

Fertility in Rostock and Rural Mecklenburg-Schwerin in the 19th Century

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Fertility in Rostock and Rural Mecklenburg-Schwerin in the 19th Century

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ABSTRACT

In this paper we first set out to evaluate how much the fertility between Rostock as an urban settlement differed from the surrounding rural area of Mecklenburg-Schwerin, in the 19th century. The available microdata allows for a more in-depth analysis compared to previous research based on aggregate data. The censuses of 1819, 1867, and 1900 provide data for using the Own-Children-Method. We analyse the urban-rural difference, the influence of occupational groups in the city of Rostock and its rural surroundings, and finally the influence of migration on fertility in the city of Rostock. Immigration from rural areas and other cities was the main reason for the population increase of Rostock in the 19th century and this could have affected its fertility levels. Overall fertility was higher for rural areas than for urban ones, while marital fertility was more or less the same. Marital fertility was almost the same for all occupational groups, even for the agricultural sector. Migration had no visible effect on marital fertility, which is both interesting and unexpected. The most important factor for the level of overall fertility was the proportion of married people, which was an outcome of the possibilities offered by different economic sectors and environments.

Keywords: Rostock, Mecklenburg-Schwerin (Northern Germany), Fertility decline, Urban-rural differences, Socio-economic differentiation, Migration

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1 INTRODUCTION

In a recent publication Dribe et al. (2017) challenge the idea of a positive association between social status or wealth and fertility before the Demographic Transition (established by e.g. Guinnane 2011; Clark & Cummins 2015). An analysis of microdata in three European and two North American sites revealed a combination of high socio-economic status and high fertility before the transition in only one of these sites. Socio-economic fertility differences in pre-transitional societies were highly dependent on local contexts and conditions for childbearing, while the hypothesis of high-status groups as forerunners of the fertility decline could be supported (Dribe et al. 2017). Szreter (1996) found that there was not one but multiple fertility declines in Britain. By analysing different occupational groups, he identified twenty or more distinct fertility regimes. These findings demonstrate the need to pay closer attention to variations in fertility decline within countries.

Germany is a prime candidate for such an analysis since after its establishment in 1871, the German Empire was one of the largest countries in Europe. It was characterised by major internal variations in terms of economic development, religious confessions, cultural traditions, and demographic regimes. Since then, homogenising tendencies of the nation state have remained in effect, but the Demographic Transition at the end of the 19th century took place in a country which was not yet homogenised. Analyses of these different demographic regimes are necessary in order to obtain an overall picture of Germany as a whole, instead of average rates which present a homogenised picture of a non-homogenised country.

One of the lesser-known constituent states of the German Empire was the Grand Duchy of Mecklenburg-Schwerin, located in northern Germany. It was characterised by delayed industrialisation and the distinct demographic features of low fertility, low mortality, and high emigration rates. It differed considerably from the general German development during the time period between the founding of the German Empire until WWI, which is why it presents an interesting case for analysis. Rural fertility in this region in the 19th century was among the lowest in Germany and had possibly already started to decline among some parts of the population as early as the mid-19th century (Gehrmann 2013). Mortality and marriage patterns during the 19th century in Rostock, the largest city in Mecklenburg-Schwerin, have already been extensively analysed (Schulz 2009; Szotysek, Gruber, Scholz & Zuber-Goldstein 2009; Oepen & Toch 2010; Mühlichen 2011; Scholz & Gruber 2011a; Scholz & Gruber 2011b; Scholz 2013; Szotysek, Gruber, Scholz & Zuber-Goldstein 2011; Mühlichen & Scholz 2015; Mühlichen, Scholz & Doblhammer 2015), yet fertility has attracted less attention to date (Lange 2010).

Another precondition for an in-depth analysis is the availability of longitudinal or cross-sectional microdata. Fortunately, the situation concerning such data for Mecklenburg-Schwerin is comparatively good since census data are completely preserved for the years 1819, 1867, and 1900 and can be used for scholarly research. In Germany there is still a considerable backlog of access to such historical sources. After WWII quantitative historical demography developed only slowly, and there are only a few centres in which quantitative demographic research is being conducted. The University of Rostock's history department has made multiple contributions to quantitative historical demography over the last 20 years. The transcription of the census of Mecklenburg-Schwerin in 1819, including the city of Rostock, is especially noteworthy.¹ From 2008-2011 the federal state of Mecklenburg-Vorpommern funded the "Rostocker Forschungsverbund Historische Demographie" – a co-operation between the University of Rostock and the Max Planck Institute for Demographic Research. This produced a transcription of handwritten manuscript sources of the census of Mecklenburg-Schwerin for the year 1867 (including Rostock), the census of Rostock for the year 1900, and of selected demographic events found in the church record books of Rostock dating from the 19th century (see also Scholz 2013). A follow-up project, including a transcription of a rural sample of Mecklenburg-Schwerin for 1900, was not carried out due to lack of funding.

To date there are only a few microdata databases of complete urban populations and major rural populations in Germany which allow us to reconstruct demographic developments over a longer period of time. The data for the censuses of 1819, 1867, and 1900 represent the largest database

¹ A pilot project, named "Mecklenburg in the Demographic Transition of the 18th and 19th century", provided the framework for this analysis. Historians based in Rostock have published several results of the analysis of the urban population and social history at the beginning of the 19th century, e.g. Krüger & Kroll 1998; Krüger 1998; Krüger 2000; Krüger 2003; Krüger 2007; Manke 1999; Manke 2000; Manke 2005a; Manke 2005b.

for research on the 19th century within Germany, presenting excellent possibilities for research. These three points in time represent also different stages in the demographic transition: the data of 1819 are pre-transitional, the data of 1867 may belong to the early-transitional stage (but this still must be verified), while the 1900 data are clearly transitional.

2 RESEARCH QUESTIONS

In this paper we first set out to evaluate how much the fertility of Rostock as an urban settlement differed from the surrounding rural area of Mecklenburg-Schwerin in the 19th century. According to previous research, fertility should have been lower in Rostock, but the rural fertility was already found to be among the lowest in all of 19th century Germany. Prussian data points to the fact that, even in 1875, urban and rural fertility could be rather similar. The analysis was done for the pre-transitional period using data of the 1819 census, while the data of the 1867 census reflected the early phase of the fertility transition (although perhaps only in Rostock and not in the rural areas).

The second question concerned the possible effects on fertility of occupational groups, which were used instead of social status groups. This is because we think that the deduction of social status groups from the occupational titles in these censuses does not result in consistent groups. Most research has stressed the higher fertility of people from a higher social status/income/wealth group and that upper and middle classes were the forerunners of fertility decline in the 19th century. We sought to confirm or disprove different fertility levels of occupational groups in the census of 1819 in Rostock or in its rural hinterland.

The third question focused on the possible effect of migration on fertility: Was there a difference between people born in Rostock and those who migrated into the city? Do these migrants display behaviour similar to people born in Rostock or are they more like the rural population around Rostock, where the majority of them came from (socialisation versus adaptation hypothesis, see next section)? Perhaps this rural-urban migration group takes up an intermediate position in terms of fertility, similar to both people born in Rostock and the rural population of Mecklenburg-Schwerin.

Finally, we analysed which characteristic (urban/rural, occupation, migration) caused the largest fertility differences in Rostock and its surroundings in the 19th century. Possible influences of religion and ethnicity cannot be analysed, as the population was almost entirely German and Protestant. Unlike other studies of the Germany population from this era, we cannot analyse the effect of mining on fertility because there was no mining in the region.

3 THEORETICAL FRAMEWORK

We analyse fertility in Mecklenburg-Schwerin in the 19th century and pre-transitional fertility mechanisms which might have been in effect there through the second half of the 19th century. Malthus (1798) contrasted a potentially exponential population growth model with an arithmetical growth model of food production. In addition to other measures, he proposed delayed marriage in his “preventive checks” to reduce human fertility so that “positive checks” (increased mortality due to hunger, disease, and war) can be avoided. Delayed marriages reduce overall fertility, while marital fertility is not affected by such a measure. Rostock and Mecklenburg-Schwerin were characterised by late ages at marriage and a predominance of simple family households (Scholz & Gruber 2015). This means that the region fell under the “European pattern” (Hajnal 1965), or “Western European Marriage Pattern” as it is generally referred to, and the “Northwest European simple household system”. This system is made up of late marriage for both sexes (over 26 for men and over 23 for women), establishing their own households after marriage, and young unmarried people employed as servants (Hajnal 1982).

Five different hypotheses about the effects of migration on fertility have been proposed to date. They are all based on contemporary migration research, yet they also provide a useful theoretical framework

for historical research. The *socialisation hypothesis* assumes that a person's social environment during childhood determines his/her fertility. Therefore, migrants have fertility levels close to the region of their childhood and which therefore might not resemble those of their actual residence. This is based on the assumption that fertility preferences are relatively stable over the life course. In contrast, the *adaptation hypothesis* stresses the influence of the current social context on childbearing behaviour. Socio-cultural and economic factors are important for fertility decisions, and thus migrants have fertility levels close to their place of residence, and not so much to their place of birth or childhood. The *selection hypothesis* assumes that migrants are a selective group of people whose fertility preferences are different from those of the population at origin, but similar to those at their place of residence. This hypothesis also emphasises the importance of a person's own childhood for fertility decisions, but these preferences are group- or individual-specific rather than place-specific (as in the socialisation hypothesis). The *disruption hypothesis* points to the economic costs and socio-psychological stress associated with migration, therefore fertility immediately after migration is much lower, but increases later. The *interrelation hypothesis* argues that different events, such as migration and family building (including fertility), coincide with each other (see e.g. Kulu 2005; Kulu 2006; Schmid & Kohls 2009).

In reality these hypotheses interact. Therefore, they might not be so easily discernible. They may operate in opposite ways, or may apply only to some groups of migrants or to specific time periods (Schmid & Kohls 2009). Earlier research places greater emphasis on the socialisation hypothesis, while later research tended more towards the adaptation hypothesis (Kulu 2005). Research about the effects of migration on fertility in historical populations is scarce, and results for Belgium do not support the same hypotheses. An analysis of the industrial region of Liège in the 19th century showed higher fertility for immigrants from rural areas than those of the native urban population (Oris 1996), while an analysis of the city of Charleroi in the second half of the 19th century revealed nearly no difference in total marital fertility rates between the sedentary and the migrant population (Eggerickx 2001). Schumacher, Matthijs, and Moreels (2013) found a clear disruption effect for the cities of Antwerp and Geneva in the 19th century. Research on Albania around 1900 has shown that none of these hypotheses can serve as a single explanation for fertility outcomes (Gruber 2011).

Sharlin (1978) proposed a model of urban migration in 17th and 18th century Europe, differentiating between permanent residents and temporary migrants. The first group could reproduce itself while the latter could not. The reason for these different demographic outcomes was the much lower proportion of married people in the second group. He used German and Austrian data for his analysis, but this time frame does not fit our analysis, so it is not likely that our results will confirm his model.

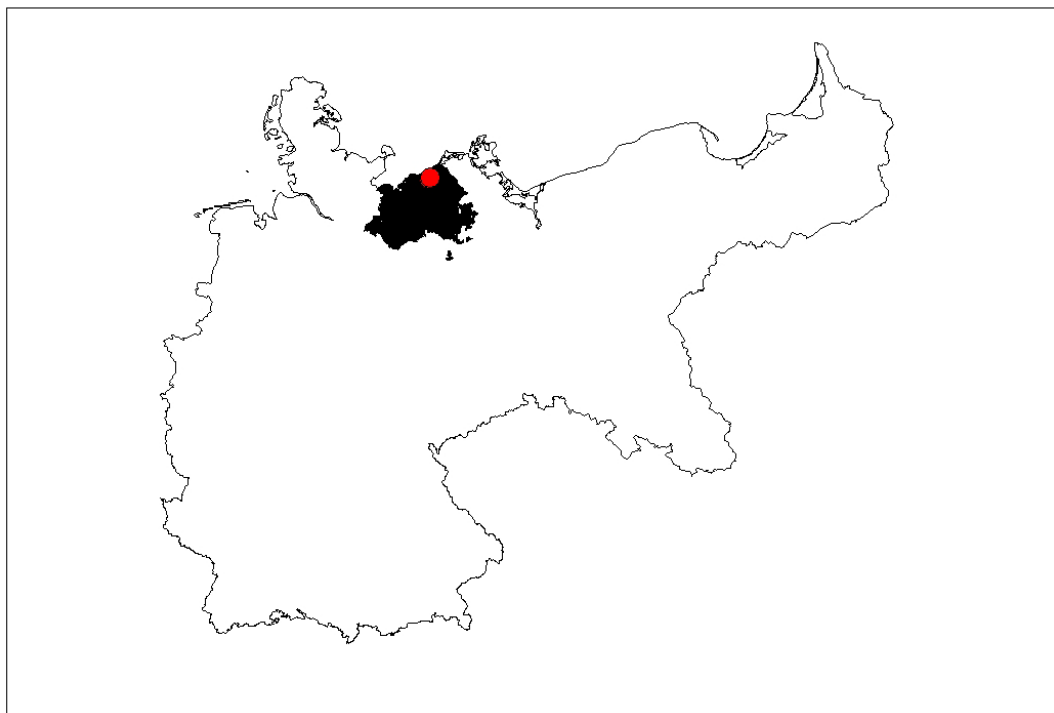
4 HISTORICAL BACKGROUND

Mecklenburg joined the reformation movement in the 16th century and suffered heavy population losses during the Thirty Years War. In 1701 the territory was divided into two duchies (as of 1815 these were grand duchies): Mecklenburg-Schwerin and Mecklenburg-Strelitz, which was much smaller. The constitution of 1755 (valid in both duchies) gave most of the power to the nobility and remained valid until 1918. At the end of the monarchy in Germany, Mecklenburg was seen as having the most backward political system in Germany. Serfdom was abolished in 1820, but the right of abode was not granted until 1868, and freedom of trade was only declared in 1869. Agricultural lands were primarily owned by the grand duke or the nobility, and to a lesser degree by the cities and monasteries. Peasants were either tenant farmers or agricultural workers at large estates. These estates produced mainly grain for export, and had already started with mechanisation and employment of seasonal workers in the 19th century. Urbanisation was low and industrialisation was hindered by the political system of Mecklenburg. Population density was among the lowest in Germany, and the economic and social situation created massive out-migration.

Rostock was the largest city in Mecklenburg but never became its capital. In medieval times it joined the Hanseatic League and became a major trading and port city on the Baltic coast (see map 1), adding a university, founded in 1419. The Thirty Years War and a disastrous fire in 1677 led to an economic downturn. In the 19th century the economy recovered again, and the population increased so steadily that the city expanded beyond the medieval city walls, and former rural areas were incorporated into

the city after 1830. Industrialisation started late, but by the end of the 19th century the shipyards were the largest urban employer (Polzin & Witt 1974).

Map 1 Rostock and Mecklenburg-Schwerin within Germany in 1900



Source: MPIDR [Max Planck Institute for Demographic Research] and CGG [Chair for Geodesy and Geoinformatics, University of Rostock] 2011: MPIDR Population History GIS Collection (partly based on Hubatsch & Klein 1975 ff.) – Rostock.

5 OCCUPATIONAL STRUCTURE

Occupational titles were classified using the coding scheme of the Historical International Standard Classification of Occupations (HISCO, see Van Leeuwen, Maas & Miles 2002)². The large number of different occupations makes it necessary to group these into larger categories, without which statistical analysis would be impossible. The HISCO codes can be divided into major groups and economic sectors. Table 1 lists these groups and sectors for men between the ages of 15 and 64 as percentages in each census year. Unspecific occupational titles, such as “Arbeiter” or “Arbeitsmann” (worker), were assigned to a separate category, which also represents the fastest growing sector in Rostock at that time. The census lists do not distinguish between employment in handicraft or industry, so we assumed that most industrial workers are included in this category. Handicraft and industry employed about half of the male workforce of working age in Rostock. The categories of trade and services each accounted for about 10 percent of the workforce, while the other sectors were of less importance. In rural Mecklenburg-Schwerin agriculture was the dominating economic sector. Unspecified workers and day-labourers in rural Mecklenburg-Schwerin were placed in the agricultural sector, as there were no rural industries. Servants in households headed by a person engaged in agriculture were assigned to the agricultural sector as well. Services and handicraft employed 10 to 15 percent each, while there was also a large proportion of men of working age registered without any occupation. In 1867 the census also counted people who were not present, accounting for almost 20 percent of the male population of working age in rural Mecklenburg-Schwerin, but less than 6 percent in Rostock. Most of these men with no occupational title were grown children who had left home for employment somewhere else; from the migration statistics we can assume that many of them never returned home.

2 The North Atlantic Population Project (NAPP) uses a version of HISCO with fewer categories; we have applied this version of HISCO here.

Therefore, they were excluded from the statistics for rural Mecklenburg-Schwerin in 1867, and the proportion of men without any occupational title is lowest for this census sample. The major increase of the agricultural sector between 1819 and 1867 in rural Mecklenburg-Schwerin is primarily an effect of not including these men.

Table 1 *Economic sector of men aged 15-64 years in percentages, Rostock and rural Mecklenburg-Schwerin, 1819-1900*

| Major group in HISCO | Economic sector | Rostock | | | Rural Mecklenburg-Schwerin | |
|----------------------|-------------------------------|---------|--------|--------|----------------------------|-------|
| | | 1819 | 1867 | 1900 | 1819 | 1867 |
| 0/1 | Professional and technical | 6.4 | 6.3 | 5.6 | 3.0 | 2.7 |
| 2 | Administrative and managerial | 0.9 | 1.0 | 1.5 | 2.1 | 1.6 |
| 3 | Clerical | 1.8 | 2.3 | 4.4 | 0.5 | 0.2 |
| 4 | Sales | 8.7 | 7.3 | 10.5 | 0.1 | 0.2 |
| 5 | Services | 11.5 | 16.4 | 8.8 | 16.6 | 10.9 |
| 6 | Agriculture | 3.8 | 2.2 | 1.9 | 38.7 | 60.2 |
| 7-9 | Handicraft | 43.9 | 33.6 | 33.3 | 12.1 | 14.0 |
| 9-99 | Unspecified worker | 10.1 | 18.6 | 19.3 | 0.3 | 0.3 |
| | Without occupational title | 12.9 | 12.3 | 14.8 | 26.6 | 9.8 |
| N | | 4,867 | 10,006 | 17,058 | 6,314 | 9,494 |

Source: Authors' calculations, censuses 1819, 1867, and 1900 (see [data references](#)).

6 DEMOGRAPHIC CONDITIONS IN MECKLENBURG-SCHWERIN

The "Mecklenburgische Staatskalender" was first published in 1784 and contained systematic demographic data, including population figures starting in 1796. The population in Rostock increased from 10,829 in 1795 to 60,454 in 1900 (Scholz & Gruber 2015), mainly due to immigration, while the population increase in Mecklenburg-Schwerin from 388,066 in 1819 to 607,770 in 1900 was much smaller (Vierteljahrshefte 1902). In addition to the population figures, the numbers of demographic events (births and deaths) were also published yearly in the Staatskalender. Crude birth rates declined from over 40 to 35 between 1796 and 1874. Crude death rates were around 30 in the beginning of this period and declined to slightly above 20. In the administrative region of Rostock, crude birth rates remained stable at about 30, while crude death rates fluctuated around 25 (Scholz 2013).

Mecklenburg-Schwerin was characterised by high rates of emigration starting in the 1830s, and from about 1850 to 1880 the rates of emigration to North America were the highest of all Germany. Reasons for this mass emigration included the poor economic and social situation of large parts of the population and the restrictions on marriage (Gehrmann 2013). Natural population growth rates in Mecklenburg-Schwerin were quite high, but population growth in the 19th century was below the average of the German Customs Union due to emigration (Marschalck 1984). These migration movements were later directed towards other regions in Germany, so that 31.4 percent of all people born in Mecklenburg-Schwerin lived outside its borders by 1900, a proportion larger than in any other German state (Dietzsch 1918).

The censuses of 1819 and 1867 yield similar ages at marriage for Rostock (singulate mean age at marriage/SMAM, see Hajnal 1953): 30.4 and 30.3 years respectively for men and 27.4 and 28.2 years

for women. Later the age at marriage decreased to 27.4 years for men and 25.1 years for women in 1900. We can observe that persons who were registered as unskilled workers in the census married at the youngest ages (Szołtysek, Gruber, Scholz & Zuber-Goldstein 2011). The decreases in age at marriage were a consequence of the state lifting the marriage restrictions following its joining the Northern German Federation in mid-1867 (Gehrmann 2013). (Before then, one needed a licence to establish a new household, but the local authorities were reluctant to grant them. See Gehrmann 2013.) Mecklenburg-Schwerin was among those German regions with the highest ages at marriage towards the end of the 19th century (Knodel & Maynes 1976). Another feature already apparent in the 19th century was the high rate of illegitimate births, which surpassed 20 percent in 1850, but declined massively after the abolition of marriage restrictions in 1867 (Gehrmann 2013)

The city of Rostock had very favourable life expectancy compared to other German cities – as did Mecklenburg-Schwerin compared to other German regions. This life expectancy was comparable to Scandinavian countries, and at the end of the 19th century there were changes which especially affected children and young people. Mortality in middle and higher ages remained rather constant, and the difference between men and women is quite noticeable.³ Reasons for this high life expectancy include extended breast feeding, smallpox vaccination, and the training of midwives (Gehrmann 2013). Comparing life expectancy of different social strata in Rostock in the 19th century shows that the upper class did not always have the highest life expectancy. What was more decisive for life expectancy than social strata was the city quarter one lived in, however the results for social strata and city quarters were only partly statistically significant (Scholz & Gruber 2011a).

7 FERTILITY AND THE DEMOGRAPHIC TRANSITION IN MECKLENBURG-SCHWERIN

The first major demographic transition research about Mecklenburg-Schwerin using aggregate data was the Princeton European Fertility Project (Coale & Watkins 1986). The volume dedicated to Germany deals with Mecklenburg (Mecklenburg-Schwerin and Mecklenburg-Strelitz combined) as part of north-northwestern Germany (Knodel 1974). This project showed that urban marital fertility was generally lower than rural marital fertility, and that cities had lower levels of nuptiality. It was quite clear that the fertility decline began earlier in cities than in rural areas, while the fertility levels of cities were highly correlated with those of the surrounding rural regions (Sharlin 1986).

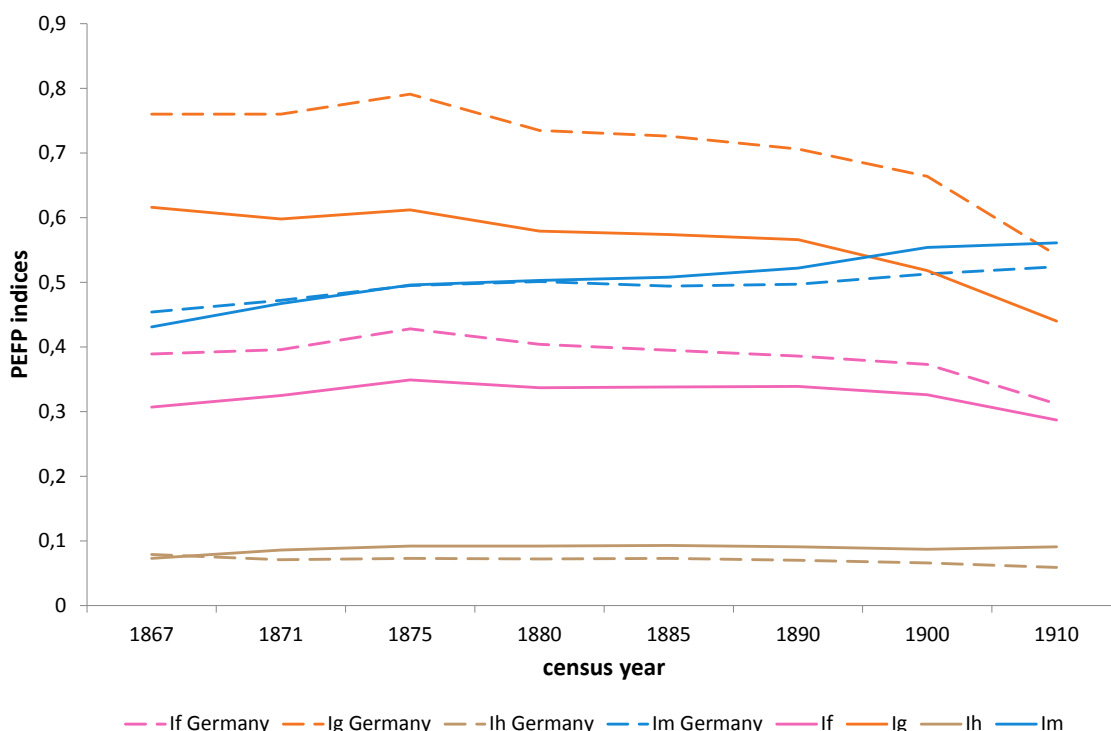
Researchers compared the four northern cities of Berlin, Hamburg, Bremen, and Lübeck with the general German trend in fertility and found substantially lower fertility levels in these four cities, and the paths of decline were interestingly similar (Knodel 1974). Prussian data since 1867/68 showed a steady decline of marital and general fertility from rural areas to small cities, large cities, and Berlin: “the more urban the area, the lower the marital fertility” (Knodel 1974: 96). The date of a 10 percent decline in fertility depicts generally the same picture (Knodel 1974). In addition, there was a clear correlation between the rural fertility of an administrative area with the urban fertility of the same area (Knodel 1974). Data on births by occupation of parents are available only for Prussia, and these clearly show the lowest marital fertility in the group civil service/military/professional and the highest marital fertility in the agriculture group for the period 1882-1924. Miners showed a different pattern, with increasing marital fertility between 1882 and 1895 and only a small decline afterwards, so that in 1907 they surpassed the agriculture group (Knodel 1974). The occupational position also played a major role in marital fertility in Prussia 1907-1924: “Workers” had considerably higher rates than “owners and white-collar employees”. The ranking of these three sectors was the same for both occupational positions (Knodel 1974). Higher fertility was found for Catholics than for Protestants (Knodel 1974).

In 1869-1873 marital fertility in Mecklenburg was the second lowest of the 71 regions of Germany: the index of marital fertility was 0.598 compared to the German average of 0.760 (Knodel 1974). General fertility in 1870 was also among the lowest in Germany and remained at about the same low level 30 years later, albeit with some fluctuation: the index of overall fertility was 0.325 and 0.326

3 Abridged period life tables can be seen in Gruber & Scholz 2016: 6, and complete period life tables in Scholz 2013: 219-221.

compared to the German averages of 0.396 and 0.373 respectively (Knodel 1974). The permanent decline of general and marital fertility in Mecklenburg (the two grand duchies combined) began in 1892⁴ and in Germany as a whole in 1895 according to the European Fertility Project (Knodel 1974). Figure 1 displays a comparison of these fertility indices for Germany and Mecklenburg. An analysis of two villages in Mecklenburg yields a decrease in the average number of children born, from 5.7 – 6.1 to 4.0 – 4.7 from the second half of the 18th century to the second half of the 19th century (Knodel 1974). Most likely, fertility had already started to decline in some parts of the population earlier around 1850 (Gehrmann 2013), making marital fertility in 1866-1868 the second lowest in Germany. Mecklenburg-Schwerin had rather low fertility and low mortality compared to other German territories (Gehrmann 2013).

Figure 1 *Indices of the Princeton European Fertility Project for Mecklenburg and Germany, 1867-1910*



Source: Coale & Watkins 1986: 108 & 112.

Note: I_i : general fertility, I_g : married fertility, I_h : unmarried fertility, I_m : proportion of married women, solid lines represent Mecklenburg and dashed lines represent Germany.⁵

In the 1990s, the Prussia database 1861-1914 created by Galloway which contains 407 administrative units, informed several publications about the marital fertility decline in Prussia during this time period. Religion was identified as the most important indicator of fertility, followed by ethnicity and the proportion of miners. In contrast, fertility decline was driven by structural economic factors (Galloway, Hammel & Lee 1994). In a comparison of the 54 cities with these 407 administrative units, Galloway, Lee, and Hammel (1998) found that in 1875 marital fertility was fairly similar across different degrees of urbanization, but afterwards marital fertility declined much more rapidly in more urbanized areas than in rural areas. A recent geographic analysis of the data provided evidence of the impact of both economic and cultural variables on the marital fertility decline, and some unexplained geographic clustering remained which provides support to the social diffusion hypothesis (Goldstein & Klüsener 2014).

4 Map 2.1 in their publication displays a starting date in the 1870s (Coale & Watkins 1986), when the last plateau was actually reached.

5 The index of overall fertility is the ratio of the actual number of births to the maximum (Hutterite) fertility, the other indices are accordingly calculated. Their relationship is: $I_i = I_m * I_g + (1 - I_m) * I_h$. An in-depth discussion can be found in Coale & Watkins 1986: 153-162.

Fertility research using microdata was generally directed towards single communities, and in northern Germany we know of Leezen (Gehrmann 1984) and Belm (Schlumbohm 1994a). A major exception is Knodel's analysis of 14 villages, two of which were located in East Friesland in northwestern Germany. These two had the lowest marital fertility in this set of villages (Knodel 1988). No influence of occupations on fertility could be found concerning these two villages, and even in the other villages the differences were small (Knodel 1988). These major regional differences in fertility in Germany in the 19th century is an established fact, while social differences within villages have no general pattern. In some villages the differences were small due to property being positively or negatively correlated with fertility (Ehmer 2004). A comparative overview by Schlumbohm (1994b) showed the same picture. Gehrmann's investigation of the population history of northern Germany from 1740 to 1840 (including Mecklenburg-Schwerin) covers only the first part of the 19th century. He found a positive association of fertility and property (Gehrmann 2000). An analysis of the urban and rural populations of Bremen in the first half of the 19th century yielded higher marital fertility for the upper class compared to the lower class for a majority of marriage cohorts (Marschalck 1994). A recent analysis of the Krummhörn data (East Friesland) shows that small-scale farmers and landless families had fewer children than did large-scale and mid-scale farmers (Willführ & Störmer 2015). Overall, we can conclude that the course of fertility decline in the 19th century in rural areas in Germany did not follow the same general pattern everywhere; different developmental paths existed (Ehmer 2004).

Recent analyses of non-German microdata have been conducted to check the results concerning the correlation between social class and fertility based on aggregate data. The generally assumed correlation between higher social class and higher fertility before the onset of the demographic transition can be only partially verified (Dribe, Oris & Pozzi 2014; Dribe et al. 2017). Upper and middle class were generally the forerunners of fertility decline during the demographic transition (Bras 2014; Dribe & Scalone 2014; Vézina, Gauvreau & Gagnon 2014), while workers and peasants followed later (Bengtsson & Dribe 2014; Breschi, Esposito, Mazzoni & Pozzi 2014; Maloney, Hanson & Smith 2014). A meta-analysis of 879 samples from 129 sources of fertility levels by social status confirmed that high status was associated with relatively high fertility before the fertility decline, thereafter it had a neutral or negative effect (Skirbekk 2008). Unfortunately, most of these examples are from the 20th century, and there are almost no German data included in them.

8 DATA AND METHODS

8.1 CENSUSES OF 1819, 1867, AND 1900

Longitudinal data to study fertility in Mecklenburg-Schwerin or Rostock are not available yet, therefore we have to rely on the abundant census material there. Cross-sectional data can still provide valuable information about fertility and possible fertility decline in this northern German region. Following a decree of the German Confederation (an organization created in 1815 by the Congress of Vienna to organize the remaining states of the German nation), the Grand Duke of Mecklenburg ordered a census to be taken in the Grand Duchy of Mecklenburg-Schwerin in August 1819. The purpose of the census was to determine the exact military contingent of each Confederation territory. Census taking took some months and the last manuscripts were handed in only in 1820. Only the present population was to have been recorded, but some temporarily absent people were also registered.

One major drawback of this census is that no households were delineated in the census manuscripts. The population of the city of Rostock was published, ordered by households based on characteristics such as being an adult and having an individual income (Manke 2005a). These criteria are not always straightforward, therefore we tried to find a different solution in developing an algorithm to delineate households automatically. The algorithm was tested on the census of 1867, which had clear household borders (separate sheets for each household). The major differences between these 1867 household borders and the household borders created by this algorithm are for unmarried people 20-29 years old. Do they form individual households or are they members of the previous household (Gruber, Scholz & Szoltysek 2011)? This problem is not relevant for this paper, because here we are dealing with young children in their parents' households, and this relationship is not affected by household borders.

The 1867 census was taken on December 3rd in the Grand Duchy of Mecklenburg-Strelitz and the Grand Duchy of Mecklenburg-Schwerin on the occasion of these territories' accession to the North German Confederation and the German Customs Union in 1867/68. Present and absent people were registered separately.⁶ The 1900 census was taken on December 1st as part of the general census of the German Empire. In this census every person was registered on a separate sheet, and different sheets were used for present and absent people.

The 1819 rural Mecklenburg-Schwerin dataset has a highly clustered sample design of portions of territories and therefore cannot be treated as representative in a strict sense. The 1867 rural Mecklenburg-Schwerin dataset was created for comparative purposes, therefore sampling and representativeness are similar to the 1819 census. The 1900 dataset contains only the city of Rostock. The data analysed were standardized as part of the Mosaic-Project⁷, making a comparative analysis with other data in the Mosaic-Project and with microdata of international databases, such as NAPP⁸ and IPUMS⁹, possible (see also [Szotlysek & Gruber 2016](#)). The data of the city of Rostock for 1819, 1867, and 1900 can be downloaded from the website of the Mosaic project¹⁰ and RAPHIS¹¹. The data of the 1819 census are available at the NAPP website¹². Table 2 summarises the sample sizes and sample densities of the three census years for Rostock and rural Mecklenburg-Schwerin.

Table 2 *Data used*

| | Rostock | | Rural Mecklenburg-Schwerin | |
|------|-------------|----------------|----------------------------|----------------|
| | Sample size | Sample density | Sample size | Sample density |
| 1819 | 15,460 | 100 % | 22,047 | 8 % |
| 1867 | 29,660 | 100 % | 36,225 | 11 % |
| 1900 | 55,705 | 100 % | 0 | 0 % |
| Sum | 100,825 | | 58,272 | |

Source: Authors' calculations, censuses 1819, 1867, and 1900 (see [data references](#)).

8.2 OWN-CHILDREN-METHOD

These censuses do not provide information about the number of children ever born, therefore this study utilizes the Own-Children-Method (OCM) for analysing fertility ([Cho, Retherford & Choe 1986](#); [Breschi & De Santis 1997](#); [Breschi, Kurosu & Oris 2003](#); [Childs 2004](#)). In this method, children are assigned to their mothers, then the average numbers of children by single ages for mothers are counted. These figures are then used to calculate the age-specific fertility rates of past years. Correction factors have to be used in accounting for age-specific mortality rates of children and mothers between the birth of the children and the census. Such correction factors for mortality have already been published for single ages of children ([Breschi & De Santis 1997](#)). We applied the following life expectancies at birth, based on published period life tables, and as a model life table we applied the model West of the Coale-Demeny-Tables ([Coale & Demeny 1983](#)).

6 For more information about the censuses of 1819 and 1867, see [Manke 2005b](#).

7 <http://www.censusmosaic.org>

8 <https://www.nappdata.org/napp/>

9 <https://international.ipums.org/international/>

10 <http://www.censusmosaic.org/data/mosaic-data-files>

11 <http://www.demogr.mpg.de/cgi-bin/databases/raphis/default.plx>

12 <https://www.nappdata.org/napp/samples.shtml>

Table 3 *Life expectancy at birth used for the Own-Children-Method*

| | Rural Mecklenburg-Schwerin | Rostock |
|------|----------------------------|---------|
| 1819 | 45.0 | 35.0 |
| 1867 | 42.5 | 35.0 |
| 1900 | - | 47.5 |

Source: Authors' calculations, censuses 1819, 1867, and 1900 (see [data references](#)).

Additional correction factors must be used for those children who cannot be assigned to their mothers. These children are either orphans or foster children, or the information in the census does not allow them to be assigned to their mothers. In this paper we used only the mother-child-relationships of female household heads and spouses of male household heads in order to save time in checking the accurateness of all such possible mother-child-relationships. These relationships are the most trustworthy and account for about 90 percent of all mother-child-relationships. All other children were accounted for by using correction factors for each age of the children separately. We assumed that the mothers of these children have the same age distribution as the female household heads and spouses of male household heads. The correction factors range between 1.05 and 1.20, depending on the census year and the age of the children. The highest correction factors are needed for the older children and the youngest ones. Correction factors are generally higher for the rural population than for the urban, as well as, for older data as compared to younger data.

Wrong age information is not adjusted for in this paper, since age information is of high quality. The Whipple's Index ([Hobbs 2004](#): 138) yields results which are "highly accurate" or "fairly accurate" for the census years 1867 and 1900 and "approximate" for the census year 1819 according to the standards of the United Nations ([United Nations 1990](#)). Under-registration of children in the census is partially dealt with (see below). Mobility is another source of bias, because people registered in the census could have arrived only recently, while people who lived there for a long time but who just recently left are not included in the census. Only in the census of 1819 is there any information about the time of arrival at the place of residence, thus we cannot use this information. We shall reduce the possible bias in calculating age-specific fertility rates for children of ages 1 to 5 for most analyses, because the most recent years are the least affected by migration movements. The census year itself is affected by under-enumeration and thus also cannot be used (see below).

In addition, some absent people were registered in the censuses of 1867 and 1900. We deal with this problem by excluding all absent children and potential mothers from the analysis to reduce the bias of these generally childless women. Most of them are in the age range of 15 to 30 years, and they are especially numerous in the rural data of 1867. The 1819 data do not provide enough information about the presence or absence of the female population, so the entire 1819 female population is used.

9 FERTILITY

9.1 URBAN/RURAL DIFFERENCES

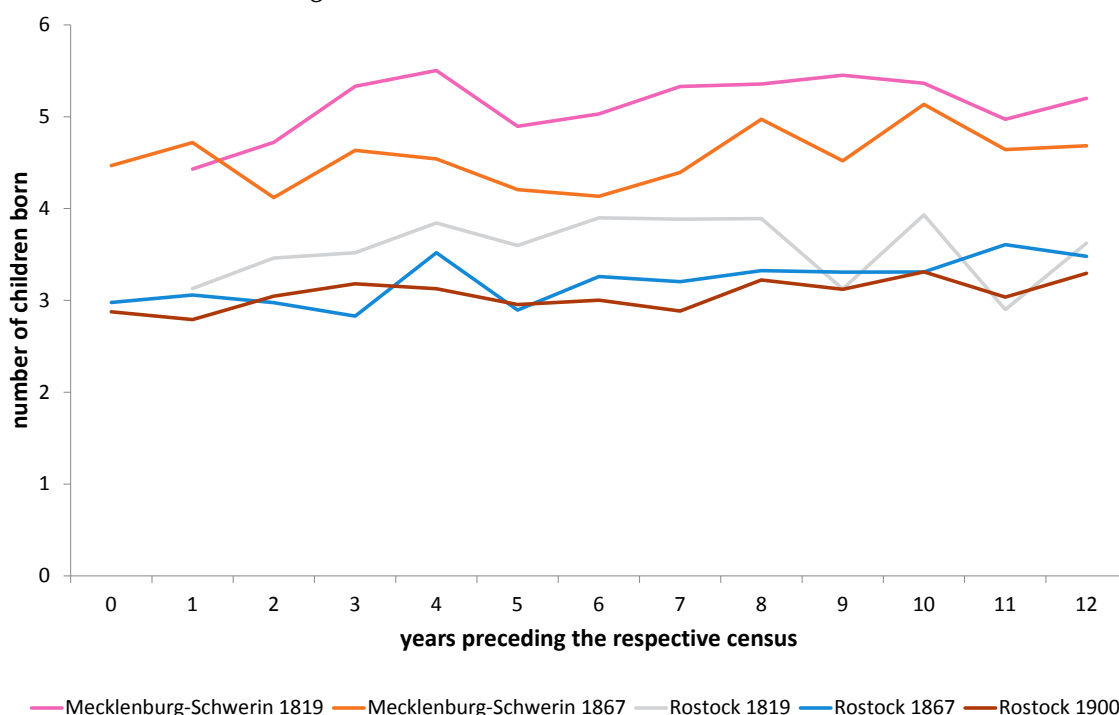
First, we analyse the differences between Rostock and rural Mecklenburg-Schwerin. Figure 2 depicts the calculated overall fertility of the five census samples for 13 years. The numbers below the figure indicate the number of years preceding the census year, i.e. "0" means the census year. Children aged 13 and 14 had already higher rates of living apart from their parents, thus the correction factors reached 1.30 and more; these results are less reliable and are omitted from the figure.

This analysis yields very similar results of 2.8 to 3.6 children born per woman in Rostock for the latter two censuses and 2.9 to 3.9 children born per woman in Rostock for the census of 1819. Fertility decreased during the 19th century and yearly fluctuations became less pronounced. The analysis of the rural data yields considerably higher numbers of children born per woman: 4.5 to 5.5 before 1819 and 4 to 5 before 1867 (decreasing at first and stabilizing later on). The highest average number of children born was calculated for 3 to 4 years preceding the census of 1819. In the last years preceding the census the number of children decreased, especially in the census year. This is similar

to the situation in the city of Rostock. One reason is that the census was not taken on December 31st, but earlier in the year. Therefore, the number of children born in the census year is incomplete (ages of children refer here to the year of birth and not to the exact age or date of birth, because very often it is only the year of birth which is registered in the census lists). In 1867 and 1900 the census was taken at the beginning of December; therefore, the number of children had been adjusted for the missing month of December. After that adjustment, no drop in fertility for the census year can be seen. In 1819 no reference date was decreed, so the census was taken at different dates in different settlements. This makes it impossible to make a general adjustment, therefore this year was omitted. In the two years preceding the census there was an under-registration of the youngest children, hence the calculated fertility is lower than the real one. Children under the age of five years were not counted in earlier population tallies of Mecklenburg-Schwerin, therefore some time was needed for a complete enumeration of children.

The rural population of Mecklenburg-Schwerin had clearly higher fertility than the urban population of Rostock in 1819 and 1867, reflecting the general pattern in Germany (Knodel 1974). The rural data is similar to the results for the two villages in Mecklenburg mentioned above (Knodel 1974). The data also suggest a decline in fertility between 1819 and 1867 for the urban and the rural population, as suggested by Gehrman (2013). The urban fertility of 1867 resembles that of 1900 more closely than in 1819, which suggests more change between 1819 and 1867 than between 1867 and 1900.

Figure 2 *Calculated average number of children born per woman in Rostock and rural Mecklenburg-Schwerin, 1807-1819, 1855-1867 and 1888-1900*



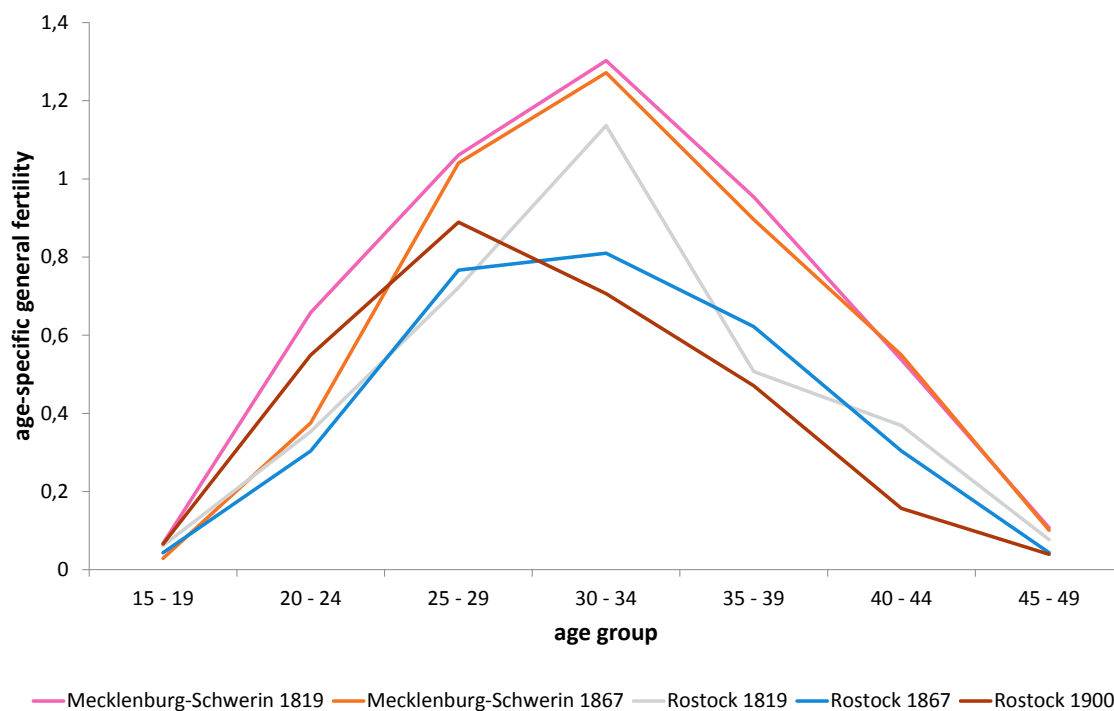
Source: Authors' calculations using OCM of censuses 1819, 1867, and 1900 (see [data references](#)).

Note: Title refers to the analysed years and the legend to the year of census.

In the next step we shall examine age-specific fertility more closely to find possible reasons for the urban and rural differences. The analysis is based on children between 1 and 5 years old in the census years. This age group was chosen because the analysis of a single birth year would have been influenced too much by random variations, and because the data of the census year were not complete. The age-specific fertility for the rural population of Mecklenburg-Schwerin was consistently higher than the urban fertility of Rostock in the 19th century (see Figure 3). The patterns for the rural population in 1819 and 1867 were very similar, with the highest fertility in the group of 30-34 years (presumably an outcome of the late age at marriage). The only difference between the two census years concerns the age-group 20-24 years, where the 1819 census data yields much higher fertility than for 1867.

The pattern of age-specific fertility in Rostock in the years preceding 1819 was quite similar to the rural pattern, but lower in all age groups. The censuses of 1867 and 1900 had much lower maxima of fertility, and in 1900 the highest fertility was already in the age group of 25-29 years, caused by the decreasing age at marriage. The decrease in fertility in older age groups was an outcome of the demographic transition which led to permanently lower fertility.

Figure 3 *Calculated age-specific general fertility, Rostock and rural Mecklenburg-Schwerin, 1814-1818, 1862-1866 and 1895-1899*



Source: Authors' calculations using OCM of censuses 1819, 1867, and 1900 (see [data references](#)).

Note: Title refers to the analysed years and the legend to the year of census.

In the next step we distinguish between marital and non-marital fertility. Mecklenburg-Schwerin was known to have higher than average non-marital fertility (see above), but unfortunately, we were not able to calculate non-marital fertility rates. In the age groups of 25-29 and 30-34 years only 1.5 to 5.5 percent of unmarried women in Rostock were registered in the census years of 1819, 1867, and 1900 with at least one child, while the proportion of married women, whose husbands were registered in the census, was higher than 70 and 80 percent respectively. While Rostock had the lowest proportion of unmarried women with registered children in 1819, the proportion of fostered children in the age group 0-5 years was the highest, at 6.9 percent. Therefore, we can assume that many children born out of wedlock were registered as foster children in the census. The parents were not mentioned in connection with these foster children and thus we cannot assign them to their mothers, neither married nor unmarried.

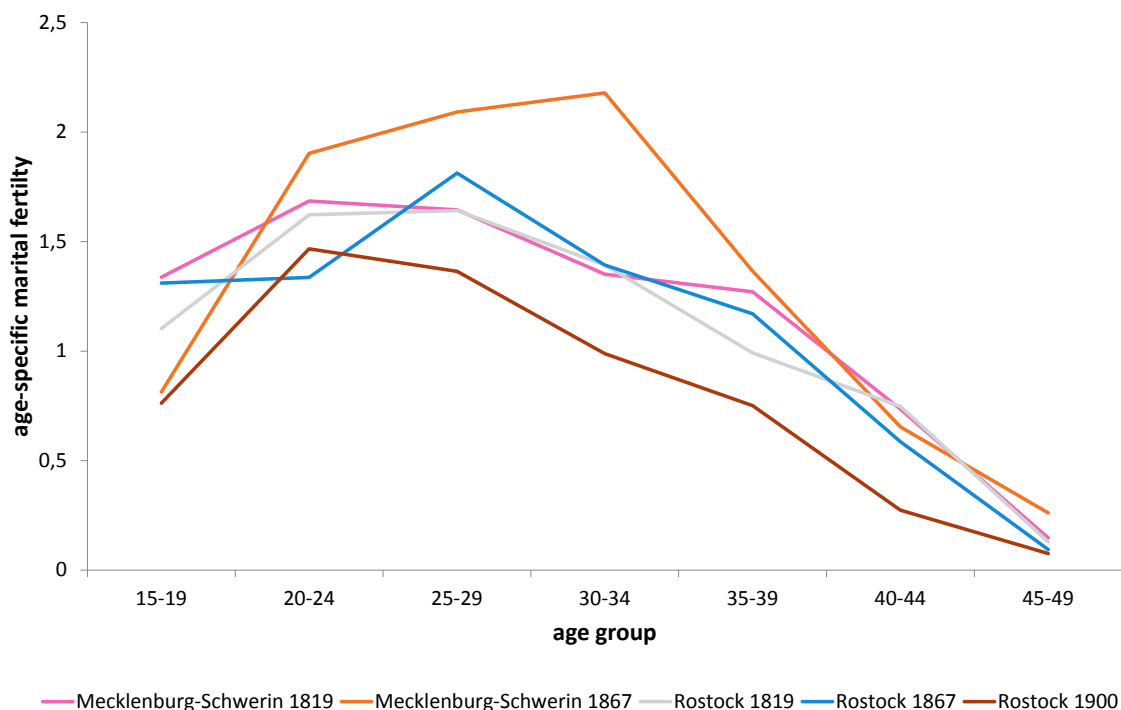
This means we have to concentrate on marital fertility, and the reduction of marital fertility was seen as the major component of the fertility transition. Changes in the age of marriage and the proportion of married people have a major impact on general fertility, and we seek to exclude this influence from our analysis. Therefore, in the next analysis we concentrate only on married women whose husbands were present at the time of the census (to reduce the influence of absence of the husband on fertility). Unfortunately, we have no information about the date of marriage respective to the duration of the present marital status. In analysing married women over a longer period of time, we would miss all women who gave birth as married women, but who were no longer married at the time of the census. We would also analyse women who were newly married but who had no children yet. We shall therefore concentrate only on the year preceding the census and avoid these two biases. Nevertheless,

we do introduce two other biases: random variation in this single year and assumed under-registration of children at an age of 1 year in the census of 1819.

In the age-specific marital fertility rates of Rostock and rural Mecklenburg-Schwerin we see three different patterns; similar to rural Mecklenburg-Schwerin in 1818 and Rostock in 1818 and 1866 (see Figure 4). Marital fertility in Rostock in 1899 was constantly lower in all age groups than in the two previous censuses for this city. Marital fertility in rural Mecklenburg in 1866 was the highest for the central age groups, especially pronounced in the age group 30-34 years. If we accept the notion of an under-registration of very young children, also suggested by Figure 2, we can discover a steady decline in marital fertility for Rostock for these three census years. Comparing these age-specific marital fertility rates with other European data, we see that the data for the year 1866 differ from the others because of increases in fertility for the age-group 25-29 years and partly even for the age-group 30-34 years (Dribe et al. 2017; Breschi & Serio 2003). The difference between rural Mecklenburg-Schwerin and Rostock in 1818 was quite small, so that the generally lower marital fertility for cities compared to the surrounding rural areas (Knodel 1974; Sharlin 1986) can be confirmed only to a small degree.

Marital fertility amounts to 8.2 and 9.3 children in rural Mecklenburg-Schwerin in 1818 and 1866 and 7.6, 7.7, and 5.7 children in Rostock in 1818, 1866, and 1899. These rural figures are similar to those calculated for Scania and Saguenay in the pre-transitional period. The earlier figures for Rostock are the same as for Alghero in the pre-transitional period, while the figure for 1899 is lower than that of Stockholm in the early transitional period (Dribe et al. 2017). According to these comparative analyses, the data for rural Mecklenburg-Schwerin and Rostock fits quite well into a wider European context. In contrast, the comparison with Bremen, also in northern Germany, in the first half of the 19th century shows much lower figures for the urban and the rural populations in Bremen, although the measures used are not completely comparable (Marschalck 1994). The increase in marital fertility in rural Mecklenburg-Schwerin between 1818 and 1866 is attributed to a large degree to the under-registration of children in 1818, hence we do not suggest any real increase in marital fertility during these five decades. On the other hand, there is no sign of an onset of fertility decline during this period for rural Mecklenburg-Schwerin, while we can find declining marital fertility in Rostock during this time period (taking into account under-enumeration in 1818 in Rostock). Gehrman's suggestion of a possible fertility decline in mid-19th century (Gehrman 2013) can be verified only for the urban population.

Figure 4 *Calculated age-specific marital fertility, Rostock and rural Mecklenburg-Schwerin, 1818, 1866 and 1899*



Source: Authors' calculations using OCM of censuses 1819, 1867, and 1900 (see [data references](#)).

Note: Title refers to the years analysed and the legend to the year of census.

This age-specific marital fertility is much higher than those noted above. The reason for this is the low proportion of married women at that time. In the age group 35-39 years, only two thirds of women in Rostock were married; only in 1900 was the proportion slightly higher. In contrast rural women in this age group were married much more often: 90 percent (1819) and 80 percent (1867). Decreasing ages at marriage in the last decades of the 19th century can be seen in the proportions of married women in Rostock in the age group 25-29 years: in 1819 and 1867 fewer than 40 percent were married, while in 1900 almost 60 percent were already married. This increase of married women partially compensated for the decrease in marital fertility. In the rural population we can see the increasing age at marriage until the abolition of marriage restrictions: In 1819 almost two thirds of women were married in the age group 25-29 years, whereas in 1867 only 40 percent of them were. Constant marital fertility would have led to a decrease in general fertility during this time. If general fertility had stayed the same, marital fertility would have increased (which we can see in Figure 4).

9.2 DIFFERENCES BY OCCUPATIONAL GROUPS

In a further step we examine whether the nine economic sectors used for this analysis (professional-technical, administrative-managerial, clerical, sales, services, agriculture, handicraft-production, unspecified worker, missing information) had different fertility patterns in Rostock and rural Mecklenburg-Schwerin. We compare the overall and marital fertility based on children aged one to five years, because some economic sectors are simply not large enough for an analysis based on one year. The analysis uses the economic sector of the women, and in case of missing information the economic sector of the household head. Furthermore, it is restricted to women present at the time of the census. We shall use the same life expectancy at birth for all economic sectors, because no separate life tables for these have been published yet. The life expectancies available refer to social strata which are not completely comparable to these nine economic groups and the differences between them are only partly significant (Scholz & Gruber 2011a).

The categories of clerical and sales people and unspecified (industrial) workers are missing for the rural population (they do not contain enough cases for analysis¹³). All the other groups had rather similar fertility of 5 to 6 children in the years 1814-1818 in rural Mecklenburg-Schwerin. The major exception was the service sector, with only one child on average. This sector was characterised by a majority of young unmarried women working as domestic servants. When they grew older and married, they generally belonged to a different economic sector. Therefore, this sector had the lowest fertility of all economic sectors.¹⁴ The different age structure of this economic group cannot be the reason for this low fertility because the figures are based on age-specific fertility rates.

Fertility in rural Mecklenburg-Schwerin in 1862-1866 was lower for all economic sectors than in 1814-1818, and the variation between the sectors increased, spanning from four to almost six children on average. Interestingly the agricultural sector did not have the highest fertility in rural Mecklenburg-Schwerin (see Figure 5). The production/handicraft sector and part of the white-collar sector had higher fertility. The urban fertility of 1814-1818 showed more variation than rural fertility at the same time. The highest fertility was computed for people engaged in sales and agriculture, with about 5.5 children, while people in the clerical sector had only three children. The group of people without any occupational information had about 1.5 children, and the service sector about one child. Rural fertility in 1862-1866 was generally lower than what was recorded in the earlier census, and the data of the 1900 census reported generally the lowest fertility. Urban fertility decline was most pronounced for the professional-technical and the sales sector, while workers in handicraft and industry showed almost no fertility decline. Therefore, they had clearly the highest fertility around 1900. The sector of unknown occupations was quite similar to the other rural sectors (except the service sector), while it was much closer to the service sector in Rostock. Obviously, there were different people in this group in rural and urban environments. In Rostock the majority were never married and many of them were widowed, whereas in rural Mecklenburg-Schwerin in 1819 the overwhelming majority of them were married and in 1867 almost half of them were married and most obviously doing some agricultural work. The unmarried people were often adult children without any occupation stated, while their parents were either pensioners, widows, or had also no occupation stated.

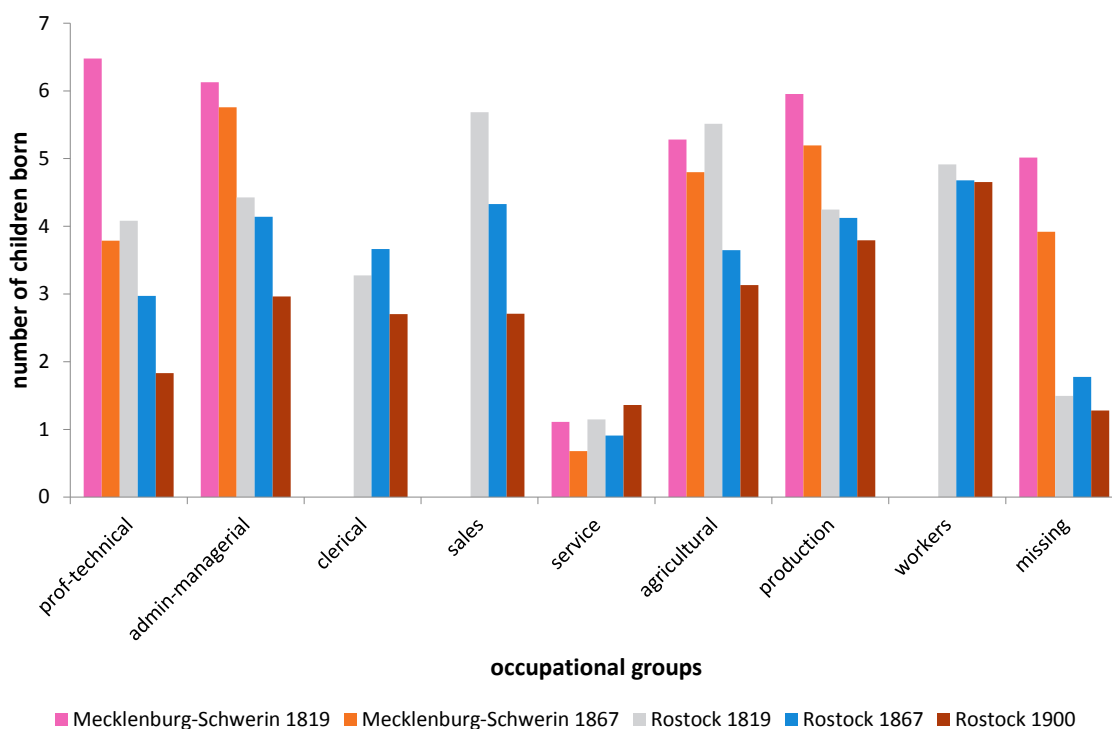
13 We do not calculate fertility for groups with fewer than 50 people. This refers to all figures below.

14 Only a few children were registered as being the offspring of domestic servants in these censuses. Some of the fostered children might have been illegitimate children of servants, but the mothers of the fostered children are not indicated. The actual fertility of the service sector is probably higher than calculated, but we do not know the amount.

Marital fertility in 1814-1818 (both rural and urban) and in 1862-1866 in rural Mecklenburg-Schwerin ranged from 6 to 7 children on average (see Figure 6). Urban marital fertility in 1862-1866 was around 5 to 7 children, and in 1895-1899 the range was 3.5 to five children. In the urban population a decline in marital fertility can be observed (even among craftsmen and industrial workers), while in the rural population only in the professional-technical group can a major decline be seen. Marital fertility was much more similar in each census year compared to general fertility. There were no real outliers (except perhaps the high value for the professional-technical group in rural 1814-1818). Age-specific marital fertility rates of several occupational groups in the places of origin of domestic servants in Ghent during the time period 1830-1930 differed to a higher degree than in rural Mecklenburg-Schwerin (Matthys 2011).

Urban and rural marital fertility were very similar for the agricultural and handicraft group (except the last census year for Rostock). The fertility decline in rural Mecklenburg-Schwerin up to 1867 was obviously driven by the rising age at marriage, therefore by the lower proportion of married women, while marital fertility stayed the same or even increased slightly in some sectors. Once again, the agricultural sector was not outstanding in marital fertility but was similar to several other sectors.

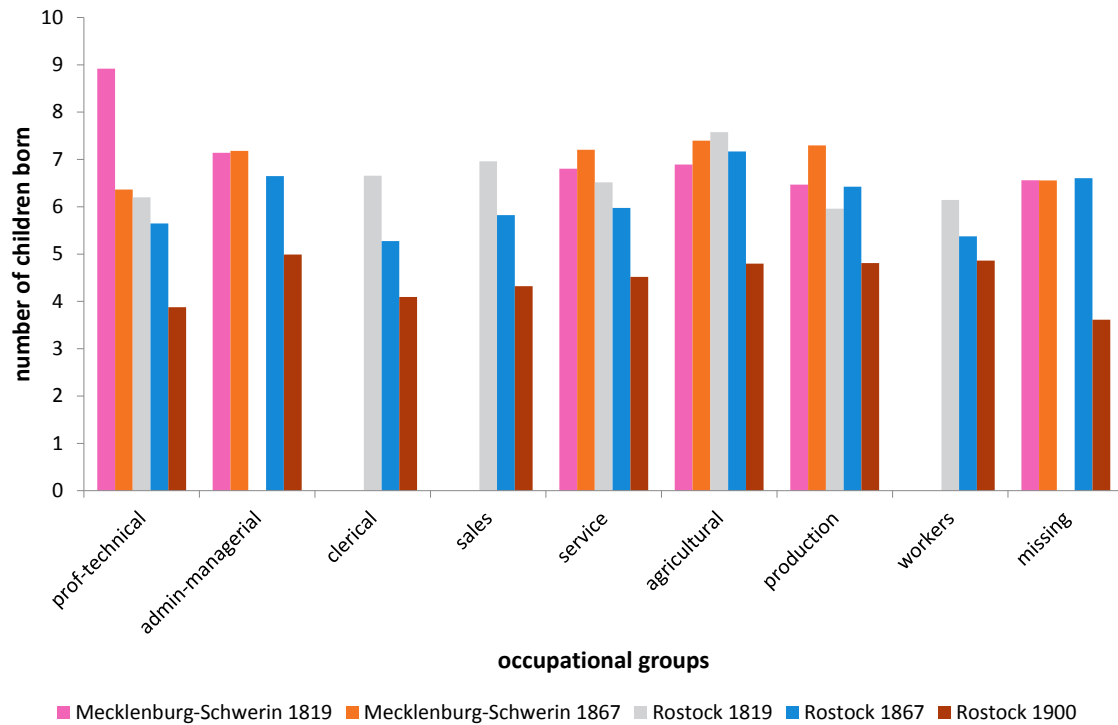
Figure 5 *Calculated general fertility of present women by occupational groups in Rostock and rural Mecklenburg-Schwerin, 1814-1818, 1862-1866 and 1895-1899*



Source: Authors' calculations using OCM of censuses 1819, 1867, and 1900 (see [data references](#)).

Note: Title refers to the years analysed and the legend to the year of census.

Figure 6 *Calculated marital fertility of present women by occupational groups in Rostock and rural Mecklenburg-Schwerin, 1814-1818, 1862-1866 and 1895-1899*

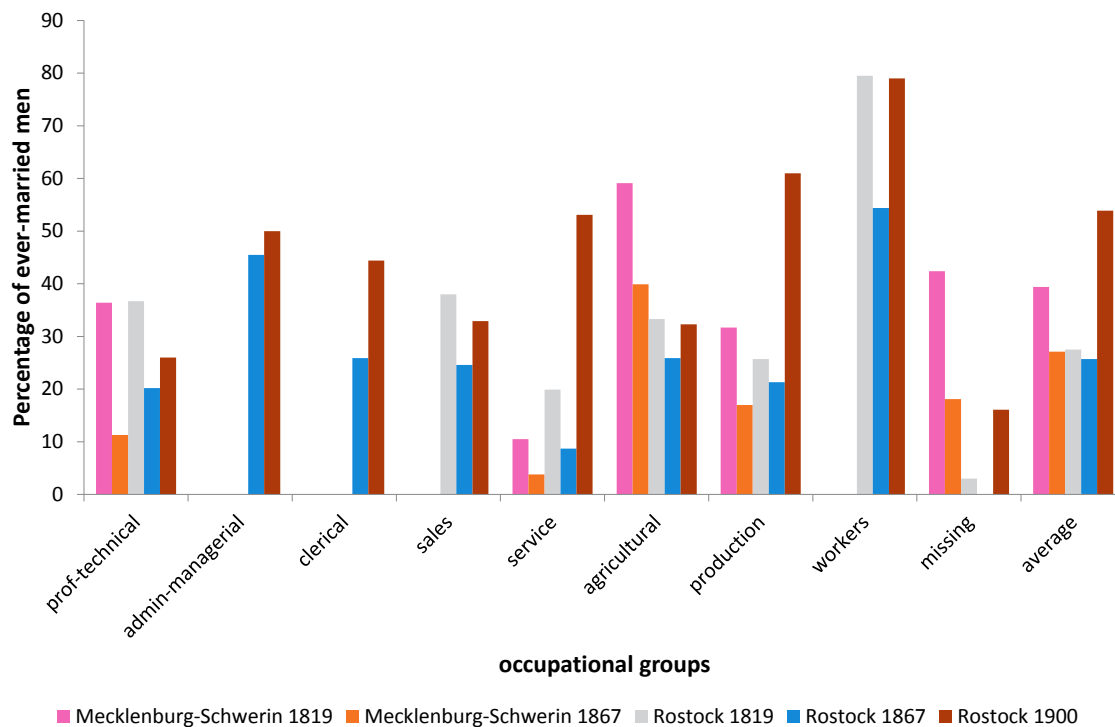


Source: Authors' calculations using OCM of censuses 1819, 1867, and 1900 (see [data references](#)).

Note: Title refers to the years analysed and the legend to the year of census.

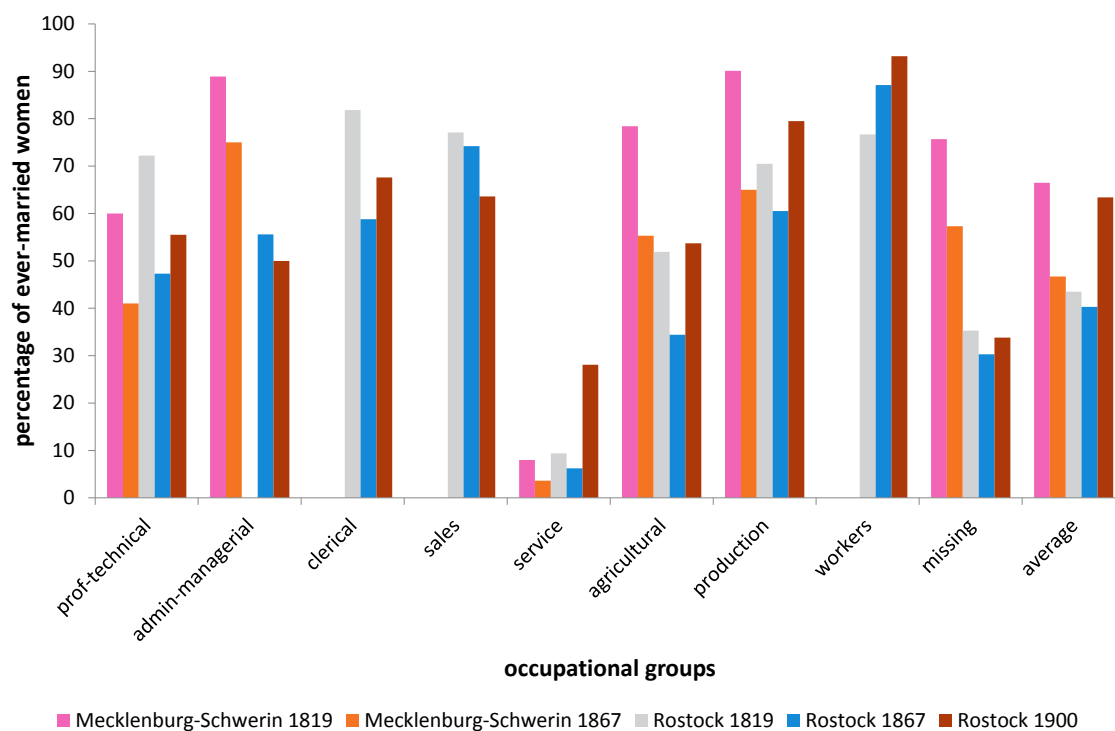
We have seen that a major factor of general fertility was the proportion of married people. Hence, we now analyse the proportions of ever-married (married, widowed, and divorced) people in the age group 25-29 years for these occupational groups. We shall use only the population present (except 1819). We see clearly a decreasing proportion from 1819 to 1867 and an increase near 1900 for both men and women (see Figure 7 for men and Figure 8 for women). This was the outcome of marriage restrictions and their final abolition in 1867. The most exceptional group was clearly the service sector, which had by far lowest proportions of ever-married men and women. Only in 1900 did men in the service sector have average proportions of ever-married persons in this age group. The highest proportions were registered for unspecified/industrial workers, even in 1867 more than half of them were already married, which was twice the average share. This comparison is not as striking for women. In rural Mecklenburg-Schwerin men in agriculture had the highest proportion of already married people in this age group, while this was not true for women.

Figure 7 *Proportions of ever-married men 25-29 years in Rostock and rural Mecklenburg-Schwerin, 1819, 1867 and 1900*



Source: Authors' calculations using censuses 1819, 1867 and 1900 (see [data references](#)).

Figure 8 *Proportions of ever-married women 25-29 years in Rostock and rural Mecklenburg-Schwerin, 1819, 1867 and 1900*



Source: Authors' calculations using censuses 1819, 1867 and 1900 (see [data references](#)).

9.3 DIFFERENCES BY PLACE OF BIRTH

Our final analysis concerns the possible influence of migration on fertility in the city of Rostock. The censuses of 1819 and 1900 provide information about the place of birth, and this information was used to classify all places of birth into several categories. In 1819 the majority of the population was born in Rostock, while in 1900 the native population had already become a minority. People born in Mecklenburg-Schwerin constituted about a quarter of Rostock's population in 1819, while in 1900 they already totalled 40 percent – almost the same share as those born in Rostock. A considerable number of these migrants from Mecklenburg-Schwerin had been born in other cities of this province, a similar share came from other German provinces. Their places of birth were primarily in neighbouring Mecklenburg-Strelitz, Pomerania, and Brandenburg. Less than 1 percent of the population was born outside of Germany.

Table 4 *Place of birth by sex, Rostock in 1819 and 1900*

| | 1819 | | 1900 | |
|----------------------------|--------|--------|--------|--------|
| | Male | Female | Male | Female |
| Rostock | 57.9 % | 63.5 % | 40.8 % | 43.7 % |
| Mecklenburg-Schwerin rural | 15.6 % | 14.1 % | 26.4 % | 25.5 % |
| Mecklenburg-Schwerin urban | 10.3 % | 13.8 % | 14.1 % | 17.4 % |
| Other Germany | 13.6 % | 7.1 % | 16.9 % | 12.2 % |
| Outside Germany | 1.2 % | 0.6 % | 1.0 % | 0.7 % |
| Unknown | 1.4 % | 0.9 % | 0.8 % | 0.5 % |
| N | 7,404 | 8,053 | 26,345 | 29,360 |

Source: Authors' calculations using censuses 1819 and 1900 (see [data references](#)).

The proportion of married people in Rostock who were also born there was much lower, because among the people born in the city were a considerable number of children born to parents who had migrated there. In the following analysis we concentrate only on married couples in which both partners were present at the time of the census, thereby reducing the possible effect of spousal absence on fertility. In addition we do this only for household heads and their spouses, because they comprised 99 percent of all married couples. Such married people born in Rostock constituted a minority of all married people: in 1819 only among women they were half of the married population, while in 1900 they were a fifth to a fourth of all married people. In 1900 rural migrants from Mecklenburg-Schwerin constituted a relative majority among married household heads and their spouses. Grouping these married couples into couples of different origins for comparative analysis was impossible due to the high number of possible combinations. The largest groups in 1819 were couples of husbands and wives born in Rostock (24.0 percent) and in 1900 couples of husbands and wives born in rural Mecklenburg-Schwerin (22.5 percent). People of the same origin had higher probabilities of marrying each other, but all combinations were possible. In the following analysis, therefore, we consider only the wife's place of birth as the characteristic for placing them into four groups. This is in line with Vandezande and Moreels (2012), who found that the migratory status of the wife was more important than that of the husband for fertility outcomes in Antwerp in the 19th century. Schumacher (2013), in contrast, concluded that it was the man's demographic socialization which was more important for immigrants to 19th century Geneva.

Table 5 *Place of birth of married men and women, both partners present, Rostock in 1819 and 1900*

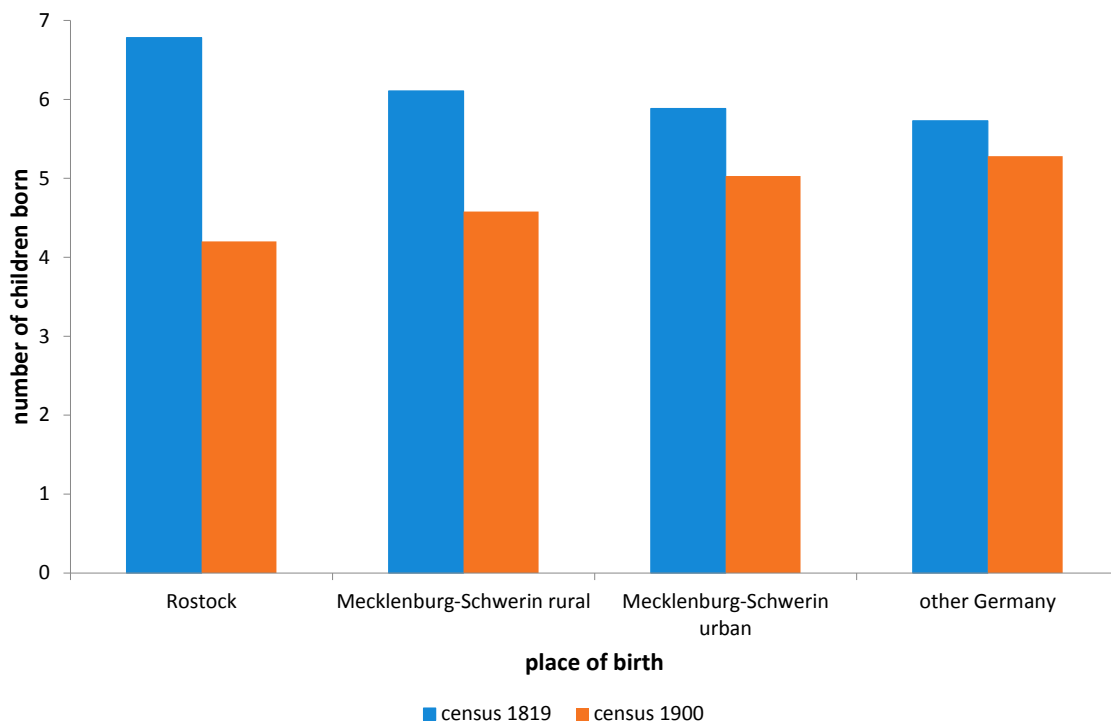
| | 1819 | | 1900 | |
|----------------------------|--------|--------|--------|--------|
| | Male | Female | Male | Female |
| Rostock | 40.4 % | 51.2 % | 21.3 % | 24.9 % |
| Mecklenburg-Schwerin rural | 22.4 % | 18.6 % | 39.6 % | 37.3 % |
| Mecklenburg-Schwerin urban | 12.6 % | 17.6 % | 17.8 % | 22.1 % |
| Other Germany | 21.4 % | 10.6 % | 19.5 % | 14.8 % |
| Outside Germany | 1.5 % | 0.9 % | 0.8 % | 0.7 % |
| Unknown | 1.7 % | 1.1 % | 1.0 % | 0.2 % |
| N | 2,376 | 2,376 | 9,677 | 9,677 |

Source: Authors' calculations using censuses 1819 and 1900 (see [data references](#)).

We analyse marital fertility based on children aged 1 to 5 years to avoid the random variation of a single year. The mean numbers of children born to these four groups were 6 to 7 in 1814-1818 and 4 to 5 in 1895-1899 (see Figure 9). Differences between these four groups were not very large: in 1819 only women born in Rostock stand out with higher marital fertility than women born in other places. The differences between these three groups of immigrant women to Rostock were negligible. In 1895-1899 the situation reversed, with women born in Rostock having the lowest number of children. The differences between these four groups were not very large. It is interesting that the women who migrated the longest distances had the highest fertility in 1900. Likewise, an analysis of the marital fertility in the city of Bremen in the first half of the 19th century showed almost no difference between people born in the city and immigrants to the city ([Marschalck 1994](#)). The same result was found for the Belgian city of Charleroi during the second half of the 19th century ([Eggerickx 2001](#)), while in the Belgian city of Tilleur, immigrants from rural areas had higher fertility ([Oris 1996](#)). Studies of Antwerp ([Schumacher, Mattijs & Moreels 2013](#)) and Stockholm ([Puschmann, Grönberg, Schumacher & Matthijs 2014](#)) revealed differences between short-distance and long-distance immigrants.

Marital fertility in rural Mecklenburg-Schwerin and the city of Rostock in 1818 was almost the same (see Figure 4), thus the socialisation and adaptation hypotheses cannot be verified, because of a lack of fertility difference between the place of birth and the place of residence. We do not have yet enough data on the fertility levels of the places of origin for the other two groups of immigrant women to assess the possible effect of migration on their fertility. The most obvious answer to the question of the impact of migration from rural Mecklenburg-Schwerin to Rostock on marital fertility is that there was none: Marital fertility was the same in rural and urban environments and no distinction could be found.

Figure 9 *Calculated marital fertility of present women by place of birth in Rostock, 1814-1818 and 1895-1899*



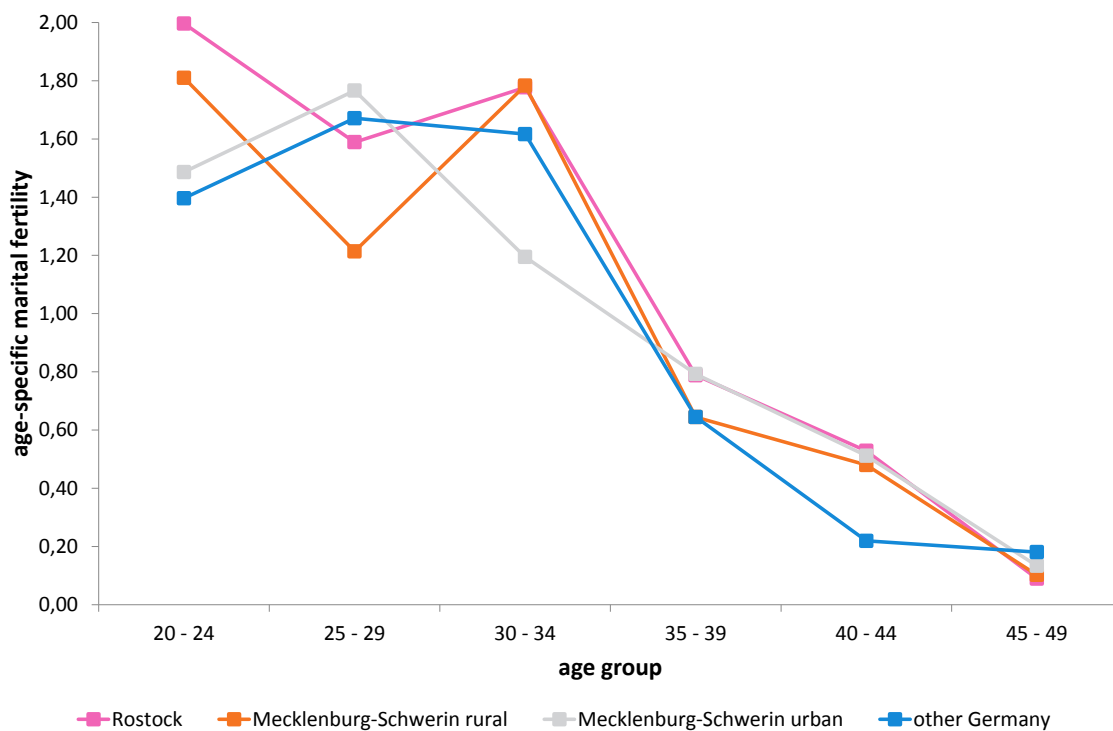
Source: Authors' calculations using OCM of censuses 1819 and 1900 (see [data references](#)).

Age-specific marital fertility rates for these four groups based on these two censuses show some differences in the first census (see Figure 10), but more or less the same pattern in the second one (see Figure 11). The youngest age group (15-19 years) was omitted because only few women were married so young and these women had relatively high fertility, so the mean numbers of children born would have been artificially inflated and the pattern of age-specific marital fertility would show enormous random variation. The first census reveals the most variation for the youngest age group used in the analysis, with the highest fertility for women born in Rostock. Interestingly there was an increase in marital fertility in the age group 30-34 for women born in Rostock and rural Mecklenburg-Schwerin. Such an increase was found for the upper class in Kiebingen in the first half of the 19th century, but generally such increases were rare ([Schlumbohm 1994b](#)). In the age group 25-29 years, women born in rural Mecklenburg-Schwerin were an outlier with the lowest fertility. In the age group 30-34 years this was the case for women born in urban Mecklenburg-Schwerin; in the age group 40-44 years women born in other parts of Germany had the lowest marital fertility. Each of the other three groups of women had one age group in which marital fertility differed markedly from that of women born in Rostock.

Even the age group 20-24 years seems to have been a selective group with at least partly extraordinarily high fertility. If we omit this age group from the analysis as well, the difference between the three groups of immigrant women disappears and the difference to native women of Rostock diminishes. The major drop in fertility in the age group 25-29 years for women born in rural Mecklenburg-Schwerin can either be caused by the extremely high fertility of the younger age group or it might be a sign of the disruption hypothesis with lower fertility at this age and fertility going back to "normal" levels afterwards.

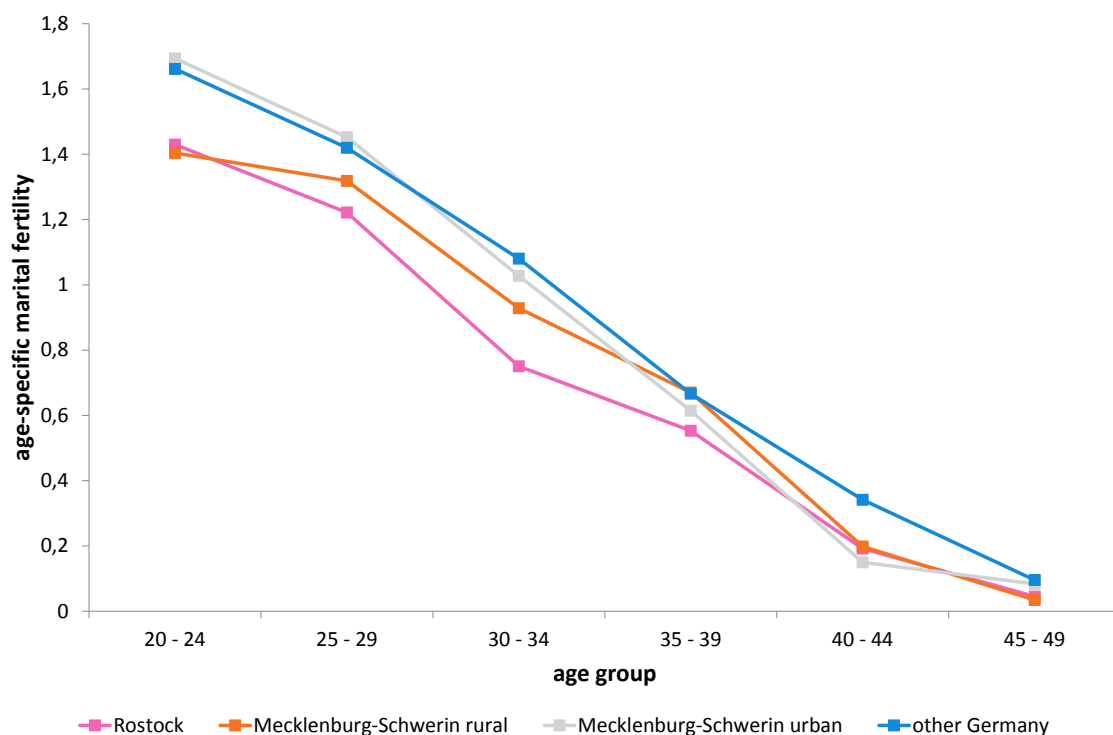
The second census does not show any increase of marital fertility over the life-course of women, only a steady decline. The fertility of women born in Rostock was the lowest in all age groups, while fertility of women born in other parts of Germany was the highest in almost all age groups.

Figure 10 *Calculated age-specific marital fertility of present women by place of birth, Rostock, 1814-1818*



Source: Authors' calculations using OCM of census 1819 (see [data references](#)).

Figure 11 *Calculated age-specific marital fertility by migration status, Rostock, 1895-1899*



Source: Authors' calculations using OCM of census 1900 (see [data references](#)).

The proportion of married people had a major impact on fertility. Therefore, we examine the proportion of married women in the age group 25-29 years. In the census of 1819 almost no difference could be found (only in the smaller group of women born in other parts of Germany who were already married to a higher degree). Our group of migrants is made up of migrants who settled permanently in Rostock as well as, temporary migrants. The proportion of married women will be lowered by these temporary migrants according to Sharlin's model. We could not find such an effect and therefore Sharlin's (1978) model of different marriage regimes for permanent residents and temporary migrants in 17th and 18th century Europe cannot be confirmed for Rostock in the beginning of the 19th century. In 1900 about half of the women born in Rostock were married, while almost two thirds of women who came to Rostock were already married, which is in clear contrast to Antwerp, Rotterdam and Stockholm in the second half of the 19th century and the beginning of the 20th century (Puschmann, Grönberg, Schumacher & Matthijs 2014; Puschmann, Van den Driessche, Grönberg, Van de Putte & Matthijs 2015; Puschmann, Van den Driessche, Mattijs & Van de Putte 2016). We conclude that around 1900 moving to Rostock was in close temporal connection to marriage. Either moving to Rostock made marriage more easily available or these women moved to Rostock because they wanted to get married.

Access to marriage was depended on the availability of a possible spouse besides the ability to establish one's own household. In Rostock in all the 5-year-age groups between 20 and 34 years a female majority existed in all three censuses with only one exception. In 1819 and 1867 sex ratios were below 90 with the only exception of the age group 20-24 years in 1867, while in 1900 sex ratios were about 95. The sex ratio of almost 150 in 1867 was caused by the presence of almost 900 soldiers who were only temporarily there. In the other two census years the number of soldiers stationed there was much smaller. Within Rostock the lowest sex ratio could be found among the people born in Rostock, similarly low was the sex ratio of urban-urban migrants, while the rural-urban migrants had an almost balanced sex ratio. The long-distance migrants (from other parts of Germany or from abroad) had sex ratios of 150 or even more. In rural Mecklenburg-Schwerin sex ratios were 85 in 1819 and in 1867 in dealing only with the population present at census time. These sex ratios indicate a much worse situation for women to find a marriage partner as compared to men. This is reflected in the proportion of permanent celibate persons (in the age group 45-54 years) in Rostock: for men it declined from ten to seven percent between 1819 and 1900, while the proportion declined from 17 to 14 percent for women. The proportion was still exceeding 20 percent for women born in Rostock in the 1900 census, while it was only 8 percent for women born in rural Mecklenburg-Schwerin. In rural Mecklenburg-Schwerin we do find almost the same proportions of still unmarried man and women around an age of 50 years (5 percent in 1819 and 8 percent in 1867) despite such low sex ratios. The lowest proportions had rural men who migrated to Rostock (only 3 percent in 1900). The influence of migration on the chances to marry can be clearly seen for Rostock, while it is not so clear for rural Mecklenburg-Schwerin.

Another possible influence on the fertility of migrant women could be a different occupational structure compared to that of women born in Rostock. Women who moved from rural Mecklenburg-Schwerin to Rostock had much higher proportions in the occupational group services (in 1819 only a third and in 1900 only a fourth of all domestic servants were born in Rostock) and unspecified workers. Women originating from urban Mecklenburg-Schwerin also had higher proportions in the service sector. Women from other parts of Germany were more commonly found in the white-collar sectors and in the trade sector (longer distance migration was obviously partly connected with more highly qualified jobs), while women born in Rostock had higher proportions in production (handicraft) and trade. If we include only these women who have been analysed for their marital fertility in this analysis, these occupational differences remain; with the exception that the service sector becomes equally distributed among these groups of women. In addition, women from urban Mecklenburg-Schwerin were more prominent in the handicraft sector. The effect on marital fertility was quite negligible because the marital fertility levels of these occupational groups were very similar.

10 CONCLUSIONS

The microdata of the censuses of 1819, 1867, and 1900 available for Mecklenburg-Schwerin provide researchers with an excellent opportunity to examine fertility in the city of Rostock and the rural

surroundings. We think that there are several important conclusions which we can draw based on our analyses of these data:

There was a major difference between overall fertility and marital fertility. Overall fertility was higher for rural areas than for urban ones, while marital fertility was more or less the same. However, overall fertility shows a decline during the 19th century which can be seen in the age-specific fertility rates for the urban population, while the changes for the rural population were much smaller. This decline is apparent for almost all occupational groups within the rural and urban population, especially for the sales sector. There was almost no decline among craftsmen (production workers) and industrial workers, which confirms previous research about workers beginning the fertility decline later than most other occupational groups (Bengtsson & Dribe 2014; Breschi, Esposito, Mazzoni & Pozzi 2014; Maloney, Hanson & Smith 2014; Dribe et al. 2017).

Age-specific marital fertility shows no decline for the urban population between 1819 and 1867, while an increase for the rural population was observed for the same time period. Marital fertility was almost the same for all occupational groups, even for the agricultural sector. This is in line with recent research pointing to the substantial variety in historical patterns of fertility by socio-economic status (Dribe et al. 2017). The urban population experienced a marital fertility decline during the last decades of the 19th century, which confirms prior research on urban marital fertility starting to decline earlier than rural marital fertility (Galloway, Lee & Hammel 1998). Migration had no visible effect on marital fertility, which is both interesting and unexpected.

The age at marriage and the proportions of married women had a major impact on overall fertility. Ages at marriage rose until the abolition of marriage restrictions in 1867 and declined afterwards, confirming the results of the Princeton European Fertility Project (Coale & Watkins 1986). The service sector group was exceptional, as it had by far the lowest proportions of married people, while the group of industrial workers had the highest proportions. The age of industrial workers at first marriage declined to ages which were below the threshold of the "Western European Marriage Pattern" (Szołtysek, Gruber, Zuber-Goldstein & Scholz 2011). Generally, rural people married earlier than urban people and fewer of them remained permanently unmarried than urban people, accounting for the higher overall fertility in the countryside.

The most important factor for the level of overall fertility was the proportion of married people, which was an outcome of the possibilities offered by different economic sectors and environments. We can interpret this as a still functioning Malthusian setting, although the restricting factor was the political intention to restrict access to marriage. It was not the shortage of food, as this region was exporting food. Marital fertility was most affected by change over time (for the urban population), not so much by the urban-rural difference, occupational categories, or migration experiences.

Verification or falsification of existing knowledge or theories about fertility and fertility decline in Mecklenburg-Schwerin is mixed. Higher general fertility for the rural population can be verified. Marital fertility in 1867 was clearly higher for the rural population than for the urban population, which fits with Knodel's results (1974) and not with the Prussian results of 1875 (Galloway, Lee & Hammel 1998). Marital fertility decline among the urban white collar workers was generally more pronounced than among craftsmen and industrial workers. Unfortunately, we do not have any microdata available yet for research about the rural population in 1900, so that we cannot analyse the possible fertility decline among the rural population after 1867. Consequently, the outstanding marital fertility of the agricultural sector cannot be verified.

Future research could attempt to consider the disruption hypothesis by analysing migrants to Rostock according to the time they started to reside in Rostock and their age at migration. Such information is available for 1819, but not for 1900. This would pinpoint whether fertility was lower immediately after coming to Rostock than for Rostock-born people, as postulated by the disruption hypothesis, or higher than Rostock-born people as an effect of the interrelation hypothesis. One would also have to distinguish between immigrants who arrived in the city before adulthood and immigrants who came as single adults or as married couples (see e.g. Schumacher 2013; Vandezande & Moreels 2012). Another possibility would be to use fertility measures at the level of individual women (e.g. number of children under the age of 5 years) and to engage in more advanced analyses using the characteristics of the respective women as independent variables.

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