code the father's occupational title into a consistent social class scheme, this paper adopts several classification systems. The first one, HISCLASS, is widely used in sociological and economic research.[19] It is based on HISCO.[20]

The Historical International Standard classification of occupations (HISCO) is a detailed classification system introduced by van Leeuwen et al. (2002) to enable comparisons of occupational data across time and countries. HISCO is based on a coding system for contemporary professions, that is, the International Standard Classification of Occupations (ISCO68) developed by the International Labour Organization. The occupational titles used in the creation of HISCO originate from historical sources (e.g. marriage certificates or other clerical data) gathered in eight countries between 1692 and 1971.[21] The scheme contains ten major groups, divided into several minor groups which are in turn sub-divided into various unit groups. Table 1 reports the ten major groups in HISCO.

[18] To be precise, although Regensburg opened a second Gymnasium in 1880 (Keyser 1974, p. 594), only one institution enters the dataset. This is due to the fact that the 1890 annual report of the old Gymnasium is unavailable. Hence, data for Regensburg in 1890 originates from the school registry of the new Gymnasium.

[19] Studies employing HISCO and HISCLASS commonly use these tools for the analysis of marriage certificates. See for example Abramitzky et al. (2011) and Maas and Van Leeuwen (2005).

[20] Besides HISCLASS, historians and sociologists have developed a variety of tools to measure social structure in past societies. See Zijdeman and Lambert (2010) for a survey.

[21] These countries are: Belgium, Britain, Canada, France, Germany, Netherlands, Norway, and Sweden (van Leeuwen et al. 2002, pp. 11-25).

Table 1 – Major groups in HISCO

Major groups	Group label
0/1	Professional, technical, and related workers
2	Administrative and managerial workers
3	Clerical and related workers
4	Sales workers
5	Service workers
6	Agricultural, animal husbandry and forestry workers, fishermen, and hunters
7/8/9	Production and related workers, transport equipment operators and labourers

Notes: Table depicts HISCO major groups and respective characteristics.

Source: Adapted from van Leeuwen et al. (2002, p. 39).

HISCO codes consist of five digits. Hence, sales workers are assigned a HISCO code in the form of 4-xx.xx. Each digit indicated by an x provides more information on the nature of the occupation. For example, 4-3x.xx refers to 'Technical salesmen, commercial travelers, and manufacturers' agents' (minor group), 4-31.xx to 'Technical sales and service advisers', and finally 4-31.20 to 'Technical sales man' (unit group). In total, HISCO contains about 1,600 unit groups.

To allow not only cross-national and time-independent comparisons of occupations but also of social status, the Historical International Social Class Scheme (HISCLASS) has been developed by van Leeuwen and Maas (2011). HISCLASS assigns each HISCO unit group one of twelve social classes. According to Maas and van Leeuwen (2005, p. 280) social class "*is a set of persons with the same life-chances*". HISCO codes are classified into social classes by the use of information provided by the 1965 Dictionary of Occupational Titles (DOT). DOT contains 13,000 occupational categories, respective job descriptions, and thereby provides indicators to allocate HISCO codes into social dimensions (van Leeuwen and Maas 2011, pp. 29-35). Furthermore, expert judgement by historians was consulted to test and improve the transformation of HISCO into HISCLASS through the usage of DOT (van Leeuwen and Maas 2011, pp. 61-75). Finally, HISCLASS distinguishes between four dimensions: manual and non-manual work, skill level, supervision, and sector. Table 2 presents the social classes in HISCLASS.

Table 2 – Social classes in HISCLASS

Class number	Class label	Manual/ non-manual	Skill level	Supervision	Sector
1	Higher managers	non-manual	high	yes	mainly other
2	Higher professionals	non-manual	high	no	other
3	Lower managers	non-manual	medium	yes	mainly other
4	Lower professionals, and clerical and sales personnel	non-manual	medium	no	other
5	Lower clerical and sales personnel	non-manual	low	no	other
6	Foreman	manual	medium	yes	other
7	Medium skilled workers	manual	medium	no	other
8	Farmers and fishermen	manual	medium	no	primary
9	Lower skilled workers	manual	low	no	other
10	Lower skilled farm workers	manual	low	no	primary
11	Unskilled workers	manual	unskilled	no	other
12	Unskilled farm workers	manual	unskilled	no	primary

Notes: Table depicts HISCLASS classes and respective class characteristics.
Source: van Leeuwen and Maas (2011, p. 57)

Hence, in this paper, the student's father's occupation is first coded into HISCO using van Leeuwen et al. (2002) who provide an extensive collection of German occupational titles, respective descriptions, and corresponding HISCO codes. In addition, the History of Work Information System website contains a search engine tool to match occupational titles in several languages with HISCO codes.[22] In the next step, HISCO codes are transformed into HISCLASS by employing the crosswalk list provided by van Leeuwen and Maas (2011). For example, the above mentioned 'Technical sales man' with HISCO code 4-31.20 is assigned into HISCLASS 4, i.e. the class of lower professionals, and clerical and sales personnel. HISCLASS further acknowledges supervisory and inferior positons. If artisans are denoted as 'masters' they are promoted to class 6 and if occupations include the characterization 'principal' these are promoted one class higher within the manual/non-manual group (from class 2 to 1, 4 to 3, 5 to 4, 7 to 6, and 9 to 6). However, if a job title includes 'apprentice', 'learner', or 'subordinate' it is demoted one skill level lower within the manual/non-manual divide (from class 1 to 3, 2 to 4, 4 to 5, 7 to 9, 8 to 10, 9 to 11, 10 to 12). Furthermore, 'nobles' and 'owners' without more occupational information are classified into class 1 (van Leeuwen and Maas 2011, pp. 57-60). Finally, HISCLASS excludes retirees, pensioners, and also private gentlemen if no further occupational information is provided. However, since a considerable number of students listed in annual reports falls into this category, this paper adds "Retirees, pensioners and independent gentlemen" as class 13 to the class scheme. In addition, this class includes cases that could not be

[22] The website is accessible at: http://historyofwork.iisg.nl/index.php.

matched with HISCO, mainly due to missing occupational data.[23] In total, 1,022 different occupational titles for 18,090 students in 21 cities have been classified by this procedure. Table A4 in the Appendix presents the number of students in the selected Bavarian sample according to their HISCLASS categorization.

Instead of using the full HISCLASS scheme depicted by Table 2, this paper follows the literature by employing a condensed version of HISCLASS in order to increase the number of observations in each class.[24] This modified scheme combines social classes as follows: 1, 2 to 'higher managers and professionals'; 3, 4, 5 to 'lower managers, professionals, clerical and sales personnel'; 6,7 to 'foreman and medium skilled workers'; 8 to 'farmers and fishermen'; 9 to 'lower skilled workers'; 11 to 'unskilled workers'; 10, 12 to 'lower and unskilled farm workers'. Consequently, in this paper, class 1, 2 is considered as society's elite, classes 3, 4, 5 and 6, 7 as middle class, and classes 9, 11 and 10, 12 as working class. Agricultural class 8 is placed between middle and working class.

Besides HISCLASS, this paper adopts another classification system of occupations which had been used by the royal Bavarian statistical office (*Königlich-Bayerisches Statistisches Bureau*) to categorize occupational data from 1850 onwards. This categorization divides occupations along the five economic sectors: agriculture, industry, trade and transportation, personal services, and civil services. Further, it includes a category for unemployed and people living on pensions and private means. Occupational data is available for 1852, 1882, and 1895. This data includes not only the population actually working in these sectors but also the number of children or relatives dependent on the income of these workers. In order to enable comparisons with employed annual reports, this data is used in an interpolation to attain respective data for 1870 and 1890. Note that since the occupational census of 1852 reports only three sectors – i.e. agriculture, industry, trade and services, state officials (incl. clergy) and others (i.e. retirees, pensioners, scholars, physicians, and artists) – data of 1882 and 1895 is used in the interpolation to obtain data for all sectors in 1870 and 1890.

Table 3 depicts these sectors and respective economic sizes in 1852, 1882, 1895 as well as the interpolated numbers for 1870 and 1890.

[23] In some very few cases it was either impossible to identify the meaning of an occupational title or the title was to general to assign a suitable HISCO match. These titles were: 'Heumeister', 'Bereiter', 'Högner', 'Groß-Hetmann', 'Vorleger', 'Inzipient', and 'Geniewart'.

[24] See for example Abramitzky et al. (2011) and Maas and van Leeuwen (2005).

Table 3 – Occupational classification used by the royal Bavarian statistical office (BSKB)

BSKB code	Occupational category	% of population in BSKB sectors				
		1852	1870[c]	1882	1890[d]	1895
A	Agriculture and forestry	67.8	55.6	50.9	47.8	45.8
B	Industry, crafts, and mining	22.7	25.8	28.3	30.0	31.0
C	Trade and transportation		6.7	8.3	9.3	9.8
D	Household services, servants, and day laborers		0.6	0.7	0.8	0.8
E	Civil services[a]	9.4	4.1	4.6	4.9	5.1
F	Pensioners, independent gentlemen, and unemployed[b]		7.0	7.2	7.4	7.5

Notes: Table reports % of total population working or dependent on relatives working in the respective sector and year.

[a] Including military, church, school, medical, and court personnel as well as artists and freelancers.

[b] Including people without occupational information.

[c,d] Data of 1870 and 1890 are the result an interpolation based on 1882/1895 occupational data.

Sources: Own calculations based on BSKB, XXVII (1873), BSKB, L (1886), BSKB, LXII (1902). See Table A2 in the Appendix for data details.

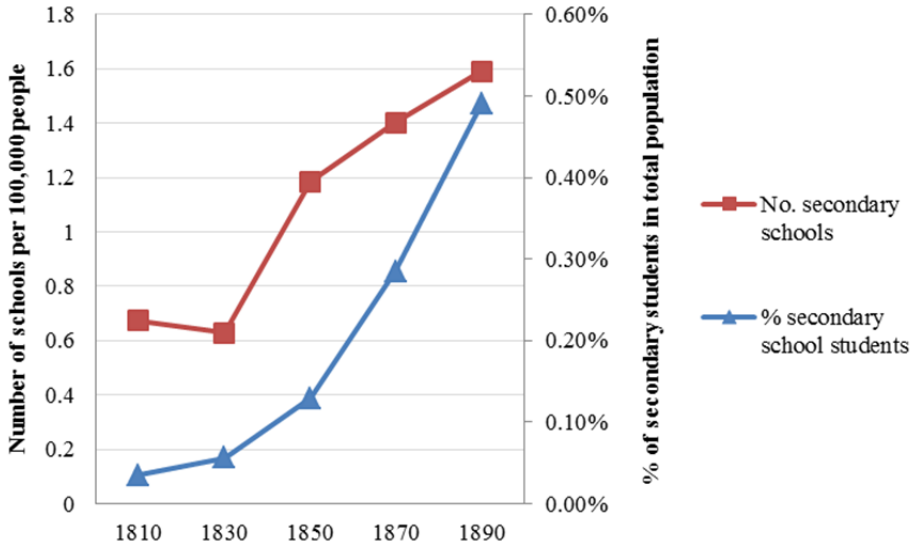
According to Table 3, the majority of people worked in (or were dependent on) agriculture throughout the 19th century although this share constantly declined. An obvious drawback of this kind of classification is that it is unable to provide information on social status. For instance, the agricultural category includes occupations ranging from peasants, husbandmen, and farmers to forest officers or aristocratic landowners. On the other side, however, usage of this scheme enables comparisons between the occupational structure in schools and the overall structure of the economy. In fact, the royal Bavarian statistical office started to include sectoral affiliations of students in their publications on educational statistics from 1873 onwards (BSKB XXVII). However, these are reported only on the state instead of school-level. Thus, respective sector codes (BSKB codes) had to be assigned manually to each of the 1,022 HISCO titles based on a detailed overview of professions attached to the occupational census in 1882 (BSKB XXXXVIII, pp. 257-60). This overview lists 19th century Bavarian occupations according to the six BSKB codes. Table A5 in the Appendix lists students in the selected Bavarian sample according to their BSKB categorization.

Furthermore, this paper follows Stocker (1911) who provides a qualitative analysis of students' social backgrounds in the Gymnasium and Realschule at the beginning of the 20th century. Instead of focusing on sectoral affiliations, he concentrates on the social and financial situation of students. For this purpose he uses the occupational information stated in annual school reports to identify sons of civil servants. Since most civil service professions demanded a certain level of education, it is possible to draw conclusions about the school achievement of fathers. Furthermore, he distinguishes remaining – i.e. non civil service – occupations according to wealth and social position (as far as possible given the informative content of the data). Hence, this paper further allocates professions into social categories based on Stocker's classification.

4 Extensive margin: educational expansion during the 19th century

19th century Bavaria saw a tremendous increase not only in population[25] but also in secondary student numbers, presented by Figure 1. While at the beginning of the century only a minority of children continued to secondary education, the share of students in total population reached almost 0.5 percent at the end of the century.[26] According to the figure, student shares steadily increased up to 1850 and virtually shot up afterwards. This development was not paralleled by the number of secondary schools since these could not keep pace with the vast increase in students: whereas the average school had 52 children in 1810, this number was more than 4 times larger at the end of the century when on average 308 pupils visited one school (see Table A6 in the Appendix).[27]

Figure 1 – Development of secondary school numbers and student shares during the 19th century



Notes: Figure depicts share of all Bavarian secondary schools and students in total population.
Source: Own illustration; see Table A2 in the Appendix for data details.

As outlined in section 2, the Gewerbeschule was introduced as an additional form of secondary education in 1829. Hence, with the opening of various Gewerbeschulen across Bavaria between 1833 and 1835, the supply of secondary schools was substantially increased. Thus, the rise of student numbers after 1850 depicted in Figure 1 might just be a result of greater school supply. However, as Figure 2 shows, this is rather unlikely: much of the increase in student numbers is due to the

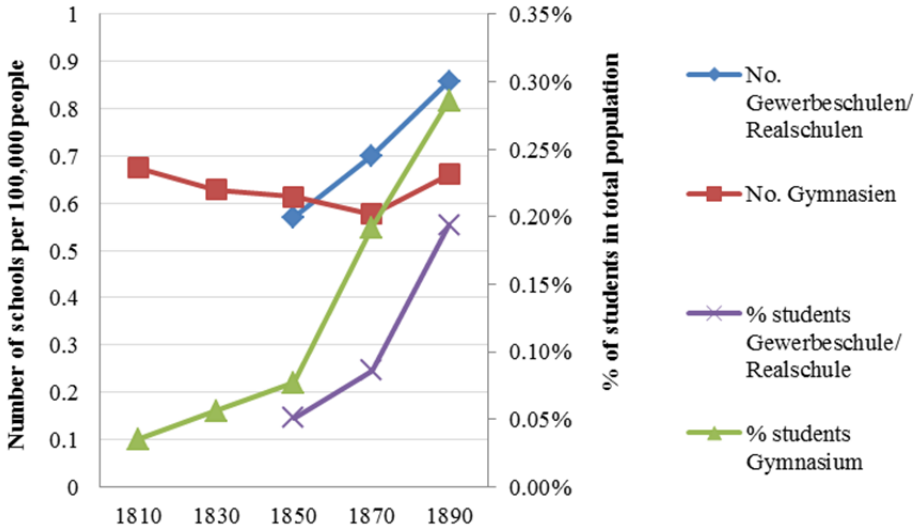
[25] The Bavarian population increased from 3,707,966 in 1818 to 4,559,452 in 1852 and finally to 5,594,982 in 1890 (BSB 192). Compared to other states of the German Confederation (without Austria), population growth was however rather low: while population in these states increased by 60 percent between 1816 and 1865 and 61 percent between 1867 and 1910, the corresponding rates in Bavaria were 35 and 43 percent, respectively. This gap was a direct consequence of Bavaria's economic backwardness resulting not only in high rates of emigration but also in high infant mortality (Götschmann 2010, pp. 148-51).

[26] Detailed information on the age structure of the population is available for 1870 and 1890. Thus, the share of secondary students in school-aged population (age 11-20) was 1.6 in 1870 and 2.4 percent in 1890. Corresponding shares for Prussia were 2.3 and 2.5 percent, respectively (Ringer 1980, p. 11).This is comparable to rates in most western countries, where the share of school-aged children in secondary education did not exceed 2 or 3 percent in 1870 (Craig 1981, p. 185).

[27] Note that these numbers also include six Realgymnasien with 364 students in 1870 and 4 Realgymnasien with 496 students in 1890 (see Table A4).

'explosion' of students in traditional secondary education, i.e. the Gymnasium – even though the number of Gymnasien more or less stagnated up to 1870.

Figure 2 – School numbers and student shares in traditional and modern secondary education



Notes: Figure depicts share of traditional and modern secondary schools and respective students in total population.
Source: Own illustration; see Table A2 in the Appendix for data details.

Hence, Bavaria experienced a substantial degree of educational expansion during the 19th century. But what were the reasons behind this huge expansion?[28] The answer might be found in the phenomenon of industrialization. Although Bavaria started to industrialize fairly late compared to other German states (Bosl 1985) and remained predominantly agrarian up to WWII (Kohlbauer 2013, p. 37), the 19th century brought new technologies and industries to the rather backward state as well. These led to substantial changes, best seen for the labour market: First, industrialization increased the demand for skilled workers such as engineers, technicians, and scientists and also of other industrial labourers such as blue collar workers. This was accompanied by the demand for civil servants with administrative and technical skills required by the state to manage growing cities, monitor economic expansion, and deal with an increasing working class (Kaelble 1973, pp. 47-8). Hence, increased job opportunities might have led to a growing demand for secondary education in the population. This is in line with the 'human capital hypothesis' which maintains that an increase in the demand for skilled labour leads to higher monetary returns to education (everything else equal) and thus people start to invest more in schooling (Craig 1981, pp. 152-3).[29] Second, growing industrialization led to increased levels of urbanization, especially towards the end of the century (Götschmann 2010, p. 155). This was accompanied with transitions from agricultural into urban occupations, thereby reducing the need of children as helpers on family farms. According to Treiman (1970, p. 216) this resulted in higher

[28] See Craig (1981) for a detailed summary of so-called 'extant hypotheses' regarding the educational expansion experienced in most western countries during the 19th or early 20th century.
[29] In this context, it has been argued that students (or their parents) overestimated the returns to education in terms of labour market outcomes. Consequently, the increase in graduate numbers lowered individual returns and produced an 'academic proletariat' (Craig 1981, p. 187; Musgrove 1959).

schooling rates since urban parents had fewer incentives to withhold their children from schooling.[30] Finally, industrialization led to increases in income per capita, at least during the last decades of the 19th century (Götschmann 2010, pp. 168-75). This might have made secondary education more affordable for parents. On the other side, supply factors might have also triggered educational expansion. Hence, the state might have expanded secondary schooling to meet its own demand for educated employees as well as that of the overall economy. As outlined in section 2, lobbying by the mercantile middle class played a decisive role in the introduction of modern secondary education. According to Figures 1 and 2, even though school numbers were relatively stagnant until 1830, they sharply increased afterwards, mainly due to the expansion of modern secondary education. Consequently, both demand and supply of secondary education resulted in higher student numbers.

5 Compositional effect: secondary education and social class

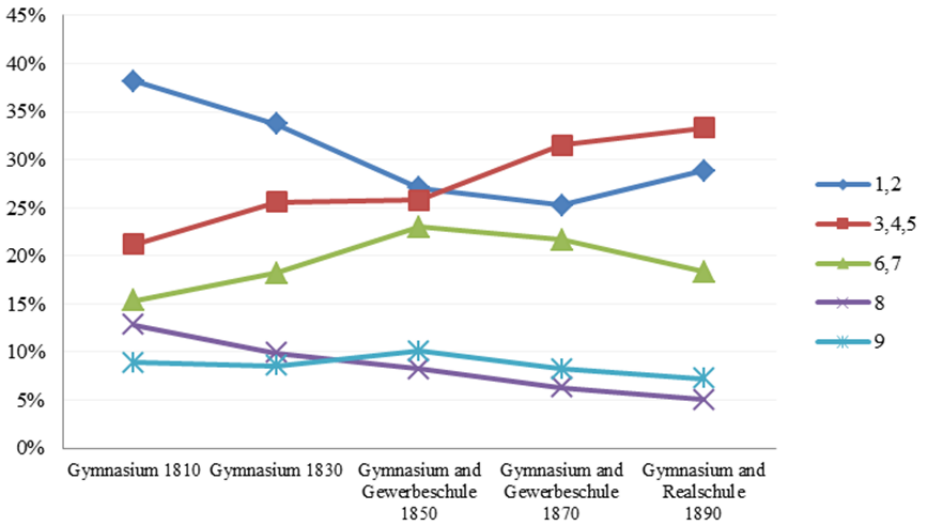
Was this dramatic increase in student numbers complemented by a change in the composition of participating social classes in secondary education? To answer this question, occupational information given by annual reports of secondary schools has been categorized based on various systems as outlined in section 3.

5.1 Social composition of secondary students

Figures 3 and 4 depict the share of secondary students according to their social background based on HISCLASS. Since the number of cases falling into HISCLASS 10-13 is relatively small, Figure 3 depicts HISCLASS categories 1-9, while Figure 4 focuses on classes 10-12 and 13. Note that modern secondary education in form of the Gewerbeschule enters the dataset in 1850. Hence, prior to 1850, the Gymnasium is the only secondary school type in Bavaria. Figure 3 shows clearly that secondary education became less elitist during the 19th century as indicated by the sharp decrease in children belonging to class 1, 2: while at the beginning of the century, almost 40 percent of children belonged to the highest social class, their share fell under 30 percent by 1890. The share of (upper) middle class children (i.e. 3, 4, 5) markedly increased after 1850 with the opening of Gewerbeschulen. Noticeable is also the development of the artisanal middle class denoted by 6, 7: there was an upward trend up to introduction of the Gewerbeschule in 1850; afterwards, however, this share slightly decreased. There is no indication that lower social classes were able to substantially increase their student shares in secondary schools during the 19th century. However, taken together (i.e. 8, 9, 11, 10, 12) they accounted for about one fifth of all secondary students. Figure A1 in the Appendix depicts students' classes according to the full HISCLASS class range.

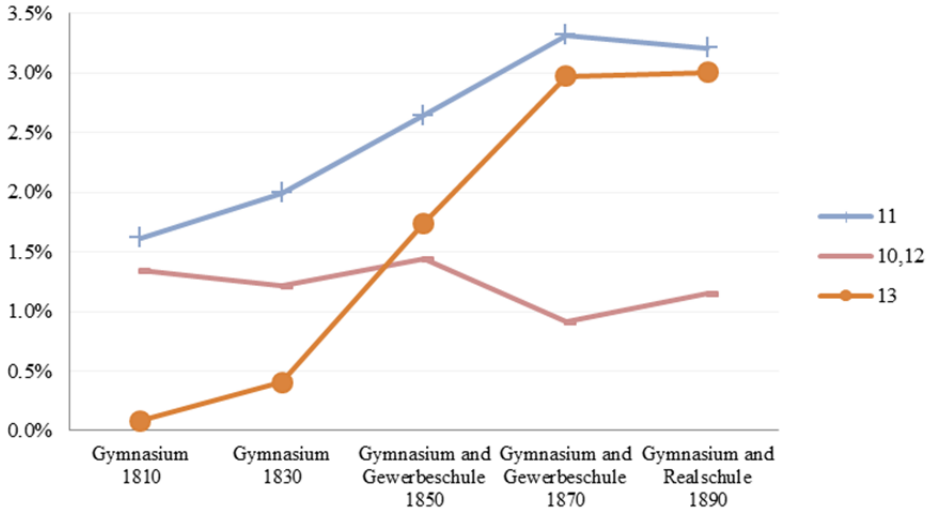
[30] In addition, parents working outside the home might have appreciated the fact that schools took care of children during daytime. However, it could also be that especially working class parents depended on additional income generated through child work. Hence, urbanization could also negatively influence educational participation. For example, Parsons and Goldin (1989) show that in the US child labor was quite common in industrial families at the end of the 19th century.

Figure 3 – Participation of upper (1-2), middle (3-7), agricultural class (8), and working class (9) children in secondary education (HISCLASS)



Notes: Figure depicts students' social classes according to HISCLASS categorization of fathers' occupations as share of all secondary school students in the respective year.
Source: Own illustration; see Table A2 in the Appendix for data details.

Figure 4 – Participation of lower working (10-12) and undefined (13) class children in secondary education (HISCLASS)

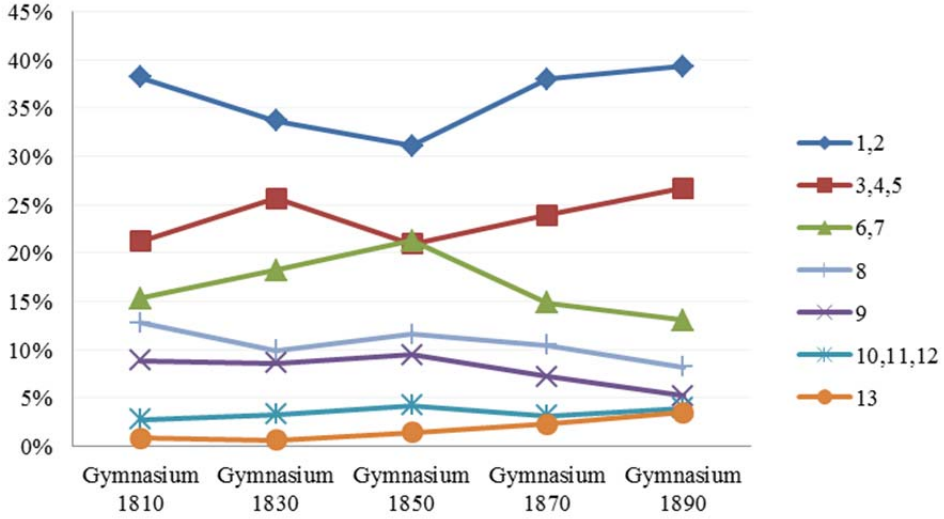


Notes: Figure depicts students' social classes according to HISCLASS categorization of fathers' occupations as share of all secondary school students in the respective year.
Source: Own illustration; see Table A2 in the Appendix for data details.

Thus, throughout the 19th century, secondary schools were mainly attended by upper and middle class children. But were there differences between modern and traditional secondary education in terms of social composition?

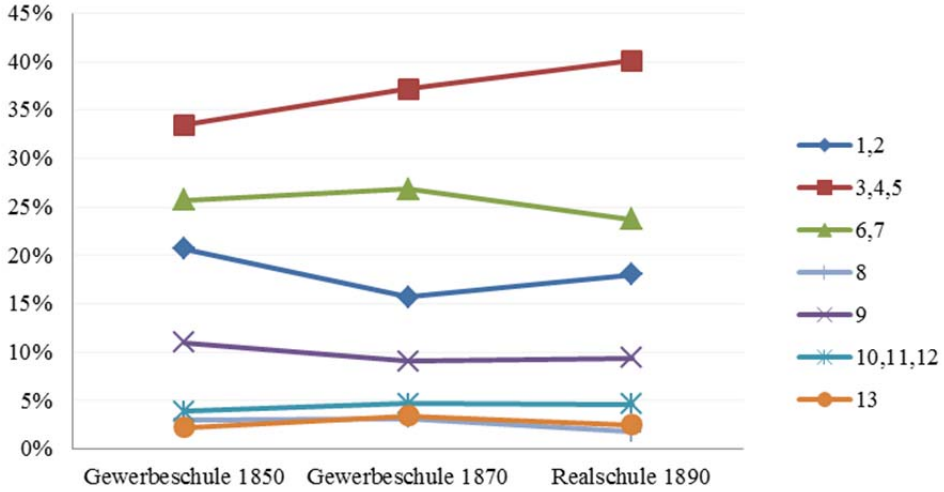
To answer this question, the following Figures depict students' classes separately for the Gymnasium and Gewerbeschule/Realschule. Figures 5 and 6 present the social composition of students in traditional and modern secondary education, respectively, based on HISCLASS. In order to increase the sample size in lower classes, HISCLASS categories 10, 11, and 12 are combined into one category representing the (lower) working class.

Figure 5 – Students' social background in the Gymnasium (HISCLASS)



Notes: Figure depicts students' social classes according to HISCLASS categorization of fathers' occupations as share of all students in Gymnasium in the respective year.
Source: Own illustration; see Table A2 in the Appendix for data details.

Figure 6 – Students' social background in the Gewerbeschule/Realschule (HISCLASS)



Notes: Figure depicts students' social classes according to HISCLASS categorization of fathers' occupations as share of all students in Gewerbeschule/Realschule in the respective year.
Source: Own illustration; see Table A2 in the Appendix for data details.

As expected – given the elitist conception of the Gymnasium – students in this institution were mainly recruited from the highest social classes, i.e. 1 and 2. Throughout the 19th century, at least every third student in the Gymnasium was the son of a higher state official, manager, school teacher, physician, or of other related free professions. In modern secondary schools, however, this was only the case for every fifth student. It is interesting to note that participation of the top class in the Gymnasium steadily declined up to 1850 when it reached its trough with the introduction of modern secondary education. Afterwards, it started to rise again to reach previous levels of 40 percent. The picture for artisanal middle class children (i.e. 6, 7) is quite reverse: their share grew up to 1850 and declined afterwards. In contrast, participation of the upper class in the Gewerbeschule was never again

as high as in 1850, i.e. the year modern secondary education enters the data series, while the share of artisanal children remained relatively constant from the beginning. These findings suggests that in the Gymnasium the share of children belonging to the elite declined at the cost of an increasing number of craftsmen's children until 1850. Hence, the Gymnasium seems to have become less socially segregated or elitist during the first decades of the 19th century. Introduction of the Gewerbeschule might have then triggered a selection process, leading to self-selection of upper class children into the Gymnasium and artisanal middle class children into the Gewerbeschule/Realschule.

The majority of students in modern secondary education belonged to the group of lower managers, professionals, clerical and sales personnel (i.e. 3, 4, 5) and their share steadily increased up to 1890. As will be shown in the subsequent analysis of specific occupations, this was mainly driven by merchants. The participation of remaining social classes was relatively stable throughout the time period.

Consistent with contemporary perception, farmers (i.e. 8) sent their children primarily to the Gymnasium even though most Gewerbeschulen included specific agricultural departments up to 1877 (*Ministerialblatt* 1877, pp. 197-201). According to Stocker (1911, p. 8), most farmers would send their sons only to secondary education if these were willing to pursue a clerical career. In this case, the Gymnasium constituted the optimal schooling choice since only this institution prepared for theological university studies. Furthermore, scholarships provided by the church played a decisive role in rural areas. Moreover, children from class 13 coming mainly from wealthy households without further occupational information attained noticeable numbers only at the end of the century when they constituted about 4 percent of all secondary school children. In both institutions, the lowest social classes (i.e. 10, 11, and 12) consisting mainly of husbandmen, day laborers, and factory workers, participated the least in secondary education. It is likely, that this is due to the lack of financial means, resulting in labor market entry of children after primary education even though waiving of school fees was common for students unable to pay tuition and scholarships were available.[31]

To sum up, in case of traditional secondary education, there seems to have existed a strong positive relationship between social status and participation of children, while modern secondary schools were mainly visited by middle class children.

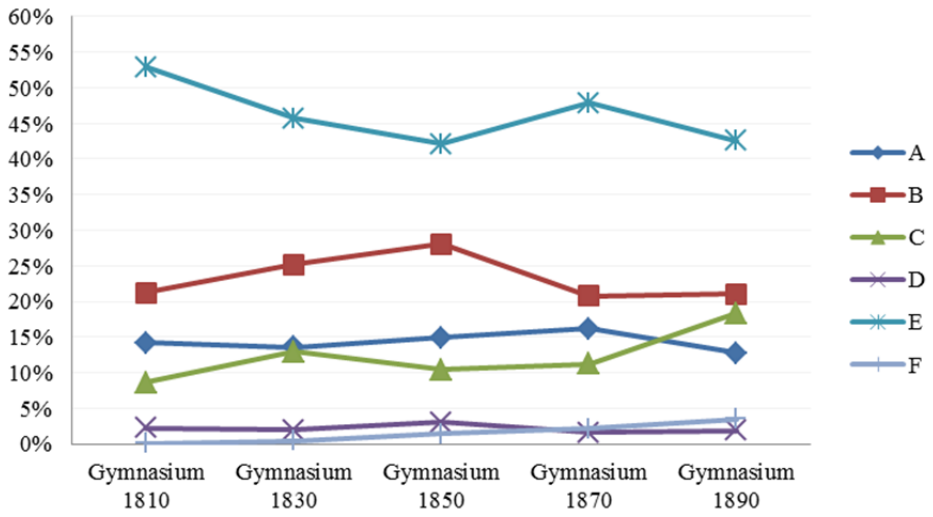
5.2 Composition of students relative to overall population

Do above findings suggest that secondary education was exclusive in terms that it was only attained by privileged groups of society? Not necessarily. If these social groups included most of the population then the social composition of secondary schools might just resemble the composition of the overall population. Hence, in order to evaluate whether secondary education was exclusive, the occupational background of students has to be compared to the overall occupational distribution of the population.

[31] For example, only 77 and 84 percent of students at the Gymnasium and Realschule, respectively, paid tuition in 1870 (BSKB XXVII). Scholarships were mainly granted by clerical institutions for the Gymnasium, and hence, in preparation for subsequent theological studies.

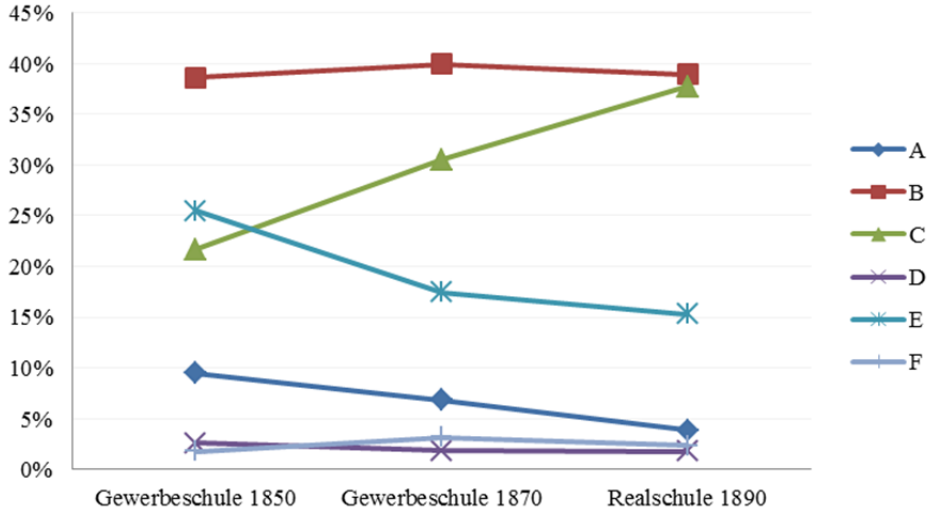
For this purpose, data on the occupational structure in 1852, 1882, and 1895 provided by the royal Bavarian statistical office is employed and students' occupational backgrounds are coded into the six occupational dimensions (BSKB) as outlined in section 3. The composition of students in traditional and modern secondary education according to this BSKB categorization is presented in Figures 7 and 8, respectively.

Figure 7 – Students' social background in the Gymnasium (BSKB)



Notes: Figure depicts students' social classes according to BSKB categorization of fathers' occupations as share of all students in Gymnasium in the respective year.
Source: Own illustration; see Table A2 in the Appendix for data details.

Figure 8 – Students' social background in the Gewerbeschule/Realschule (BSKB)



Notes: Figure depicts students' social classes according to BSKB categorization of fathers' occupations as share of all students in Gewerbeschule/Realschule in the respective year.
Source: Own illustration; see Table A2 in the Appendix for data details.

Consistent with the social composition based on HISCLASS, the overwhelming majority of students in the Gymnasium came from category E, i.e. households employed as state officials such as administrative personnel and teachers, engaged in the military sector, or working in the free professions (e.g. as lawyers or physicians). However, as argued before, the BSKB scheme is unable to

capture social power or prestige dimensions since it concentrates only on sectoral affiliations of occupations. Hence, this class E contains also lower personnel such as medical service staff, school janitors, policemen, and soldiers. Furthermore, it does not include managers, industrialists, and factory owners – a group of high social status growing rapidly at the end of the century with emerging industrialization. These belong to industry (i.e. B) and thus contributed to a weaker drop after 1850 compared to the downfall of class 6, 7 in Figure 5. Once again, students with agricultural background (i.e. A) were mainly found at the Gymnasium. Results for modern secondary education are also consistent with HISCLASS findings: most students had an industrial or trade and transportation-related background, denoted by categories B and C.

Table 4 – Social composition of secondary schools relative to overall population, 1850-1890

BSKB code	Occupational category	Ratio between % of students and % of population in respective BSKB classes					
		Gymnasium			Gewerbeschule/Realschule		
		1850	1870	1890	1850	1870	1890
A	Agriculture and forestry	0.22	0.29	0.27	0.13	0.13	0.08
B	Industry, crafts, and mining	n.a.	0.81	0.70	n.a.	1.55	1.30
C	Trade and transportation	n.a.	1.64	1.94	n.a.	4.63	4.09
D	Services and day laborers	n.a.	3.33	2.50	n.a.	3.33	2.50
	B-D	1.81	1.03	1.02	2.82	2.21	1.97
E	Civil services[a]	n.a.	11.65	8.78	n.a.	4.13	3.06
F	Pensioners, retirees, private gentlemen, and unemployed[b]	n.a.	0.29	0.41	n.a.	0.43	0.27
	E-F	4.57	4.50	3.74	2.87	1.80	1.38

Notes: Table lists student shares according to their social background based on BSKB classes divided by share of population in respective BSKB classes.

[a] Including military, church, school, medical, and court personnel as well as artists and freelancers.

[b] Including people without occupational information.

Sources: Own calculations; see Table A2 in the Appendix for data details.

Table 4 compares the occupational structure of the economy in 1850, 1870, and 1890 to the sectoral composition in schools by presenting ratios reflecting the over- or underrepresentation of classes in secondary schools. A ratio below (above) one suggests that the occupational category is underrepresented (overrepresented) in schools.[32] According to these ratios, children coming from the agricultural sector were severely underrepresented not only in modern but also in traditional schools. While representation of the agricultural sector even more decreased in modern schools, it slightly increased in traditional schools. This finding once more confirms that families working in agriculture and forestry preferred the Gymnasium over the Gewerbeschule/Realschule. Interesting to note is also the development of student numbers belonging to industrial, trade, and services sectors as indicated by aggregate numbers in sectors B-D: while these students were overrepresented in modern secondary

[32] As outlined in section 3, sectors B, C, and D as well as E and F are combined in 1850.

schools across all time periods, this only applied to 1850 in case of the Gymnasium. As individual sector ratios reveal, this might have been a result of the low (and decreasing) representation of children from sector B. These children were also only moderately overrepresented in modern schools. Hence, it seems as if secondary school participation of sector B could not keep pace with its growth in the economy as indicated by Table 3. Children from parents working in trade and transportation were overrepresented in both schools in 1870 and 1890; however, only at the Gymnasium this overrepresentation grew between 1870 and 1890 suggesting that the Gymnasium became more popular among these parents. Yet the highest degree of overrepresentation is provided by aggregated sectors E-F in the Gymnasium. Although the share of these children in modern secondary education exceeded the respective share in the economy as well, corresponding student shares in the Gymnasium were more than 4 times higher than respective population shares. This was a result of the extreme overrepresentation of civil service children, as individual shares for sector E in 1870 and 1890 reveal. However, overrepresentation of these children declined steadily.

Thus, besides sector A (and individual ratios of sector F), ratios of the remaining sectors constantly declined towards 1 in the Gewerbeschule/Realschule indicating that the composition of modern secondary schools more and more resembled the overall sectoral affiliations of the population. The picture for the Gymnasium is more diverse: while representation of the agricultural sector increased, representation of the industrial sector further decreased. Only the development of children from sector E-F became more representative of the overall sectoral distribution in the economy.

Consequently, compared to the occupational structure of the economy, it is evident that students in both school types did not resemble the common school-aged child which should have had an agricultural background. Especially the social composition of the Gymnasium differed from that of the overall economy: while only 4 to 5 percent of the labor force worked in sector E between 1870 and 1895 (see Table 3), this class accounted for more than 40 percent of all students. However, as outlined in section 3, BSKB codes are unable to reflect social status since they only capture sectoral affiliations. The next section approaches this shortcoming by combining BSKB sectoral codes with HISCLASS.

5.3 Occupational composition of secondary students

While HISCLASS concentrates on the social class of occupations and BSKB codes focus on sectoral affiliations, this section combines both approaches by distinguishing between several occupational groups. Focusing on the fathers' occupation directly – instead of studying aggregate HISCLASS and BSKB codes distributions – provides deeper insights into the social background of students since especially occupations falling into the upper and middle class can differ in terms of educational entry requirements, entrepreneurism, or wealth. This is best seen for occupations falling into the upper class: for example, high state officials, industrialists, and also large landowners belong to HISCLASS 1, 2 and the associated BSKB codes are E, B, and A, respectively. Yet these occupations are quite different: state officials are usually university-educated, industrialists may be self-made entrepreneurs,

and major landowners are heirs of family wealth. Hence, aggregate results in sections 5.1 and 5.2 are not able to provide information about the actual 'nature' of the occupation. Therefore, this paper follows the categorization suggested by Stocker (1911) who differentiates between fathers working as civil servants, in academic professions, as self-employed in trade and industry, and in agriculture (see section 4).

Table 5 lists students coming from civil service households, based on a wide range of civil service professions.[33] In addition, the table reports HISCLASS and BSKB codes associated with occupations falling into the respective civil service category. According to the table and consistent with previous findings, sons of civil servants were much more likely to be found at the Gymnasium than at modern secondary schools. However, within the group of civil servants, substantial redistribution in participation rates took place during the 19th century. This is best seen in the case of ministers, administrative officers,[34] fiscal officers, and teachers in the Gymnasium. While in 1810 the first three groups contributed most of the students coming from civil servant households, their contributions slightly decreased (or remained constant) over the following decades. In contrast, the number of students with fathers working as teachers increased from decade to decade; from 1850 onwards, this group constituted the majority within students from civil service households.

Further, the growing participation of civil servants working in transport and communication in both school types is a result of the increasing influence of the railway towards the end of the century. Bavaria had been the first German state to adopt the railway with the opening of the line Nuremburg-Fuerth in 1835, followed by the line Munich-Augsburg in 1840 (Seiderer 2013, pp. 65-7). In the following years several more routes were added, especially after 1860 when the state started to invest heavily in railway projects connecting rural areas (Götschmann 2010, p. 51). This was accompanied by the expansion of the communicational infrastructure: the postal and telegraphy sector experienced rapid growth starting in mid-century (Götschmann 2010, pp. 114-6). Thus, a variety of new job positions had to be filled, ranging from line keepers and conductors to higher railway and postal officials.[35] The latter fell into HISCLASS categories 3, 4, 5 and are thus also responsible for an increase of these classes in both institutions as depicted by Figures 5 and 6. It is interesting to note however, that this 'modern' type of civil service preferred the Gewerbeschule/Realschule and thus a modern kind of secondary education (except for 1890).

[33] Tables A7-A9 in the Appendix report students according to occupational background as share of total student numbers.

[34] Administrative officers were mainly higher members of the government such as council members, mayors, state administrators or other highly ranked state professions. Hence, the majority of these civil servants fell into HISCLASS categories 1 or 2.

[35] The extension of civil service to include even the postal and railway sector, is extreme in international comparison as Müller et al. (1989, p. 30) point out.

Table 5 – Students with fathers employed as civil servants

Father's occupation	No. of students with fathers working as civil servants								HISCLASS codes	BSKB codes
	Gymnasium					Gewerbeschule/Realschule				
	1810	1830	1850	1870	1890	1850	1870	1890		
Head teacher, principal	6	5	9	5	22	0	1	3	1	E
University Professor	7	8	31	22	30	4	3	3	2	E
Teacher	45	103	227	174	290	64	69	89	2	E
Minister[a]	57	54	91	82	68	27	10	7	2	E
Administrative officer	152	143	118	125	144	54	62	54	1, 2, 3, 4, 5	E
Forest officer	12	49	68	85	74	80	66	24	3	A
Customs officer	13	30	57	20	34	29	16	21	1, 2, 3, 4	E
Transport and communication officer	10	15	24	30	65	27	58	49	3, 4, 5	C
Fiscal officer	63	85	87	54	63	30	22	24	1, 2, 3, 4	E
Public medical officer	21	34	34	25	45	9	10	3	1, 2	E
Technician	10	16	21	14	35	18	17	23	1, 2, 3, 4	E
Military officer	23	39	37	42	103	36	33	19	1, 3	E
Physician	31	43	74	52	49	16	11	7	2	E
Judge	36	72	66	56	48	14	19	8	2	E
Notary	2	1	4	17	21	1	2	7	2	E
Lawyer	43	61	58	65	70	16	19	7	2	E
Total	531	758	1,006	868	1,161	425	418	348		

Notes: Table depicts students according to occupational background as share of total student number in respective school and year.

[a] Including Rabbis.

Sources: *Jahresberichte*, various years. See Table A2 in the Appendix for data details.

Hence, throughout the 19th century, people working in the civil service sent their children predominantly to the Gymnasium. Since most of these civil service occupations are associated with high social status as indicated by the HISCLASS code, this made the Gymnasium an institution for the elite.

Table 6 presents participation in secondary education for the population engaged in trade and industry. As expected, students with these backgrounds were primarily found at the Gewerbeschule/Realschule where they accounted for 50 to 60 percent of all children (see Table A8).[36] Especially merchants seem to have appreciated the commercial focus of modern secondary education. Moreover, industrialists' sons were much more likely to visit modern secondary schools, even though their numbers in the Gymnasium substantially increased at the end of the century. Again, as aggregate trends in Figures 5 and 6 indicate, there was an interesting development concerning middle class participation: up to 1850, the number of contractors' and craftsmen's children increased in the Gymnasium; after 1850, with the entry of the Gewerbeschule into the dataset, this development reverses (especially when taking relative numbers into account, depicted in Table A8). Hence, contractors and craftsmen obviously preferred the Gewerbeschule/Realschule over the Gymnasium and self-selected into this new kind of education. However, it seems as if this pattern changed once a higher skill level had been attained since the number of children of master craftsmen as a fraction of all craftsmen students in traditional exceeds that of modern secondary schools in 1870 and 1890.

[36] Total student numbers (of the selected sample) in the Gewerbeschule/Realschule amounted to 1,805 in 1850, 2,633 in 1870, and 2,784 in 1890. See Table A3 in the Appendix.

Except for contractors and craftsmen, participation of industrial and trade-related professions increased in both secondary school forms during the last decades of the 19th century, reflecting the influence of progressing industrialization in Bavaria and associated shifts towards industrial and mercantile occupations.

Table 6 – Participation of industrial and trade-related occupations in secondary education

Father's occupation	No. of students with fathers working in industrial or trade-related professions								HISCLASS codes	BSKB codes
	Gymnasium					Gewerbeschule/Realschule				
	1810	1830	1850	1870	1890	1850	1870	1890		
Engineer	0	1	3	2	11	8	5	17	2, 4	B
Architect	1	4	4	1	13	8	10	40	2	B
Industrialist	22	27	36	35	113	66	136	199	1	B
Merchant	48	127	158	98	261	223	523	583	4	C
Travelling salesman or commissioner	0	0	4	0	10	0	6	24	4	C
Contractor or craftsman	222	435	712	338	427	562	834	720	6, 7, 9	B
whereof master craftsman	52	89	254	144	195	204	300	312	6	B
Total	293	594	917	474	835	867	1,514	1,583		

Notes: Table depicts students according to occupational background as share of total student number in respective school and year.
Sources: *Jahresberichte*, various years. See Table A2 in the Appendix for data details.

Finally, Table 7 lists four 'professions' that are worth taking a closer look at to understand social recruitment at 19th century secondary schools. First, the categories private gentleman and major landowner provide information about financial means. Although the importance of both groups increases over time, there is no clear pattern reflecting preferences of wealthy parents for either school type discernible. It seems as if these parents were quite indifferent between modern and traditional secondary education. Finally, as expected given the aggregate findings, farmers sent their sons primarily to the Gymnasium. As Tables 5 and 7 show, children of sector A were mostly coming from farming households – even though the number of children of forest officers steadily increased. Taking into account that children from sector A were extremely underrepresented (Table 4) in both school types throughout the 19th century, it seems as if children of farmers had very little access to secondary schools and were thus unaffected by educational expansion taking place among other occupational groups.

Table 7 – Students with fathers of considerable wealth or working as farmers

Father's occupation	No. of students with fathers with fathers being/working as…								HISCLASS codes	BSKB codes
	Gymnasium					Gewerbeschule/Realschule				
	1810	1830	1850	1870	1890	1850	1870	1890		
Private gentleman	0	5	37	40	79	32	81	63	/	F
Major landowner	5	17	22	28	27	25	21	20	1	A
General farmers	144	190	304	185	224	50	79	44	8	A
Total	149	212	363	253	330	107	181	127		

Notes: Table depicts students according to occupational background as share of total student number in respective school and year.
Sources: *Jahresberichte*, various years. See Table A2 in the Appendix for data details.

Hence, focusing on specific occupations reveals that the Gymnasium was predominantly attended by sons of civil servants, while modern secondary education attracted mainly children of merchants, craftsmen, and other industrial and trade-related professions. A precondition of all civil

service professions stated in Table 5 was university entitlement (for teachers, military officers, and some forest officers) or even university studies (remaining categories). Since the fraction of civil servant sons was substantially higher in the Gymnasium than in the Gewerbeschule/Realschule, this suggests that overall educational attainment of fathers in traditional schools exceeded that of modern secondary schools. The fact, that entry into architectural and engineer occupations demanded at least university entitlement, does not change the overall picture. Throughout the 19th century the Gymnasium was the only institution to confer the Abitur, which entitled to university studies (Ringer 1979, p. 34; Stocker 1911, p. 8). Thus, it comes as no surprise that fathers who had been educated at the Gymnasium themselves preferred this institution also for the education of their children. This also applies to mercantile and industrial middle class parents who sent their sons to modern secondary schools in order to prepare them with valuable education for taking over family businesses.

All in all, analysis of annual school reports for traditional and modern secondary education reveals that throughout the 19th century, the Gymnasium was the institution of the social elite while the Gewerbeschule/Realschule attracted mainly middle class children. There was a slight tendency in the Gymnasium to become more socially open, however, this changed with the introduction of the Gewerbeschule. After that, segregation of social classes into respective institutions started to rise. Since the Gymnasium prepared for university studies, and careers in clerical and civil service, while the Gewerbeschule and Realschule trained for industrial, technical, and mercantile professions, this suggests that especially the second half of the 19th century was characterized by a high level of occupational consistency between fathers and sons. This naturally brings up the question whether 19th century secondary education provided any opportunity for social mobility.

6 Secondary education and social mobility

What do above findings on the social composition of secondary schools suggest for social mobility? According to sociological theory, education is a key determinant of social mobility, affecting the prospect of upward mobility on various dimensions. For example, as an ingredient to human capital it influences the productive resources of individuals, as a signalling device it facilitates the identification of suitable candidates by employers, and finally, as an institution of socialisation it endows individuals with values and norms (e.g. punctuality, respect, diligence) also relevant for a successful work life (Goldthorpe 2014). In order to evaluate whether traditional and modern secondary education enabled children to reach higher social classes than their parents (or saved them from social relegation if they were already upper class), subsequent labour market outcomes of graduates are required. Given the unavailability of this data,[37] intended career options of graduates are the closest to get, even though these are only available for some institutions or time periods.

[37] Unfortunately, the employed data does not allow matching with occupational census data. In fact, individual-level Bavarian census data is not available prior to the 1950s.

According to Buchinger (1983, p. 172) who lists intended careers of graduates at the Realschule Munich between 1878 and 1883, the majority of students opted for careers in trade, commerce, and industry (46 percent), followed by subsequent university studies (33 percent), and finally middle-level civil service (20 percent).[38] This is in line with survey results for Prussia: the majority of modern secondary school graduates between 1875 and 1899 intended to work in technical occupations such as engineering or architecture or pursue a commercial or industrial career (Ringer 1979, pp. 71-9).[39]

Information on actual careers of modern secondary graduates is provided by Kleinfeller (1883, pp. 97-101). As a contemporary witness, Kleinfeller studies the development of the Bavarian modern secondary education system and concludes that most students entered commercial or industrial professions directly after graduation.

To some extent, these career patterns of modern secondary graduates are corroborated by data on the social background of German entrepreneurs. Between 1800 and 1870, 67 percent of entrepreneurs were sons of entrepreneurs themselves, 29 percent of merchants, innkeepers, craftsmen, and lower civil servants, and finally 12 percent of civil servants, majors, teachers, clerics, large landowners, physicians, and farmers (Kaelble 1973, p. 52).[40] Since the first two groups were more likely to send their children to modern secondary education while the latter group preferred traditional schools (based on the participation rates of these social groups in modern and traditional schools as outlined in section 5), entrepreneurs were mainly educated at modern secondary schools (after 1833). This suggests that the opportunity for social mobility existed especially for middle class children.

Career intentions of students at the Gymnasiums differed hugely compared to that of modern secondary education. Müller (1975) analyses school reports of Munich's oldest Gymnasium between 1780 and 1800. According to his Figures, this Gymnasium was mainly attended by middle class children coming from lower civil servant, artisanal or merchant households.[41] Graduates of this school primarily intended to enter the clerical or civil service. It seems as if this tendency endured throughout the 19th century, as illustrated by Prussian data for 1875 to 1899: 75 percent of students opted for academic careers as jurists, higher state officials, secondary and university teachers, theologists and ministers, or physicians. Only 4 percent wanted to enter industrial or commercial professions (Ringer 1980, p. 17). These findings are especially relevant since only 21 percent of students at the Prussian Gymnasium had an academic background while 32 percent of students came from industry and commerce, 11 percent from agriculture, and 12 percent from middle and lower civil service. This suggests that in Bavaria where these shares were about the same size in 1870 and 1890 (see Tables A7,

[38] Buchinger cites career intentions of students gathered by Bavarian modern secondary teachers between 1873 and 1883 (Buchinger 1983, p. 172).
[39] Ringer refers to a survey on all students receiving the Abitur between 1875 and 1899. See also Ringer (1967).
[40] Kaelble (1980, pp. 406-10) explains the low fraction – especially in comparison to corresponding rates in Britain and the U.S. – of entrepreneurs coming from agricultural backgrounds (i.e. farmers and large landowners) as a result of their "*tenacious anti-industrial value system*". In addition, common farmers had lower access to capital compared to the U.S. and Britain where agricultural productivity and profitability was higher.
[41] The composition of students was as follows: 9 percent sons of noblemen who were working exclusively as high state officials; 32 percent sons of lower state officials, clerics, or municipal employees; 50 percent sons of craftsmen, merchants, innkeepers, and also some day labourers and servants (Müller 1975, pp. 134-5).

A8, and A9) sons of middle class parents or farmers intended to pursue academic careers as well. If these intentions were actually implemented, then the Gymnasium was indeed able to provide some degree of social mobility in terms that it prepared for state positions.

In fact, especially the civil service sector should have provided the possibility for social mobility since entry into state positions depended (and still depends) highly on educational credentials and thereby weakens the direct influence of social background on class attainment.[42]

7 Conclusion

To return to the questions at the beginning, i.e. is there reason to believe that secondary schooling became less elitist over time? Overall, yes. The introduction of modern secondary education led to entry of higher rates of middle class children into secondary education. Within schools, no. Although the Gymnasium became less elitist between 1810 and 1850, this development was reversed after the introduction of the Gewerbeschule. There is no reason to believe that within both modern and traditional secondary schools there was a tendency to become less elitist or more open to lower ranks of the society over time. The occupational structure in both schools reflected the increasing influence of industrialization towards the end of the century, resulting in a higher proportion of industrial and mercantile professions as well as state officials in transport and communication sectors. Throughout the 19th century, the Gymnasium remained the institution of the elite, attracting sons of civil servants, academics, and to a small extent also of farmers and other lower classes, while the Gewerbeschule and Realschule were the preferred choice of the middle class. In comparison to the structure of the overall economy, students coming from agricultural occupations were highly underrepresented in secondary schools whereas especially students from civil service households were extremely overrepresented.

Although it is not possible to obtain reliable conclusions on the mediating role of educational expansion on social mobility, employed findings by related studies suggest that both school types enabled upward mobility: the Gymnasium by conferring credentials required for state positions and the Gewerbeschule/Realschule by preparing for entrepreneurial activities.

What do these results for 19th century Bavaria propose for today? It has become a well-established fact that in international comparison, the relationship between social background and attainment of higher qualifications is especially strong in Germany, and particularly so in Bavaria (Freitag and Schlicht 2009; Müller et al. 1989).[43] Thus, the roots of educational inequality can be traced back to the 19th century.

[42] Müller et al. (1989) show that in international comparison the link between educational credentials and access into civil service occupations is extremely strong in Germany.

[43] Of all German states, present-day Bavaria exhibits the highest rate of social inequality in secondary education: the chances for children of high socioeconomic status to attend a Gymnasium are about 7 times higher than for working class children (Freitag and Schlicht 2009).

19th century Bavaria did not only experience vast educational expansion for boys; educational participation of girls increased as well, especially towards the end of the century: between 1888 and 1902 the share of girls in secondary education in school-aged[44] population increased from 1 to 1.3 percent. Since it can be supposed that it were mainly girls from higher social classes continuing to secondary education (which is also indicated by the high share of these girls belonging to BSKB category E),[45] the expansion of secondary education might have drastically altered the social composition in girls' schools. According to a study on the relationship between women's education and fertility in 19th century Prussia, mothers with formal education tended not only to have fewer children but to attach greater emphasis on the education of their children as well (Becker et al. 2013). As a result, expansion of female education might not only have raised current educational attainment but also future levels of human capital. Hence, the study of the impact of educational expansion on social composition (and vice versa) in secondary schools for girls provides an interesting topic for future research.

[44] Population aged 11-20 years.

[45] This exclusiveness also applies to university education. According to Craig (1982, p. 221) the social background of female students in early 20th century German universities was much more privileged than that of their male peers.

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Appendix

Table A1 – Sample of Bavarian school cities

City	Gymnasium	Gewerbeschule/Realschule
Amberg	1	1
Ansbach	1	1
Aschaffenburg	1	1
Augsburg[a]	1	1
Bamberg[b]	1	1
Bayreuth	1	1
Fürth	0	1
Dillingen	1	0
Kaufbeuren	0	1
Kempten	1	1
Landshut	1	1
Munich[c]	1	1
Münnerstadt	1	0
Nördlingen	0	1
Nuremberg[d]	1	1
Passau	1	1
Regensburg	1	1
Speyer	1	1
Straubing	1	1
Würzburg[e]	1	1
Wunsiedel	0	1

Notes: Table reports school locations of employed sample.

[a] Augsburg opened second Gymnasium in 1828 (Keyser 1974, p.77).

[b] Bamberg opened second Gymnasium in 1890 (Keyser 1971, p.110).

[c] Munich opened second Gymnasium in 1824 and third in 1849 (Keyser 1974, p. 431).

[d] Nuremberg opened second Gymnasium in 1889 (Keyser 1971, p. 414).

[e] Würzburg opened second Gymnasium in 1886 (Keyser 1971, p. 622).

Table A2 – Data description and source

Variable	Description	Source
Population 1818, 1830	Total population based on 1837 territory	BSKB, I (1850)
Population 1852, 1871, 1890	Total population based on territory of the respective year	BSB, 192 (1953)
Occupational structure 1852	Population shares employed/self-employed in respective sectors	BSB, IV (1855)
Occupational structure 1870	Interpolation based on 1852 and 1882 occupational data	own calculations
Occupational structure 1882	Population shares employed/self-employed in respective sectors	BSKB, L (1886)
Occupational structure 1890	Interpolation based on 1882 and 1895 occupational data	own calculations
Occupational structure 1895	Population shares employed/self-employed in respective sectors	BSKB, LXII (1902)
School-aged population in 1870, 1880, 1890	Population aged 11 to 20 years divided by total population	BSKB, LXIII (1902)
Students and schools		
Gewerbeschule 1850, 1870	Student and school numbers	BSKB, XXVII (1873)
Gymnasium 1833, 1851	Student and school numbers	BSKB, V (1855)
Gymnasium 1870	Student and school numbers	BSKB, XXVII (1873)
Realgymnasium 1870	Student and school numbers	BSKB, XXVII (1873)
Realschule 1890	Student and school numbers	*Ministerialblatt* (1890)
Gymnasium 1892	Student and school numbers	ZKBSB, 26 (1894)
Realgymnasium 1892	Student and school numbers	ZKBSB, 26 (1894)
Female secondary school students 1888, 1902	Students in Höhere Töchter-Schulen	ZKBSB, 20 (1888), 26 (1894)
Specific Gymnasien		
Amberg	1811, 1830, 1850, 1870, 1890	*Jahresberichte*
Ansbach	1811, 1830, 1850, 1870, 1890	*Jahresberichte*
Aschaffenburg	1818, 1830, 1850, 1870, 1890	*Jahresberichte*
Augsburg	1813, 1830 (2x), 1850 (2x), 1870 (2x), 1890 (2x)	*Jahresberichte*
Bamberg	1811, 1830, 1850, 1870, 1890 (2x)	*Jahresberichte*
Bayreuth	1811, 1830, 1849, 1870, 1890	*Jahresberichte*
Dillingen	1811, 1830, 1850, 1870, 1890	*Jahresberichte*
Kempten	1811, 1830, 1850, 1870, 1890	*Jahresberichte*
Landshut	1812, 1831, 1850, 1870, 1890	*Jahresberichte*
Munich	1812, 1830 (2x), 1850 (3x), 1870 (3x), 1890 (3x)	*Jahresberichte*
Münnerstadt	1818, 1830, 1850, 1870, 1890	*Jahresberichte*
Nuremberg	1811, 1834, 1850, 1870, 1890 (2x)	*Jahresberichte*
Passau	1811, 1831, 1850, 1870, 1890	*Jahresberichte*
Regensburg	1811, 1830, 1850, 1870, 1890	*Jahresberichte*
Speyer	1817, 1830, 1850, 1870, 1890	
Straubing	1811, 1830, 1850, 1870, 1890	*Jahresberichte*
Würzburg	1814, 1830, 1850, 1870, 1890 (2x)	*Jahresberichte*
Specific Gewerbeschulen/Realschulen		
Amberg	1850, 1870, 1890	*Jahresberichte*
Ansbach	1850, 1870, 1890	*Jahresberichte*
Aschaffenburg	1850, 1870, 1890	*Jahresberichte*
Augsburg	1850, 1870, 1890	*Jahresberichte*
Bayreuth	1850, 1870, 1890	*Jahresberichte*
Fürth	1850, 1870, 1890	*Jahresberichte*
Kaufbeuren	1850, 1870, 1890	*Jahresberichte*
Kempten	1850, 1870, 1890	*Jahresberichte*
Landshut	1850, 1870, 1890	*Jahresberichte*
Munich	1850, 1870, 1890	*Jahresberichte*
Nördlingen	1850, 1870, 1890	*Jahresberichte*
Nuremberg	1850, 1870, 1890	*Jahresberichte*
Passau	1850, 1870, 1890	*Jahresberichte*
Regensburg	1850, 1870, 1890	*Jahresberichte*
Speyer	1850, 1870, 1890	*Jahresberichte*
Straubing	1850, 1870, 1890	*Jahresberichte*
Wunsiedel	1850, 1870, 1890	*Jahresberichte*
Würzburg	1850, 1870, 1890	*Jahresberichte*

Table A3 – School and student numbers, all Bavarian schools and selected sample schools

Year	Bavaria, all schools				Bavaria, selected sample schools			
	Gymnasium		Gewerbeschule/Realschule		Gymnasium		Gewerbeschule/Realschule	
	Students (per 1,000 people)	No. of schools	Students (per 1,000 people)	No. of schools	Students (per 1,000 people)	No. of schools	Students (per 1,000 people)	No. of schools
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
1810	1,304 (0.35)[a]	25			1,194 (0.32)	17		
1830	2,334 (0.56)[b]	25			1,979 (0.48)	19		
1850	3,529 (0.77)[c]	28	2,325 (0.51)	26	2,853 (0.63)	20	1,805 (0.40)	19
1870	9,323 (1.92)	28	4,156 (0.86)	34	1,975 (0.41)	20	2,633 (0.54)	19
1890	16,032 (2.86)[d]	37	10,879 (1.94)	48	2,867 (0.51)	24[e]	2,784 (0.50)	19

Notes: Number in brackets indicates students per 1,000 people (total Bavarian population in 1818, 1830, 1852, 1870, and 1890). See appendix for data details.

[a] Due to the lack of available data, this number lacks students in Eichstaett, Freising, Metten, and Zweibruecken. Moreover, population numbers are from 1818 and student numbers are from annual school reports issued between 1810 and 1820 (depending on the institution).

[b] Student numbers of 1833.

[c] Student numbers of 1851.

[d] Student numbers of 1892.

[e] Regensburg opened an additional Gymnasium in 1880. However, the annual report of the other Gymnasium in 1890 is not available. Hence data of the new institution is used instead.

Sources: Own calculations; see Table A2 for data details.

Table A4 – Number of students according to HISCLASS (employed sample)

HISCLASS	Class label	No. of students according to HISCLASS classes	
		Gymnasium	Gewerbeschule/Realschule
		1810-90	1850-90
1	Higher managers	1,232	656
2	Higher professionals	2,656	631
3	Lower managers	507	469
4	Lower professionals, and clerical and sales personnel	1,730	2,028
5	Lower clerical and sales personnel	358	202
6	Foreman	736	869
7	Medium skilled workers	1,083	961
8	Farmers and fishermen	1,121	187
9	Lower skilled workers	838	698
10	Lower skilled farm workers	66	19
11	Unskilled workers	259	244
12	Unskilled farm workers	71	58
13	Pensioners, retirees and independent gentlemen[a]	211	200
Total		10,868	7,222

Notes: Table lists student shares according to their social background coded into HISCLASS classes. Classes 13 and 14 are no official HISCLASS categories.

[a] Including cases where assignment into HISCO/HISCLASS not possible due to lack of occupational data or match (9 in Gymnasium, 19 in Gewerbeschule/Realschule).

Sources: van Leeuwen and Maas (2011, p. 57), *Jahresberichte*, various years. See Table A2 for data details.

Table A5 – Number of students according to BSKB categorization (employed sample)

BSKB code	Occupational category	No. of students according to BSKB sectors	
		Gymnasium	Gewerbeschule/Realschule
		1810-90	1850-90
A	Agriculture and forestry	1,547	457
B	Industry, crafts, and mining	2,565	2,834
C	Trade and transportation	1,404	2,245
D	Household services, servants, and day laborers	235	142
E	Civil services[a]	4,905	1,344
F	Pensioners, independent gentlemen, and unemployed[b]	212	200
Total		10,868	7,222

[a]Including military, church, school, medical, and court personnel as well as artists and freelancers.

[b]Including cases where assignment into BSKB categorization not possible due to lack of occupational data or match (9 in the Gymnasium, 19 in Gewerbeschule/Realschule).

Sources: *Jahresberichte*, various years. See Table A2 for data details.

Table A6 – Development of school and student numbers

Year	Secondary education		
	Students (per 1,000 people)	No. of schools	Students per school
1810	1,304 (0.35)[a]	25	52
1830	2,334 (0.56)[b]	26	90
1850	5,894 (1.29)[c]	54	109
1870	13,843 (2.85)[d]	68	204
1890	27,407 (4.89)[e]	89	308

Notes: Table depicts all secondary students per 1,000 people (total Bavarian population in 1818, 1830, 1852, 1870, and 1890. See Table A2 for data details

[a] Due to the lack of available data, this number lacks students in Eichstaett, Freising, Metten, and Zweibrücken. Moreover, population numbers are from 1818 and student numbers are from annual school reports issued between 1810 and 1820 (depending on the institution).

[b] Student numbers of 1833.

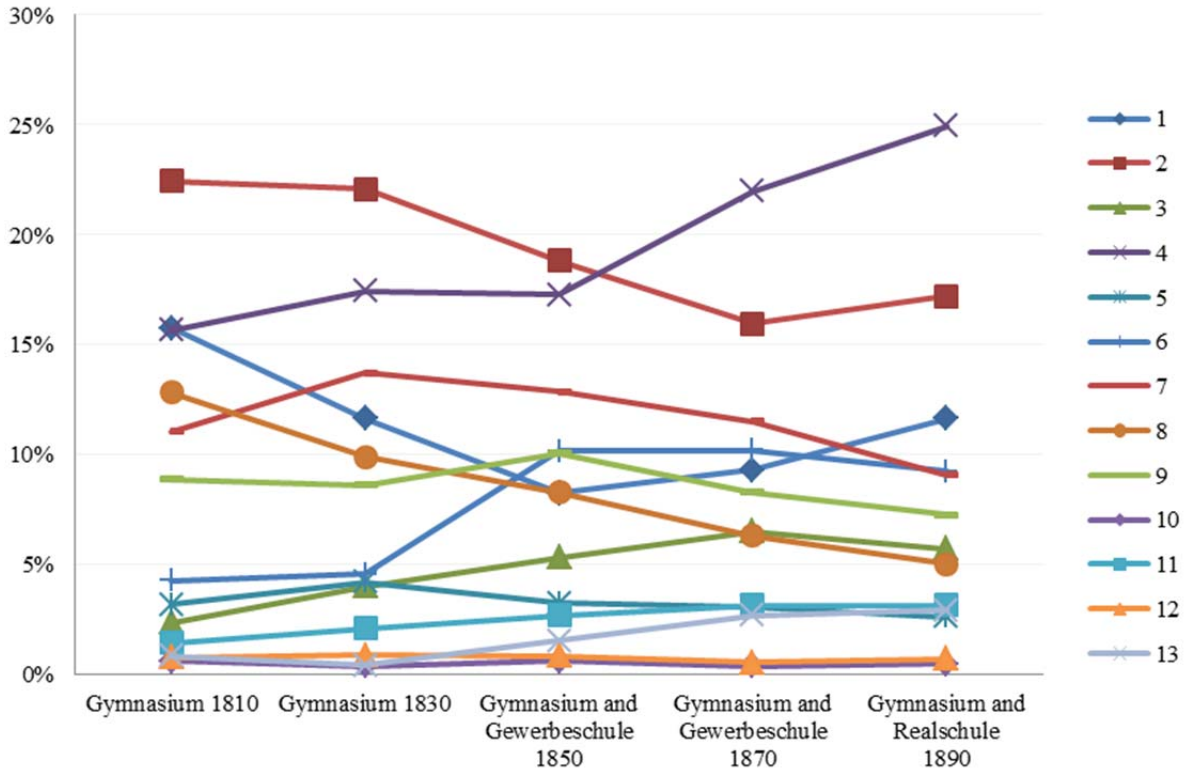
[c] Student numbers of the Gymnasium are from 1851.

[d] Including 364 students of six Realgymnasien.

[e] Including 496 students of four Realgymnasien. Student numbers of the Realgymnasium and Gymnasium are from 1892.

Source: Own calculations; see Table A2 for data details.

Figure A1 – Social composition in secondary schools, full HISCLASS range



Notes: Figure depicts students' social classes according to HISCLASS categorization of fathers' occupations as share of all secondary school students in the respective year.
Source: Own illustration; see Table A2 for data details.

Table A7 – Students with fathers employed as civil servants, shares

Father's occupation	% of students with fathers working as civil servants								HISCLASS codes	BSKB codes
	Gymnasium					Gewerbeschule/Realschule				
	1810	1830	1850	1870	1890	1850	1870	1890		
Head teacher, principal	0.5	0.3	0.3	0.3	0.8	0.0	0.0	0.1	1	E
University Professor	0.6	0.4	1.1	1.2	1.0	0.2	0.1	0.1	2	E
Teacher	3.8	5.3	8.1	9.1	10.1	3.5	2.6	3.2	2	E
Minister[a]	4.8	2.8	3.3	4.3	2.4	1.5	0.4	0.3	2	E
Administrative officer	12.7	7.4	4.2	6.5	5.0	3.0	2.4	1.9	1, 2, 3, 4, 5	E
Forest officer	1.0	2.5	2.4	4.4	2.6	4.4	2.5	0.9	3	A
Customs officer	1.1	1.5	2.0	1.0	1.2	1.6	0.6	0.8	1, 2, 3, 4	E
Transport and communication officer	0.8	0.8	0.9	1.6	2.3	1.5	2.2	1.8	3, 4, 5	C
Fiscal officer	5.3	4.4	3.1	2.8	2.2	1.7	0.8	0.9	1, 2, 3, 4	E
Public medical officer	1.8	1.7	1.2	1.3	1.6	0.5	0.4	0.1	1, 2	E
Technician	0.8	0.8	0.8	0.7	1.2	1.0	0.6	0.8	1, 2, 3, 4	E
Military officer	1.9	2.0	1.3	2.2	3.6	2.0	1.3	0.7	1, 3	E
Physician	2.6	2.2	2.6	2.7	1.7	0.9	0.4	0.3	2	E
Judge	3.0	3.7	2.4	2.9	1.7	0.8	0.7	0.3	2	E
Notary	0.2	0.1	0.1	0.9	0.7	0.1	0.1	0.3	2	E
Lawyer	3.6	3.1	2.1	3.4	2.4	0.9	0.7	0.3	2	E
Total	44.5	39.0	36.0	45.4	40.5	23.5	15.9	12.5		

Notes: Table depicts students according to occupational background as share of total student number in respective school and year.

[a] Including Rabbis.

Sources: Own calculations; see Table A2 for data details.

Table A8 – Participation of industrial and trade-related occupations in secondary education, shares

Father's occupation	% of students with fathers working in industrial or trade-related professions								HISCLASS codes	BSKB codes
	Gymnasium					Gewerbeschule/Realschule				
	1810	1830	1850	1870	1890	1850	1870	1890		
Engineer	0.0	0.1	0.1	0.1	0.4	0.4	0.2	0.6	2, 4	B
Architect	0.1	0.2	0.1	0.1	0.5	0.4	0.4	1.4	2	B
Industrialist	1.8	1.4	1.3	1.8	3.9	3.7	5.2	7.1	1	B
Merchant	4.0	6.5	5.7	5.1	9.1	12.4	19.9	20.9	4	C
Travelling salesman or commissioner	0.0	0.0	0.1	0.0	0.3	0.0	0.2	0.9	4	C
Contractor or craftsman	18.6	22.4	25.5	17.7	14.9	31.1	31.7	25.9	6, 7, 9	B
whereof % master craftsman	23.4	20.5	35.7	42.6	45.7	36.3	36.0	43.3	6	B
Total	24.5	30.6	32.8	24.8	29.1	48.0	57.5	56.9		

Notes: Table depicts students according to occupational background as share of total student number in respective school and year.

Sources: Own calculations; see Table A2 for data details.

Table A9 – Students with fathers of considerable wealth or working as farmers, shares

Father's occupation	% of students with fathers with fathers being/working as…								HISCLASS codes	BSKB codes
	Gymnasium					Gewerbeschule/Realschule				
	1810	1830	1850	1870	1890	1850	1870	1890		
Private gentleman	0.0	0.3	1.3	2.1	2.8	1.8	3.1	2.3	/	F
Major landowner	0.4	0.9	0.8	1.5	0.9	1.4	0.8	0.7	1	A
General farmers	12.1	9.8	10.9	9.7	7.8	2.8	3.0	1.6	8	A
Total	12.5	10.9	13.0	13.2	11.5	5.9	6.9	4.6		

Notes: Table depicts students according to occupational background as share of total student number in respective school and year.

Sources: Own calculations; see Table A2 for data details.