The History of the Family
Publication details, including instructions for authors and subscription information:
http://www.tandfonline.com/loi/rhof20

A two-tiered demographic system: 'insiders' and 'outsiders' in three Swabian communities, 1558-1914

Timothy W. Guinnane[a] & Sheilagh Ogilvie[b]

[a] Department of Economics, Yale University, PO Box 208269, New Haven 06510, USA

[b] Faculty of Economics, University of Cambridge, Cambridge CB3 9DD, UK

Published online: 05 Feb 2014.

To cite this article: Timothy W. Guinnane & Sheilagh Ogilvie (2014) A two-tiered demographic system: 'insiders' and 'outsiders' in three Swabian communities, 1558-1914, The History of the Family, 19:1, 77-119, DOI: 10.1080/1081602X.2013.870491

To link to this article: http://dx.doi.org/10.1080/1081602X.2013.870491

The History of the Family, 2014
Vol. 19, No. 1, 77–119, http://dx.doi.org/10.1080/1081602X.2013.870491

A two-tiered demographic system: 'insiders' and 'outsiders' in three Swabian communities, 1558–1914

Timothy W. Guinnane[a]* and Sheilagh Ogilvie[b]

[a]*Department of Economics, Yale University, PO Box 208269, New Haven 06510, USA;*
[b]*Faculty of Economics, University of Cambridge, Cambridge CB3 9DD, UK*

(*Received 20 November 2013; accepted 26 November 2013*)

This paper presents first results from a project to reconstitute the demographic behavior of three villages in Württemberg (southern Germany) from the mid-sixteenth to the early twentieth century. Using high-quality registers of births, deaths, and marriages, and unusual ancillary sources, we improve on the family-reconstitution techniques pioneered by Louis Henry and applied to good effect by the Cambridge Group and other scholars. This paper focuses on simple, standard demographic measures, in order to provide a broad overview and support comparisons with other places. An extreme system of demographic regulation operated in these Württemberg communities until around 1870. This regulation created a two-tiered demographic system. A group of 'insiders' were able to marry, and experienced both high marital fertility and high infant and child mortality. A second group, consisting of 'outsiders', were prevented from marrying. Many, especially the males, left the community; those who stayed contributed to growing illegitimacy and associated levels of infant and child mortality that were even higher than for the offspring of 'insiders'.

Keywords: western European marriage pattern; politische Ehekonsens; Wuerttemberg

Recent research on long-run economic development stresses the role of population behavior in fostering the accumulation of physical and human capital.[1] This interest highlights the need for careful empirical analysis of demographic behavior in the past. Much current research on economic growth relies too heavily either on stylized facts that mask interesting and informative variation, or research on a relatively narrow part of Europe, or both. This paper reports first results from a project that delves into the specifics of demographic behavior in three south German villages between 1558 and 1914. It spans the onset of the demographic transition from high to low fertility, and the industrial revolution that transformed economic techniques and practices. This paper does not address the wider economic growth literature, but the type of research it reports is crucial to understanding those transformations.

Compared to England and France, the two European societies whose historical demography is best known, our communities were poor and economically stagnant. They were also characterized by local constraints on decision-making, including controls that were deliberately intended to shape demographic decisions by the poorer social strata. Our results suggest that these economic and institutional constraints divided the population into two groups, which we call 'insiders' and 'outsiders.' Insiders were able to marry, and then experienced high rates of marital fertility and infant and child mortality. Just why fertility and mortality were so high awaits further research, but it clearly reflects

*Corresponding author. Email: timothy.guinnane@yale.edu

a low incidence of breastfeeding, which may in turn reflect the opportunity cost of time for 'insider' women.[2] Outsiders either left the community or remained but were not allowed to marry; their children, if any, were illegitimate and experienced even higher levels of mortality than the children of 'insiders'.

Demographic decisions in Württemberg, as in many other parts of Central Europe before the late nineteenth century, took place in the context of the *politische Ehekonsens*, the requirement that a couple obtain permission from the local authorities before they could marry (Knodel, 1967; Schomerus, 1976; Matz, 1980; Borscheid, 1982; Ehmer, 1991; Mantl, 1997, 1999; Ogilvie, 1995, 2003). The historiography has taken conflicting views of the *Ehekonsens*. Some scholars have argued that it was enforced to a considerable extent, leading to restrictions on marriage, unusually high levels of illegitimacy, and out-migration by many of those denied places as married persons entitled to head their own independent households in the local economy. Others have claimed that the *politische Ehekonsens* was merely formal, could not be enforced in practice, and therefore played no appreciable role in demographic decisions. Although the main aim of this paper is to introduce our wider project and to present the basic demographic characteristics of the communities under analysis, our sources do allow us to compare demographic behavior before and after the repeal of the marriage controls. In the places we study, the abolition of the *politische Ehekonsens* was immediately followed by dramatic increases in the number of marriages as well as sharp reductions in illegitimacy. These findings suggest that the *politische Ehekonsens* could not only act as a binding constraint on marriage decisions, but also exercise a wider impact on fertility, infant mortality, and the entire demographic system. The findings presented here establish the demographic benchmarks which will be essential for undertaking an extensive statistical analysis of the impact of the marriage controls using ancillary, household-level socioeconomic data in the next stage of our project.

This paper draws most of its evidence from two sources. The more important is the family reconstitution for each of the three communities. Family reconstitution starts with nominative registers of births, deaths, and marriages, and then links items of information within and between individuals in such a way as to enable computation of key demographic parameters. For example, by linking a person's birth entry to his death entry, we know how old he was when he died. Our family reconstitutions follow the technique pioneered by Louis Henry and applied by the Cambridge Group and others (see, for example, Wrigley et al. 1997). But we have unusual, additional sources – census-type listings, tax registers, property lists and inventories – that permit us to improve upon traditional family reconstitution methods in two respects. First, some of our ancillary information allows us to resolve otherwise ambiguous situations, for example, making clear the separate identities of two persons with identical names. Second, our supplementary information allows us to expand the 'reconstitutable' portion of the population because it gives us a sharper picture of who is or is not in a community at any given time. We also use the registers of births, deaths, and marriages in a more straightforward way, simply by compiling counts of events by year. This approach yields less information than family reconstitution, but allows us to analyze the entire population, not just the subset whose families can be reconstituted. It also makes comparisons possible, since there is a large literature based on such counts.[3]

Our second, quite unusual source consists of nearly annual counts of the resident population of each community based on church visitation reports. For consistency, when we are dealing with these counts of *inhabitants*, we use the term 'population totals'. When we refer to the total number of *events* reported in the registers, we call these 'counts'.

Information that relies on *linkage* of one of more specific events derives from the 'reconstitution'.

We try, where possible, to compare our results to other German demographic studies, although most are based on data sources other than family reconstitution. Knodel (1988)'s famous study of 14 German villages includes one Württemberg community, Öschelbronn, which lies about 40 km from two of our project communities (Wildberg and Ebhausen). Knodel's source are village-level genealogies (*Ortssippenbücher*) which differ slightly from family reconstitutions. Maisch (1992) also uses village genealogies in his 'histoire totale' of the Württemberg villages of Bondorf, Mötzingen, Nebringen and Tailfingen (all within a 15–40 km distance from our two project communities of Ebhausen and Wildberg), which reports some basic demographic measures. Medick (1996)'s micro-history presents results from a family reconstitution of the Württemberg village of Laichingen, about 20 km from our third project community, Auingen. For the nineteenth century, demographic findings based on family registers and inventories are presented by Schomerus (1976) and Schraut (1989) on Esslingen, Borscheid (1982) on Nürtingen, and Müller (2000) on Feuerbach, all centers of Württemberg's late and gradual factory industrialization. We also refer to several studies from outside Württemberg, although still within the zone of marriage restrictions. Kaschuba and Lipp (1982) present demographic findings based on nineteenth-century family registers for the Anterior Austrian village of Kiebingen, which later became part of Württemberg and was subject to strict marriage controls. Lee (1977a) presents results from family reconstitutions of the Bavarian estates of Massenhausen and Thalhausen, in which restrictions on marriage were even more severe than in Württemberg. Benz (1999) presents results from family reconstitutions of three Baden communities that also form part of Knodel's study and were subject to a slightly different variant of the political controls on marriage until the 1860s (Matz, 1980, pp. 148, 181, 231; Ehmer, 1991, pp. 53–55). Fertig (2000) analyzes the context for nineteenth-century emigration for the Baden village of Göbrichen based on a village genealogy linked to land registers. A final relevant comparison is Schlumbohm (1994), whose family reconstitution of the northwest German parish of Belm demonstrates the widely divergent demographic trajectory of a proto-industrial economy whose institutional constraints differed profoundly from those in Württemberg villages. While none of these studies is fully comparable to the present one, they provide a context for drawing both similarities and contrasts within the wider central European demographic system.

1. The Württemberg communities of Auingen, Ebhausen, and Wildberg

Our demographic data come from the communities of Wildberg and Ebhausen in the Württemberg Black Forest, and Auingen on the Swabian Jura. Figure 1 shows their location relative to the Württemberg capital city of Stuttgart. The Duchy (after 1806 Kingdom) of Württemberg was a middle-sized state of central Europe – a 'German territory of the second rank' (Vann, 1984, p. 36). It had about half a million inhabitants in 1600, sustained serious population losses in the Thirty Years War (1618–1648), but recovered again to 320,000 by 1700, 640,000 by 1797, 1.7 million by 1849, and just above 2 million in 1900 (Boelcke, 1987, pp. 93–96, 165, 215). Württemberg was repeatedly devastated by warfare, partly inflicted exogenously but also exacerbated by its institutional structure, which enabled its rulers to alternate between conspicuous consumption and destructive military ventures, as during the Thirty Years War, the War of the Grand Alliance (1688–97), the Seven Years War (1756–63), the French Revolutionary Wars (during which Württemberg fought on both sides), the Seven Weeks War (1866), and the

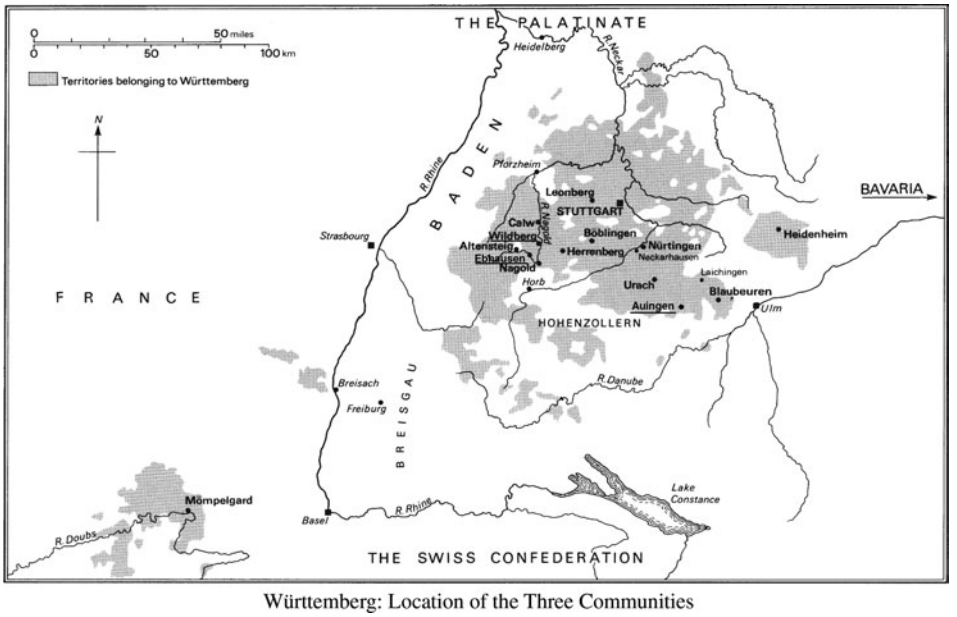

Figure 1. Locator map of Auingen, Ebhausen, and Wildberg. Note: Adapted from Ogilvie, S. C. (1997). State Corporatism and Proto-Industry. Cambridge: Cambridge University Press.

Franco-Prussian War (1870–71). A constant characteristic of Württemberg's rulers was their extravagance and consequent willingness to sell monopolies and other economic 'privileges' to powerful interest-groups in return for fiscal favours (Ogilvie, 1999; Vann, 1984; Wilson, 1995).

Figure 2 reports the populations of our three sample communities during the period under analysis.[4] For most of its history, Wildberg was the capital of one of Württemberg's 45–60 districts, administering itself and 10–12 villages, one of which was Ebhausen. Although Wildberg had the legal status of a town, it was small, with a population hovering between 1200 and 1600 throughout the period. Ebhausen, as a village, started out smaller

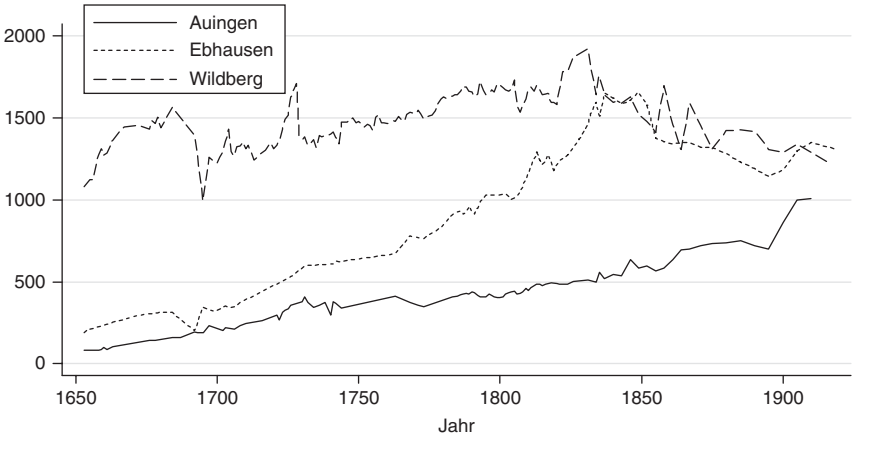

Figure 2. Populations of Auingen, Ebhausen, and Wildberg.

but grew faster, nearly equaling Wildberg in 1850, but then falling back to 1200 inhabitants by 1900. Auingen was one of the villages of the administrative district of Münsingen, about 80 km away from Wildberg in eastern Württemberg. From 1580 up to 1634, Auingen remained a small, primarily agricultural village with a nearly stable population. The Württemberg military catastrophe of 1634 brought serious devastation, and Auingen lay totally deserted in 1645–47. Post-war recovery was slow, and Auingen did not re-attain its pre-1618 population level until c. 1760. During the eighteenth century and the early nineteenth, Auingen more closely mirrored the slow population expansion of Wildberg than the accelerating growth shown by Ebhausen. But unlike either Wildberg or Ebhausen, Auingen maintained its population growth after c. 1850, accelerating after c. 1895 so that by 1916 it equaled Wildberg or Ebhausen in size.

Württemberg, like most of the German south, was economically undynamic between 1550 and 1914. Its agriculture was unproductive and continued to be carried out on small, fragmented holdings under the communal regulation of the three-field crop rotation system until the agrarian reforms of 1879. Württemberg industrialized late even by German standards, with factories first appearing in the 1830s but not becoming widespread until the later nineteenth century. But Württemberg did have a long history of rural crafts and export-oriented proto-industries, and in 1800 had one of the highest densities of industrial occupations per capita of any German state (Reininghaus, 1990, p. 9). Alongside a general pattern of by-employed craftsmen-farmers, Württemberg had export-oriented proto-industries: the Urach linen region in the east (which included Auingen) and the Calw worsted region in the west (which included Wildberg and Ebhausen) (Flik, 1990; Medick, 1996; Ogilvie, 1997).

Wildberg saw the rise of export-oriented worsted textile production in the 1580s, and until about 1800 was the most important single center of that proto-industry in Württemberg, with 120–140 independent weavers, comprising some 40% of its household heads. Ebhausen moved into proto-industry later, with only 25 weavers in 1670 and 50 by 1730, by which time they comprised about 37% of household heads. The worsted proto-industry also employed some 75% of the unmarried women and widows of Wildberg (and later Ebhausen) as piece-rate spinners (Ogilvie, 2003; 2006). But agriculture remained important, with about 40% of households in Wildberg and 80% in Ebhausen in 1736 at least partly dependent on farming their own land (usually alongside a craft or proto-industry). This was reflected in a strongly 'arable' pattern of marriage seasonality (more accentuated in Ebhausen than Wildberg), which lasted into the nineteenth century (Ogilvie, 1997, pp. 253–254). The worsted proto-industry was hard hit in the 1790s by the French Revolutionary Wars and in the first half of the nineteenth century Wildberg and Ebhausen gradually reverted to agriculture and locally oriented crafts. Even the establishment after 1850 of a few small-scale and short-lived 'factories' (wool-spinning, heckle-making, saw-milling, oil-milling, fulling, brick-making) failed to re-industrialize the local economy.[5]

In Auingen, agriculture played a much more central role (Ogilvie, Küpker, & Maegraith, 2009, pp. 155–173). Throughout the eighteenth century, some 20% of grooms who stated an occupation were farmers, rising to about 40% of the mid-nineteenth century before again declining. Additionally, at least 10% of Auingen men were agricultural day-laborers. From the mid-eighteenth century onwards, Auingen experienced a dramatic rise in proto-industrial linen-weaving, and by the 1790s over half of all grooms were practising this occupation. However, by the 1850s this figure had fallen below 20%. Auingen's first experience of factory employment came in 1897, when a cement factory opened in neighboring Münsingen (2 km away).

Like many other western European economies, Württemberg was quite market-oriented by 1600 (Sabean, 1990; Medick, 1996; Ogilvie, 1997). Proto-industrial worsted- and linen-weavers exported their wares throughout Europe and imported raw materials in bulk from outside the region. Grain and other foodstuffs were widely sold to provision townspeople, proto-industrial producers, landless laborers, and the rural land-poor. Labor markets encompassed servants, day-laborers, spinners, and a whole array of miscellaneous workers. Land changed hands between kin and non-kin at a rapid rate. On rural credit markets, borrowers offered mortgages, collateral, and interest-payments to a wide array of lenders (Ogilvie, Küpker, & Maegraith, 2012).

On the other hand, in Württemberg all these market transactions were circumscribed by powerful non-market institutions. The Württemberg state was strong enough to entangle the territory repeatedly in military ventures, but too weak to finance them without granting costly monopolies and institutional privileges to rent-seeking interest-groups (Vann, 1984; Ogilvie, 1992, 1999; Wilson, 1995). This entrenched the powers of two other institutions, guilds and local communities, which were much stronger here than, for instance, in the Netherlands, England, or France. Guilds in Württemberg, as in many areas of central and southern Europe, did not break down after the medieval period but instead became stronger by securing state enforcement. They regulated rural as well as urban producers and existed not in just traditional crafts but also in proto-industries, shop-keeping, merchant trading, and many other secondary and tertiary occupations (Hoffmann, 1905; Raiser, 1978; Ogilvie, 1997, 2004a). Worsted textile production in proto-industrial communities such as Wildberg and Ebhausen was governed until the 1860s by strong regional weavers' guilds, which regulated prices, output quotas, techniques, labor relations, and the prices paid to suppliers such as the army of unguilded female spinners (Ogilvie, 1997, 2003, 2004b; Flik, 1990). Worsted exporting was monopolized by a guild-like association of merchants called the Calwer Zeughandlungs-kompagnie which was established in 1650 and until 1797 successfully enforced its legal right to compel all local weavers to sell exclusively to its members and excluded all competitors (Troeltsch, 1897; Staudenmeyer, 1972; Ogilvie, 1997). In a nearly identical pattern, the proto-industrial linen-weavers in Auingen were until the late eighteenth century legally obliged to sell their output to the Uracher Leinwandhandlungskompagnie, a guild-like merchant association with a state monopoly (Medick, 1996; Flik, 1990).

Community institutions in Württemberg offered fiscal and political support to the state in return for enforcement of their powers to regulate marriage, sexuality, migration, inheritance, citizenship, settlement, markets, residence, education, diligence, leisure, and consumption (Grube, 1954; Ogilvie, 1997, 2003, 2010; Sabean, 1990). Demographic behavior in particular was closely monitored and controlled. People were not allowed to marry unless they could satisfy their community council that they could support themselves, whether by inheriting land, achieving guild mastership, or practising some other acceptable livelihood in a not very rapidly growing economy (Sabean, 1990; Ogilvie, 1997, 2003). Permission to marry and settle was often denied to men and women who were regarded by their communities as 'economically and morally weak', according to a set of marriage regulations that after 1800 were increasingly formalized and enforced by the state, under the rubric of the *politische Ehekonsens* (Schomerus, 1976; Matz, 1980; Borscheid, 1982; Kaschuba & Lipp, 1982; Schraut, 1989; Ehmer, 1991; Ogilvie, 1995). Together with economic stagnation and barriers to entry to most occupations, these marriage controls created incentives for massive emigration from Württemberg in the eighteenth and nineteenth centuries (Bassler, 1974; Hippel, 1984). Guilds were not abolished in Württemberg until 1864 (Ogilvie, 1997). Marriage restrictions began to liberalize only in

1862 and were abolished only with German unification in 1870 (Schomerus, 1976; Matz, 1980; Borscheid, 1982; Kaschuba & Lipp, 1982; Schraut, 1989; Ehmer, 1991).

This was a society, therefore, in which people's economic and demographic decisions were affected by both market and non-market factors. On the one hand, since few farmed enough land to subsist from, nearly everyone (including women) had to participate in markets by selling agricultural output, craft wares, proto-industrial goods, or simply their own labor to survive (Ogilvie, 1997, 2003, 2004a, 2004b, 2006). On the other hand, economic and demographic decisions were regulated by powerful non-market institutions. The Württemberg state constrained economic decisions through war-induced scarcity, monetary devaluation, high taxation, and forbidding the construction of railways until the 1850s (the Wildberg-Ebhausen region did not obtain a rail connection until the 1870s, and the Auingen region not until the 1890s (Scharf & Wollny, 1995)). Local communities and guilds slowed economic growth and enforced a particularly severe version of the 'preventive check' on demographic behavior, by restricting access to settlement and marriage by individuals whom local elites regarded as high welfare risks or otherwise undesirable fellow-citizens. What demographic pattern emerged within this framework?

2. Sources

Our main demographic sources are Lutheran parish registers and church visitation records.[6] After the Reformation, Württemberg became an officially Lutheran state, which it remained until 1806 when the Napoleonic territorial reorganization brought a number of Catholic territories into the new kingdom. Until then, Württemberg was religiously homogeneous and remarkably pious, aided by the efforts of a dedicated Lutheran church administration, powerful local church courts which monitored religious observance, and community courts which typically refused settlement rights to non-Lutherans while tolerating servants and itinerant laborers from Catholic and Calvinist territories (Schnabel-Schüle, 1990; Fritz, 1993; Holtz, 1996; Ogilvie, 1997, 2003). Even after 1806, the Lutheran territories of 'Old Württemberg' remained socially distinct from the Catholic territories of 'New Württemberg'. As late as 1895, only 2.4% of the population of Wildberg and 0.5% of the population of Ebhausen was non-Lutheran. Auingen remained almost exclusively Lutheran until the 1890s, although Catholics comprised 10% of the village's population by 1905.[7]

The Württemberg church began keeping registers of marriages and baptisms in 1558 and added registers of burials around 1610. Table 1 shows the start and end dates for our parish registers. Not all communities kept registers carefully from the beginning or were able to preserve them to the present day. Thus Wildberg has surviving marriage registers from 1558 on, burials from 1615 on, but baptisms only from 1646 on because the first register was destroyed in the Thirty Years War. Ebhausen recorded marriages inconsistently from 1559 to 1561 and consistently from 1604 on, burials from 1571 on, and baptisms from 1559 on. Auingen has all three registers from the late sixteenth century, but shows definitive evidence of consistent record-keeping only from the mid-seventeenth century. Table 2 provides details on periods when coverage may not have been complete. Although any registration system can be evaded given sufficient motivation, local communities and churches exercised sufficiently close surveillance that the costs of evasion were high (Ogilvie, 1997, 2003; Sabean, 1990), giving good grounds for confidence that the data extracted from these sources reflect the actual demographic situation.

Table 1. Survival of parish registers, by decade, Auingen, Ebhausen, and Wildberg, 1558–1914.

	Auingen	Ebhausen	Wildberg
Baptisms: start date	19 Feb 1581	3 Apr 1559	1 Jan 1646
Marriages: start date	4 Dec 1586	3 Apr 1559	3 Oct 1558
Burials: start date	11 Nov 1591	1 Mar 1559	21 Jul 1615
Baptisms: maximum years	333	355	268
Marriages: maximum years	328	355	356
Burials: maximum years	323	355	299
Baptisms: actual years	315	341	268
Marriages: actual years	309	341	355
Burials: actual years	261	276	398

Notes: 'Actual years' defined according to criteria described in notes to Table 2.
Sources: Parish registers of Auingen, Ebhausen, and Wildberg.

3. Counts and crude rates: nuptiality, fertility, and mortality

Counts of demographic events are interesting for two reasons. First, they pertain to the entire population, not just those whose families can be reconstituted. Second, with our ancillary sources providing population counts, we can use the event-counts to derive crude demographic rates that can be compared with findings for other localities.

3.1 Vital event counts

Figure 3 shows the total number of marriages annually in each community. To reduce extraneous fluctuation, we present the figures as centered seven-year moving averages.[8] Marriages in Wildberg and Ebhausen were markedly correlated across years, with the peaks and valleys usually appearing at the same time. This pattern reflects, in part, reactions to common shocks in the local economies of the two communities, which were similar since they were located only 11 km apart in the same administrative district. In Auingen the shocks appear to have been different, not surprisingly given its location 80 km away on the other side of the country and its differing occupational structure (discussed above). Auingen experienced the large early-nineteenth-century upswing in marriages, for instance, over a decade later than the other two communities. Towards the end of the nineteenth century there were marriage 'booms' in Wildberg and Ebhausen, also observable to a lesser extent in Auingen. Auingen also experienced a smaller boom in the late 1840s that had no counterpart in Ebhausen or Wildberg. The later booms, we argue below, reflect the abolition of the political controls on marriage in 1870.

Figure 4 reports the number of deaths in each community, again presented as centered seven-year moving averages. We plot deaths in Wildberg against a different vertical axis, to allow for the large mortality spikes there in the seventeenth century. Württemberg was part of a central European zone known for especially high infant and child mortality, whose important role in our communities is analyzed below. Figure 4 illustrates a second feature of mortality in this society: the frequent occurrence of short, sharp spikes in deaths. Wildberg's two mortality crises in the seventeenth century reflect war and invasion; the other, less dramatic fluctuations show the influence of crop failures and other economic crises, as well as episodes of infectious disease (Guinnane & Ogilvie, 2008; Ogilvie et al., 2009, pp. 25–36).

Figure 5 presents the same information for births, again as centered seven-year moving averages.[9] Wildberg differs from the other two communities in manifesting relatively

Table 2. Number of years for which events are recorded in parish registers, by decade, Auingen, Ebhausen, and Wildberg, 1558–1914.

	Auingen			Ebhausen			Wildberg		
Decade	baptisms	marriages	burials	baptisms	marriages	burials	baptisms	marriages	burials
1558–1559				0.7	0.7	0.8		1.2	
1560–1569				6.8	6.8	0.0		10.0	
1570–1579				9.3	9.3	1.9		10.0	
1580–1589	8.9	3.1		10.0	10.0	0.0		10.0	
1590–1599	10.0	10.0	6.5	9.5	9.5	0.0		10.0	
1600–1609	10.0	10.0	8.7	6.6	6.6	0.0		10.0	
1610–1619	10.0	10.0	3.8	10.0	10.0	5.0		10.0	4.4
1620–1629	10.0	10.0	3.9	10.0	10.0	7.0		10.0	10.0
1630–1639	6.3	6.3	3.7	4.9	4.9	2.2		10.0	10.0
1640–1649	5.4	5.4	0.3	10.0	10.0	8.5	4.0	10.0	10.0
1650–1659	4.2	4.2	0.6	10.0	10.0	8.6	10.0	10.0	10.0
1660–1669	9.3	9.3	3.8	9.4	9.4	2.2	10.0	10.0	10.0
1670–1679	9.5	9.5	7.5	10.0	10.0	6.2	10.0	10.0	10.0
1680–1689	9.3	9.3	8.7	10.0	10.0	10.0	10.0	10.0	10.0
1690–1699	9.5	9.5	9.7	10.0	10.0	10.0	10.0	10.0	10.0
1700–1709	9.5	9.5	6.7	10.0	10.0	10.0	10.0	10.0	10.0
1710–1719	10.0	10.0	7.4	10.0	10.0	10.0	10.0	10.0	10.0
1720–1729	10.0	10.0	9.3	10.0	10.0	10.0	10.0	10.0	10.0
1730–1739	10.0	10.0	9.5	10.0	10.0	10.0	10.0	10.0	10.0
1740–1749	10.0	10.0	9.5	10.0	10.0	10.0	10.0	10.0	10.0
1750–1759	10.0	10.0	8.9	10.0	10.0	10.0	10.0	10.0	10.0
1760–1769	9.4	9.4	10.0	10.0	10.0	10.0	10.0	10.0	10.0
1770–1779	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
1780–1789	10.0	10.0	8.8	10.0	10.0	10.0	10.0	10.0	10.0
1790–1799	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
1800–1809	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
1810–1819	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
1820–1829	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
1830–1839	10.0	10.0	9.5	10.0	10.0	10.0	10.0	10.0	10.0

(*continued*)

Table 2 – *continued*

	Auingen			Ebhausen			Wildberg		
Decade	baptisms	marriages	burials	baptisms	marriages	burials	baptisms	marriages	burials
1840–1849	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
1850–1859	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
1860–1869	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
1870–1879	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
1880–1889	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
1890–1899	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
1900–1909	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
1910–1914	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Whole period	315	309	261	341	341	276	268	355	298

Notes: Blank cell = registration has not yet started (see dates given in Table 1). For the first decade of recording, number of years is calculated from the date of the first entry to the end of the decade. For decades in which gaps of over six months occur in baptisms or burials, number of years of recording is calculated by subtracting gap-periods from total years in decade. Values for marriages have been arbitrarily set to values for baptisms.

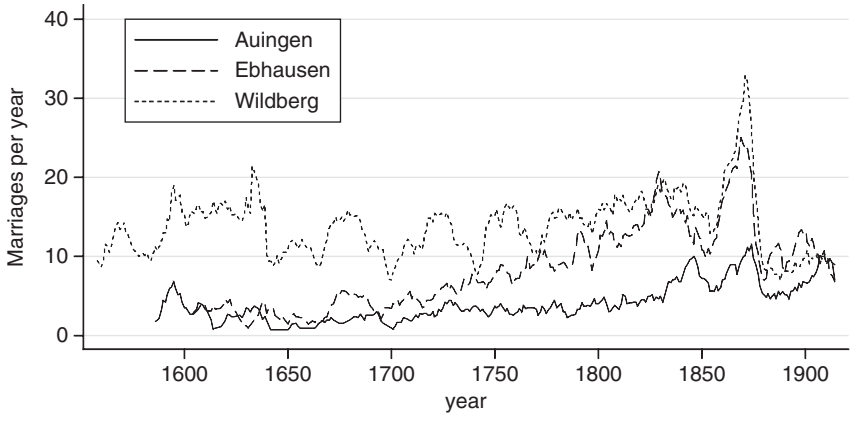

Figure 3. Numbers of marriages in Auingen, Ebhausen, and Wildberg. Note: figures are centered seven-year moving averages.

stable annual birth numbers from c. 1700 straight through to the massive peak just after 1870. Ebhausen and Auingen, by contrast, show continually growing annual birth numbers from the mid-seventeenth century onwards, though the two villages diverge in the nineteenth century, when Ebhausen experienced substantial fluctuations while Auingen saw continually rising birth numbers up to 1914. The smaller amplitude of movements in births in Auingen may reflect its less dramatic overall changes in population. The upswing in births in the 1870s, most visible in Wildberg and Ebhausen but also discernible on a smaller scale in Auingen, coincides with the abolition of the political controls on marriage in 1870.[10]

3.2 Crude rates

Most family reconstitution studies lack any direct count of the number of people living in a community and thus 'under observation' at a given time. Without firm estimates of the population at risk, it is not possible to compute true demographic rates, making it difficult

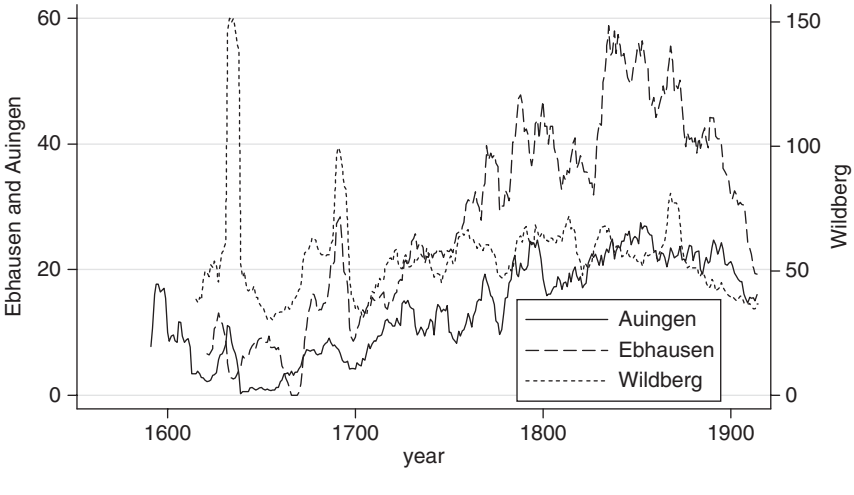

Figure 4. Numbers of deaths in Auingen, Ebhausen, and Wildberg. Note: Figures are centered seven-year moving averages. Deaths for Wildberg are plotted against the right-hand vertical axis.

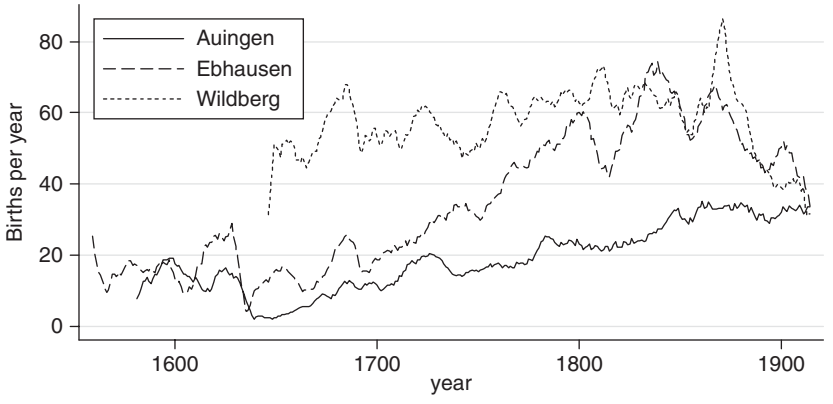

Figure 5. Numbers of births in Auingen, Ebhausen, and Wildberg. Note: Figures are centered seven-year moving averages.

to compare results across communities. For example, an increase in the number of deaths may reflect *either* an increase in the death rate *or* a shift in the population's age-structure towards those with higher age-specific death rates. The existing literature either works around this lacuna or attempts to estimate population counts indirectly, for instance by using methods of inverse- and back-projection.[11]

Because we have independent population counts from church visitations, we can estimate crude demographic rates directly. We can combine the population counts in Figure 2 with the counts of events reported in Figures 3–5 to estimate the number of marriages, deaths, and births per thousand inhabitants in a year. Figures 6–8 present crude rates for marriages, deaths, and births, aggregating by quarter-century to smooth out some of the fluctuations evident in the earlier graphs.[12] The crude rates are similar across the three communities, and all three are in line with studies of other communities from the same period, including those outside Germany (see, for example, Wrigley et al., 1997, Appendix 9). Birth rates usually exceed death rates to a degree indicating continuous

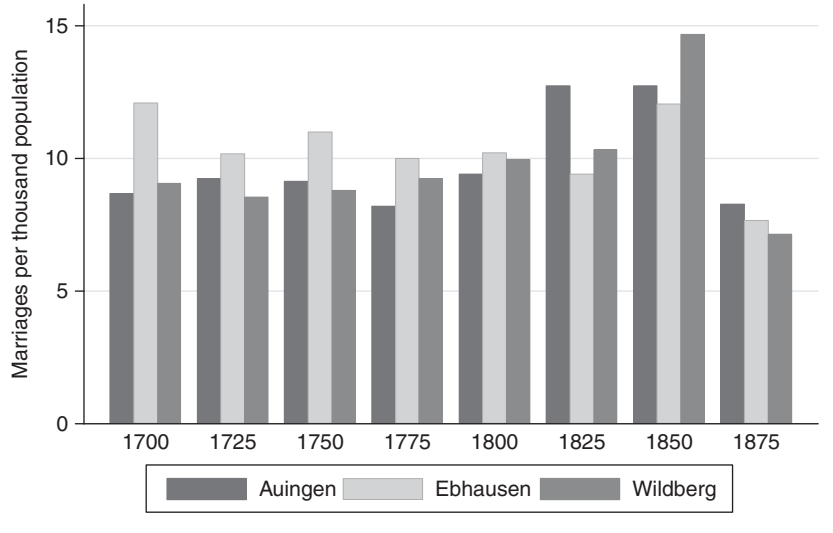

Figure 6. Crude marriage rates, by quarter-century, Auingen, Ebhausen, and Wildberg.

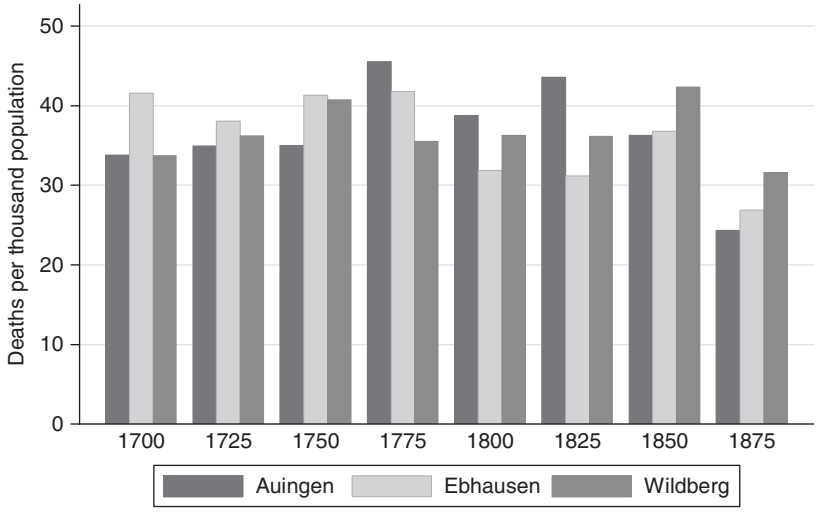

Figure 7. Crude death rates, by quarter-century, Auingen, Ebhausen, and Wildberg.

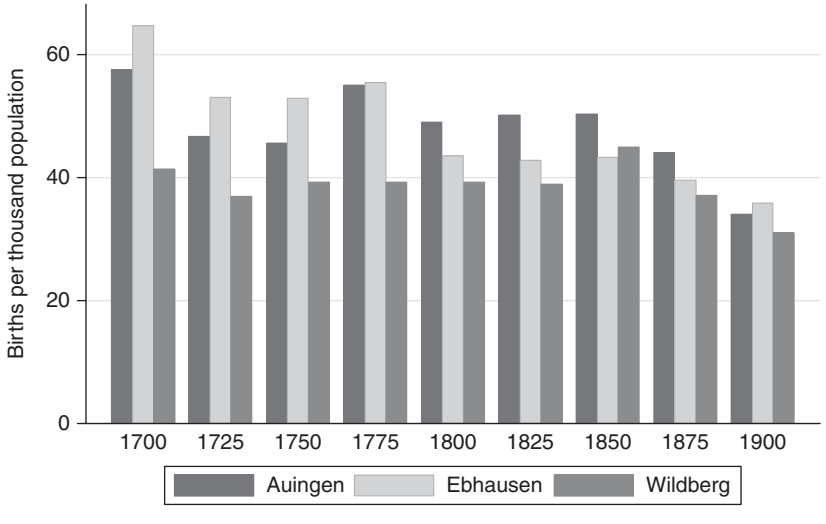

Figure 8. Crude birth rates, by quarter century, Auingen, Ebhausen, and Wildberg.

emigration. This is consistent with the view that the economic stagnation and institutional controls discussed above denied many young people an adult's place in their community of birth. Comparing Figure 8 with Figure 7 shows greater inter-community variation in birth rates than in death rates. This difference hints at differences we explore below: most of the inter-community variation in crude death rates apparently reflects differences in the age-structure of these communities, but the differences in birth rates reflect both age-structure and differences in nuptiality patterns, to which we now turn.

4. Nuptiality

Marriage marks an important transition in the lives of the people we study, and is a central aspect of the distinctive demographic regime that historians associate with western

Europe.[13] Most studies find that in European populations until the nineteenth century, nuptiality was the primary regulator of fertility. In a population where illegitimacy was rare, and there was little effort to control fertility within marriage, the number of children a woman bore was a function of whether and when she married. Figure 9 reports the proportion of all births that were illegitimate in the period 1700–1914. For most of the eighteenth and early nineteenth centuries, this proportion was less than one-tenth of all births, and thus typical of most western European populations. The proportion rose dramatically in the mid-nineteenth century, as the controls on marriage prevented more couples from marrying. We return to this period, and the dramatic reduction in illegitimacy in the 1860s and 1870s, below.

4.1 The European marriage pattern

In two influential studies Hajnal (1965, 1982) pointed out that young adults in western Europe married relatively late in life and substantial proportions never married at all. If anything, Hajnal's original article understated the robustness of this pattern; even places such as pre-Famine Ireland, where observers had long claimed to see early and universal marriage, turn out to have corresponded to Hajnal's description.[14] In his compilation of more than one hundred family reconstitution studies for England, France, Belgium, Germany and Scandinavia in the eighteenth and early nineteenth centuries, Flinn (1981, Appendix Table 7) finds mean ages at first marriage for women of about 25, with few communities showing a mean value lower than 24. Similar findings emerge from the meta-study of historical European marriage patterns carried out by Dennison and Ogilvie (2013, Tables 1–2). The proportion of adults in western Europe who remained unmarried throughout their lives was high, especially in comparison to east Asia, where permanent celibacy for women was rare. Feng, Campbell, and Lee (2010, Figure 11.1), for example, report that in the Chinese community of Liaodong, virtually no women experienced lifelong celibacy in the period 1789–1840. Generally about 10% lifetime celibacy for both men and women seems to have been 'normal' for the European zone Hajnal had in mind.

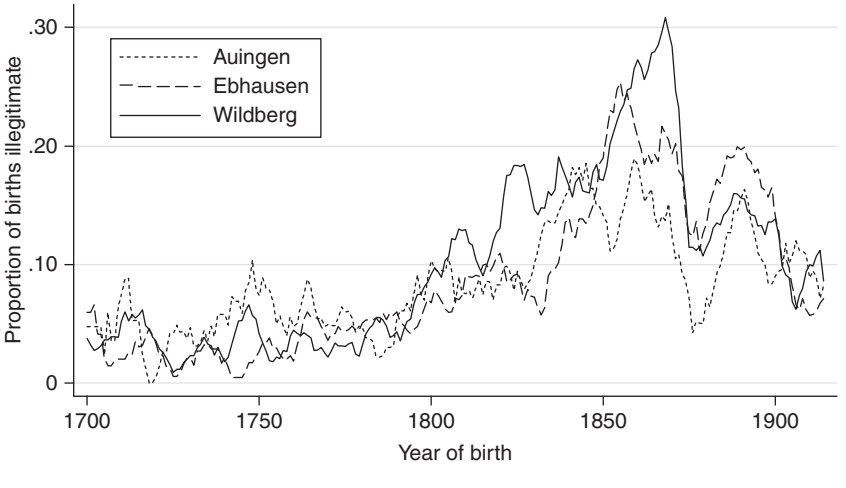

Figure 9. Proportion of all births illegitimate, Auingen, Ebhausen and Wildberg, 1700–1914. Note: Figures are centered seven-year moving averages.

The regulation of economic and demographic life that characterized Württemberg provides a different understanding of Hajnal's views of western Europe. Hajnal (and most demographic historians) view the western European marriage pattern as resulting from informal social norms according to which couples were expected not to marry unless they could set up a separate household and support themselves independently. Some couples might marry in contravention to such social norms, and neither their community nor any other institution had the ability to prevent such marriages. The central European *politische Ehekonsens*, by contrast, gave such norms legal teeth: the community and the state could do more than disapprove. To the extent that either or both of these institutions were more conservative than the individuals were themselves, the political controls on marriage effectively separated young adults into those privileged to marry and those for whom marriage would require leaving the community. The *Ehekonsens* divided people into demographic insiders and outsiders.[15]

Two features of family reconstitution studies bear on the results that follow, and need to be kept firmly in mind. First, many studies of nuptiality (such as Ehmer, 1991 or Guinnane, 1997) rely on censuses or similar household listings that report the marital status of everyone in a community. Family reconstitution, on the other hand, only reports events, and thus does not typically generate measures directly comparable to those derived from censuses. We cannot, for example, estimate the proportion of adults in a given age group who had never married, because we cannot reliably reconstruct the age-structure of the total population of a community at any given point in time. Second, family reconstitution studies can include only those who remain in the community and make their demographic decisions there. But the operation of the economic and institutional constraints on marriage in Württemberg implied a strong link between marital status and residence in the community. Those unable to marry (or denied permission to do so) might well leave the community precisely for that reason. Since we cannot follow the lives of those who leave our communities, we cannot reliably determine the proportions never-married in any given birth cohort. By contrast, in a community where constraints on marriage were weaker, one would not necessarily expect a strong correlation between marriage decisions and out-migration decisions.

4.2 Age at marriage

Tables 3–5 report age at marriage in each community, according to the marital status of the bride and groom.[16] We report both measures of central tendency (means and medians) and measures of the variation (the upper and lower quartile). For some individual cells, the number of individuals is too small for firm comparisons, especially with the wide distributions implied by our measures. But a measure such as the median is robust to sample-size issues.

Ages at first marriage in our communities fall within the range usually found in Hajnal's western European zone, but on the high end of that range, especially for women.[17] Age at first marriage also rose in the first two thirds of the nineteenth century in all three communities, contrary to the trend in England or France over the same period. Not surprisingly, widows and widowers were older at marriage than single people. This reflects several forces. The first is mechanical: to remarry requires a first marriage and widowhood. The second is economic: marriage requires the material basis to establish an independent household, something a widowed person has already achieved. The third reflects the *politische Ehekonsens*: marriage reflected a privileged status, one that made a widow or widower attractive in addition to the other attributes correlated with age. The difference

Table 3. Age at marriage in Auingen.

	Women: first marriages only					Women: second and later marriages only				
Quarter-century of marriage	Mean	N	Q1	Median	Q3	Mean	N	Q1	Median	Q3
1600	29.90	10	24	28	33	43.00	1	43	43	43
1625	28.47	17	24	29	32	40.40	5	38	39	40
1650	26.35	20	22	25.5	29	47.00	1	47	47	47
1675	23.61	23	19	22	27	36.30	10	30	37	43
1700	26.36	44	22.5	25	29.5	29.00	1	29	29	29
1725	26.56	57	22	24	28	41.27	11	35	41	44
1750	27.58	65	23	26	31	38.93	15	30	39	45
1775	26.09	67	23	25	30	37.83	12	31.5	35	45
1800	27.21	90	23	25	31	40.73	11	29	35	54
1825	28.15	153	23	27	32	41.37	19	34	41	47
1850	27.77	191	24	26	30	40.36	14	33	41	47
1875	27.87	134	24	26	30	43.25	8	41	44	47
1900	25.92	122	23	26	28	39.50	2	34	40	45
	Men: first marriages only					Men: second and later marriages only				
1600	25.91	11	24	25	29	38.80	5	26	39	51
1625	28.13	16	27.5	29	29.5	38.38	8	31.5	41	42
1650	27.77	13	25	27	31	48.29	7	33	41	68
1675	26.95	21	24	27	30	47.00	11	35	48	51
1700	25.65	37	23	25	28	47.67	6	32	52	54
1725	26.30	40	23.5	25	27	43.50	24	34.5	43	52.5
1750	27.33	42	25	26	31	42.08	37	32	41	48
1775	26.82	65	25	26	28	40.47	15	33	41	48
1800	27.66	79	25	26	29	47.30	20	35.5	50	58
1825	29.14	128	26	28	31.5	47.84	45	38	47	59
1850	29.34	179	26	28	31	44.27	26	37	41	51
1875	28.25	124	25	27	30	43.58	19	34	39	55
1900	28.46	112	25	27	30	42.82	11	35	43	51

Table 4. Age at marriage in Ebhausen.

	Women: first marriages only					Women: second and later marriages only				
Quarter-century of marriage	Mean	N	Q1	Median	Q3	Mean	N	Q1	Median	Q3
1600	24.95	21	22	24	28					
1625	26.67	27	20	24	28	32.33	3	29	32	36
1650	25.68	50	22	24	29	59.33	3	52	60	66
1675	25.30	80	23	25	26.5	38.27	11	29	39	41
1700	25.22	103	21	24	28	34.33	6	29	34.5	40
1725	26.65	131	22	26	30	41.12	17	38	43	46
1750	28.04	183	23	26	32	39.64	14	32	40	48
1775	27.25	204	23	26	30	42.50	16	36.5	41	46.5
1800	26.58	231	22	25	30	32.77	74	26	31	40
1825	25.71	333	22	25	28	33.25	60	26	30.5	39
1850	28.90	428	25	28	32	37.25	16	32.5	37	40.5
1875	28.03	235	24	27	31	41.40	15	33	42	48
1900	27.21	153	25	27	29	36.75	4	34	35	39.5
	Men: first marriages only					Men: second and later marriages only				
1600	25.33	3	24	25	27	25.41	27	23	25	27
1625						29.68	31	24	25	36
1650	25.17	12	21.5	24.5	28.5	31.68	34	23	26	34
1675	26.33	58	23	25	29	38.04	28	30.5	36	43.5
1700	25.14	73	22	24	28	35.89	27	23	37	46
1725	25.90	99	23	25	27	41.51	43	30	42	48
1750	26.11	143	23	26	28	46.55	47	37	45	55
1775	26.18	166	24	25	28	44.37	51	36	44	52
1800	27.45	194	25	26	29	38.14	107	28	37	45
1825	27.02	293	25	26	29	37.69	99	29	36	44
1850	29.68	373	26	28	32	44.78	72	37	45	51.5
1875	28.00	206	25	27	29	45.05	42	35	48	54
1900	28.23	140	26	27	31	39.35	17	34	36	40

Table 5. Age at marriage in Wildberg.

	Women: first marriages only					Women: second and later marriages only				
Quarter-century of marriage	Mean	N	Q1	Median	Q3	Mean	N	Q1	Median	Q3
1600	24.38	185	21	23	26	39.00	35	29	36	48
1625	25.58	169	22	24	28	39.93	67	33	39	47
1650	25.24	147	21	23	28	41.28	29	34	40	49
1675	26.20	173	23	26	28	40.00	38	33	40	44
1700	27.03	226	22	25	31	41.28	36	33	40.5	52.5
1725	27.65	216	22	26	32	44.07	41	36	44	50
1750	28.31	236	23	27.5	32.5	44.73	40	37	45	51
1775	28.57	273	24	27	32	39.89	36	32	39.5	47.5
1800	28.08	344	23	27	32	38.98	53	31	39	45
1825	28.90	388	24	28	33	42.44	41	34	42	48
1850	28.84	503	24	27	33	37.10	40	32.5	36	43
1875	27.68	204	23	26	30	39.24	21	34	41	45
1900	26.75	143	23	26	29	33.25	4	28.5	32.5	38
	Men: first marriages only					Men: second and later marriages only				
1600	25.54	167	21	24	28	40.25	52	29	38	50.5
1625	25.96	156	22	25	28.5	42.79	98	33	39	53
1650	25.37	149	22	24	27	44.98	52	32	40.5	57.5
1675	26.42	135	23	26	28	41.23	81	32	38	51
1700	26.71	159	23	26	29	39.39	101	26	34	52
1725	26.23	149	23	26	28	41.88	108	33	39	50
1750	27.05	185	24	26	29	47.55	89	39	45	58
1775	28.13	237	25	27	30	48.21	76	40	47.5	56.5
1800	28.49	285	25	27	30	47.78	112	40.5	48	56
1825	29.30	310	25	28	31	45.16	114	37	43	54
1850	30.60	451	27	29	33	46.27	90	38	46	55
1875	28.18	182	25	27	30	45.62	45	35	44	55
1900	27.95	132	25	27	30	41.25	16	35.5	41.5	45

increased over time, especially in the nineteenth century; in Wildberg, for example, we even find some widows remarrying in their forties. The desire and ability to remarry at that age suggests that at least these unions were not motivated by a desire to have more children.

Tables 6–8 report age differences between spouses, which are also within the range usually reported in European family reconstitution studies. However, one feature of these results warrants emphasis: the relatively narrow gap in ages, especially in first marriages for both partners. Often in populations with high marriage ages, males are significantly older than females at first marriage. The difference is usually interpreted as reflecting the relatively greater impact of age on female than on male fertility: a man of 35 can still father a large brood, while a woman of 35 probably cannot. In our communities, men who married at all tended to do so at ages not very different from their spouses. This narrow age gap may be another indicator of the way the separation between demographic insiders and outsiders affected marriage. In the contexts Hajnal was contemplating, a man could become a more attractive mate by waiting to marry, and in the meantime accumulating assets and professional qualifications. For a woman, youth was an important attribute, meaning that in contexts where many persons never married, we would not be surprised to see husbands much older than their wives. The institutional controls on marriage, by contrast, reflected community decisions about attributes that would not change as a man became older. He was, for example, either in line for achieving guild mastership or inheriting property, or not.

4.3 Lifetime celibacy rates

Family reconstitution studies typically use reported marital status at death for persons over 50 as a proxy for lifetime celibacy rates. Table 9 reports proportions ever-married for people who died age 50 or older in our communities. These estimates must be qualified in two ways. First, because the registers' coverage ends in 1914, we lack death dates (and hence marital status at death) for many people born in the later nineteenth century; these individuals do not appear in Table 9. Second, our figures may under-represent immigrants into our communities since accurate information about their age may not always have been available to the clergyman recording their burials.

The table shows considerable variation across our communities, even at the same date, but some regularities stand out. Proportions ever-married for men invariably exceeded those for women. This difference does not imply that men were more likely to marry than women were, but rather that fewer men than women who failed to marry remained in the community until after age 50. Especially in the later eighteenth century and throughout most of the nineteenth, men who could not marry left the community, while more women who could not marry remained. This pattern reflects underlying differences between the sexes in the attractiveness of remaining as a single person in our communities relative to opportunities available elsewhere (Ogilvie, 2003). These gender differences become particularly striking in the late eighteenth century, implying a growing number of never-married women remaining in our communities. From the early to mid-eighteenth century onwards, the proportion of women never married in Wildberg places that community at the extreme of the western European marriage pattern, along with Ireland, Scandinavia, Iceland, other regions of the European 'fringe,' and those wide swathes of central Europe subject to institutional controls on marriage (Ehmer, 1991; Ogilvie, 1995; Mantl, 1997, 1999; Veichtlbauer, Zeileis, & Leisch, 2006; Dennison & Ogilvie, 2013).

Table 6. Age differences between spouses in Auingen.

	Both partners single						Neither partner single				
Quarter-century of marriage	Mean	N	Q1	Median	Q3		Mean	N	Q1	Median	Q3
1600	−1.50	4	−8	0	5						
1625	2.87	8	−4	6	7	1625	3.00	1	3	3	3
1650	1.62	8	−0.5	0	3	1650	24.00	1	24	24	24
1675	4.36	11	0	5	8	1675	3.00	2	1	3	5
1700	0.94	31	−2	0	3						
1725	2.33	33	0	2	5	1725	−2.33	3	−8	−4	5
1750	1.72	36	−2	2.5	5.5	1750	6.50	10	0	8.5	10
1775	1.20	55	−3	1	4	1775	−3.00	4	−11.5	−8	5.5
1800	1.56	72	−1	2	5	1800	11.00	5	5	14	16
1825	2.60	117	−1	2	6	1825	9.44	9	1	11	18
1850	2.12	170	−1	2	5	1850	13.40	5	12	14	16
1875	1.75	230	−1	1	5	1875	7.80	5	2	9	9
	Wife single, husband not						Husband single, wife not				
1625	4.33	3	−8	6	15						
1650	4.00	2	−2	4	10						
1675	8.40	5	2	7	12	1675	−2.00	5	−7	−3	3
1700	10.80	5	8	8	10	1700	−9.00	1	−9	−9	−9
1725	11.14	14	4	11	15	1725	−7.25	4	−15.5	−11.5	1
1750	6.54	24	−1.5	6.5	15	1750	−6.00	4	−10.5	−6.5	−1.5
1775	6.67	9	3	8	14	1775	−5.25	8	−8	−6	−1.5
1800	9.21	14	−1	11.5	17	1800	−3.50	6	−7	−2.5	0
1825	11.69	36	5.5	10.5	18	1825	−5.00	10	−8	−5.5	−1
1850	7.62	21	6	8	15	1850	−6.00	9	−10	−5	−3
1875	10.32	25	4	7	16	1875	−7.20	5	−12	−9	−7

Table 7. Age differences between spouses in Ebhausen.

	Both partners single					Neither partner single				
Quarter-century of marriage	Mean	N	Q1	Median	Q3	Mean	N	Q1	Median	Q3
1600	−5.00	1	−5	−5	−5					
1625						1.50	2	−11	1.5	14
1650	0.92	12	−0.5	1	5	2.33	3	−7	2	12
1675	1.66	50	−1	1	4	6.40	5	−1	6	10
1700	0.77	70	−3	1	5	3.00	2	−3	3	9
1725	0.83	88	−3.5	1	4	11.87	8	5.5	12	19.5
1750	−0.49	133	−3	0	3	11.25	4	4	11	18.5
1775	0.39	152	−3.5	0	4	4.25	8	−1.5	5	9.5
1800	1.52	166	−2	1.5	5	5.39	51	0	5	11
1825	1.96	271	−1	2	5	1.79	38	0	1.5	3
1850	1.73	362	−2	2	5	11.67	6	6	12	18
1875	1.19	334	−2	1	4	7.40	10	4	6	9
	Wife single, husband not					Husband single, wife not				
1600	1.38	8	−1.5	2	3.5					
1625	−0.90	20	−2	3	4					
1650	2.76	29	−2	3	5					
1675	8.00	17	5	8	11	−11.25	4	−21	−8.5	−1.5
1700	6.00	23	−1	3	9	−6.00	3	−14	−5	1
1725	7.03	33	1	6	12	−11.60	5	−16	−14	−8
1750	11.10	39	3	11	19	−9.50	8	−16	−4.5	−2.5
1775	8.92	39	2	10	15	−9.00	7	−18	−7	−5
1800	8.04	53	2	8	13	−3.96	23	−9	−3	0
1825	9.59	61	5	9	14	−3.18	22	−7	−2.5	0
1850	9.61	66	5	9	15	−4.00	10	−6	−5	−2
1875	8.44	48	4	7	13.5	−2.22	9	−6	−3	0

5. Mortality

Württemberg was part of a central European zone where mortality remained high well into the nineteenth century. Infant and child mortality was, relative to adult mortality, especially high; in fact, Germany underlies the 'East' family of model life tables in the Coale-Demeny system. Knodel (1988, Table 3.1) reports a combined infant mortality rate of 30% for Öschelbronn, the Württemberg community in his sample.[18] Throughout the eighteenth and nineteenth centuries, some 38–40% of all newborns in Öschelbronn did not see their fifth birthday. Medick (1996, Table 4.16) reports even higher rates for Laichingen, where in the 1670s about one-quarter of all children died before their first birthday, rising to 48.6% by the mid-nineteenth century.[19] Kaschuba and Lipp (1982, Table II.93) find that in Kiebingen a minimum of one-quarter of children died before their first birthday in every five-year period between 1800 and 1909, rising to over 40% in the 1850–70 period. Auingen, Ebhausen, and Wildberg shared this experience, with extremely high mortality for infants and children.

Mortality studies based on family reconstitutions typically focus on infant and child mortality.[20] As in other contexts, proper estimation of demographic rates (in this case, death-rates) requires that we know when individuals are under observation, and our sources allow us to do that with tolerable certainty only for children. The problem lies in

Table 8. Age differences between spouses in Wildberg.

	Both partners single					Neither partner single				
Quarter-century of marriage	Mean	N	Q1	Median	Q3	Mean	N	Q1	Median	Q3
1600	1.36	125	−2	1	5	9.50	8	0.5	10	17.5
1625	0.85	109	−3	1	5	3.90	40	−4.5	2.5	12.5
1650	0.36	100	−4	0.5	5	8.62	13	2	11	16
1675	0.84	106	−2	1	5	4.25	16	−3	3.5	11.5
1700	0.50	138	−3	1	4	7.40	20	−2.5	5	18
1725	−0.06	127	−3	1	4	4.50	24	−1.5	6.5	10.5
1750	0.25	158	−4	1	4	8.78	23	3	9	16
1775	0.35	200	−3	0	4	6.31	13	2	5	15
1800	1.72	253	−2	2	5	8.58	26	3	10.5	12
1825	1.46	290	−2	2	5	6.25	24	0	4.5	10
1850	2.59	418	−1	2	6	4.38	8	−3	0.5	13.5
1875	1.45	298	−2	1	4	11.17	12	6.5	12	15
	Wife single, husband not					Husband single, wife not				
1600	13.85	40	3	12	24	−7.44	18	−13	−5	−2
1625	12.30	37	3	11	22	−7.85	13	−11	−5	−3
1650	6.35	20	2.5	6.5	11.5	−7.45	11	−13	−5	−2
1675	9.77	47	3	7	16	−9.31	13	−14	−8	−6
1700	8.04	76	1	7	13	−11.54	13	−18	−11	−4
1725	7.92	73	2	9	14	−6.67	12	−16	−8	1.5
1750	11.33	55	8	13	17	−11.53	15	−19	−10	−2
1775	13.74	54	7	14	20	−4.06	17	−6	−4	−1
1800	13.70	82	7	14	20	−4.59	27	−10	−4	2
1825	10.87	90	5	10	16	−6.35	17	−10	−7	−2
1850	11.83	82	5	11.5	18	−1.45	31	−8	−4	3
1875	9.73	49	5	9	15	−1.77	13	−6	−3	0

the lack of a recorded death date for some individuals. A missing death date almost certainly indicates that the person moved away from the community and died elsewhere, but we typically cannot know when they died. For children, however, we can use recorded information for other family members to infer the family's presence or absence in the community, since we can reasonably assume that young children do not migrate without their parents.

In calculating mortality levels we base our analysis on two types of children: those for whom we have death dates, and those lacking death dates but for whom we have the death date of a parent after the child would have turned five. This approach may impart some bias. The longer the parents lived, the more time they had to move away, meaning we are more likely to include a child whose parents had relatively short lives. If parental and child mortality risks are correlated, which they must be to some extent, then we are selecting for children who faced higher mortality risks. The risk of bias is slight, however, as the populations of our communities are relatively immobile. In Auingen, for example, only 1,792 of 4,692 births (about 38%) could not be linked to a death date. Of these, 1,058 were children born after 1850, when migration to and from all of our communities increased.[21] A greater source of bias may be the fact that, as with all family reconstitution studies, we can only analyze births linked to parents; our results, like all others, apply to the reconstitutable portion of the population.[22]

Table 9. Marital status at death, Auingen, Ebhausen and Wildberg.

	Auingen				Ebhausen				Wildberg			
	Males		Females		Males		Females		Males		Females	
Quarter-century of death	Ever-married	N	Ever-married	N	Ever-married	N	Ever-married	N	Ever-married	N	Ever-married	N
1600	1.00	11	0.67	3					1.00	2	1.00	2
1625	1.00	14	1.00	10					1.00	90	0.92	116
1650	1.00	6	0.88	8	1.00	3			1.00	79	0.94	121
1675	1.00	12	1.00	8	0.97	39	0.92	38	0.97	156	0.89	185
1700	1.00	14	1.00	19	1.00	11	0.93	28	0.95	91	0.92	100
1725	1.00	34	0.94	36	0.97	69	0.84	82	0.98	138	0.84	195
1750	0.97	33	0.94	47	0.99	93	0.89	124	0.96	179	0.87	251
1775	0.95	38	0.89	56	0.98	94	0.91	132	0.95	171	0.79	257
1800	0.95	44	0.82	49	0.97	103	0.90	148	0.92	224	0.84	281
1825	1.00	57	0.91	92	0.92	159	0.90	193	0.94	236	0.80	293
1850	0.99	70	0.91	69	0.88	165	0.86	196	0.86	239	0.81	268
1875	0.95	81	0.98	93	0.89	104	0.80	147	0.81	238	0.70	268
1900	1.00	51	0.93	58					0.82	116	0.70	171

Note: Table limited to persons dying at age 50 or older. ‘Ever-married’ = currently married, widowed, deserted, separated, divorced, or otherwise married to an absent spouse.

5.1 Stillbirths

We begin with the tricky issue of stillbirths. In principle, all mortality estimates pertain to individuals born alive; fetuses that die *in utero* are excluded from the analysis. The problem is to infer, from notations in the baptism registers, which children were born alive. Even modern statistical agencies face difficulty in collecting consistent data on stillbirths, and here all we have to go on are handwritten descriptions in our primary sources. Table 10 illustrates the definitional issue for Wildberg alone. The 'narrow' definition of a stillbirth in the table relies on the notations in the primary source (discussed in greater detail in Appendix 1 below), and may therefore underestimate stillbirths, because of the concern for the soul of a child who was not baptized. The 'broad' definition assumes that a child was stillborn if its birth and death dates were listed as the same; this definition may therefore overestimate stillbirths as it includes infants who were born alive but lived for up to 24 hours.

Under either the narrow or the broad definition, the proportion of stillbirths increased across the entire period under analysis up to the end of the nineteenth century, when it began to decline. The trend was broadly similar across all three communities, suggesting that changes over time did not reflect idiosyncrasies of recording in any one place. The decline in the late nineteenth century probably reflects better conditions for expectant mothers as well as improvements in the delivery of babies.[23]

The increase in stillbirths in the period before the late nineteenth century is more complicated to explain. It could reflect reporting practices, although that seems unlikely given that both narrow and broad measures follow roughly the same trend. It also seems unlikely that reporting practices would fluctuate in precisely the same way across three communities in different parts of the country. The increase might reflect changes in the experience of pregnancy: perhaps women who would have suffered a miscarriage in the early seventeenth century were able to bring to term more fragile fetuses in the early nineteenth.[24] Finally, the rising rate of stillbirths may reflect changes in married women's work: although Ogilvie (2003, pp. 149–152, 194–200) found that married women in Wildberg and Ebhausen already engaged in heavy manual labor in the 1650–1800 period, Sabean (1990, pp. 130–131, 138, 176–178) has argued that after c. 1800 agricultural changes in Württemberg villages made married women's work even more valuable. Kaschuba and Lipp (1982, pp. 358–361) find that infant mortality was highest and

Table 10. Proportion of births that were stillbirths, according to alternative definitions of stillbirth, Wildberg only.

Quarter-century of baptism	Marked stillbirth (narrow definition)	Died day of birth (broad definition)	N
1625	0.000	0.063	32
1650	0.005	0.072	221
1675	0.003	0.037	325
1700	0.071	0.107	309
1725	0.039	0.100	281
1750	0.067	0.147	430
1775	0.087	0.157	413
1800	0.125	0.174	385
1825	0.135	0.182	407
1850	0.157	0.198	369
1875	0.151	0.185	238
1900	0.015	0.104	67

breast-feeding least practised among the Kiebingen upper stratum of farmers, for whom qualitative contemporary evidence suggests the work-pressure on married women was heaviest and the affordability of breast-milk substitutes was greatest. Increasing economic pressures on married women between the mid-seventeenth and the mid-nineteenth century would help explain rising proportions of stillbirths, as well as the rising rates of infant and child mortality discussed below.

5.2 Infant and child mortality

One characteristic of the high mortality suffered by our Württemberg populations is the concentration of deaths very early in life, not just in infancy, but *early* in infancy. Table 11 reports two variants on a common measure that captures mortality experience early in life. *For those who died before their first birthday*, the table reports the proportions who died in the first week and in the first month of life respectively. Infant mortality in all three communities was concentrated very early in infancy, with about one-quarter of all infant deaths occurring in the first week of life, and one-half occurring within a month. This age-pattern hints at the reasons underlying such high mortality. In populations that practise little breastfeeding, neonates are especially susceptible to gastro-intestinal infections brought about by consumption of breast milk substitutes.[25]

Table 12 reports two standard measures of infant and child mortality, excluding births with a stillbirth annotation (and thus adopting the narrow definition of a stillbirth). The very low estimates for the seventeenth century probably reflect missing links in the reconstitution at a period when registration was just starting up and was also disrupted by the Thirty Years War. From the mid- to late seventeenth century onwards, the estimates confirm the earlier indications of extremely high mortality, with up to half of all children dying before their fifth birthdays. Although mortality rates eventually declined in the final period covered (1875–1914), they actually increased in the mid-nineteenth century, especially in Auingen.

Table 13 delves into another feature of infant mortality: its seasonality. Mortality was much worse for children born at some times of the year than at others.[26] These strong seasonal effects highlight the underlying causes of death for infants in these populations: the risk of exposure to gastro-intestinal disease, especially for children who were not fully breastfed. The late summer and early autumn were usually the worst. Auingen, the most agricultural of the communities, had the most pronounced seasonality in infant mortality. This difference between Auingen and the other two communities, whose occupational structure was more proto-industrial, may indicate an interaction between environmental and behavioral factors, with women finding it harder to breastfeed during the late summer and early autumn when agricultural but not proto-industrial labor demands were at their peak. Knodel (1988, Figure 3.7) reports similar seasonal patterns for Öschelbronn to those we observe in Auingen, and suggests that they reflect variations in breastfeeding intensity across the year. Mothers who were busier during the harvest season might begin to introduce substitutes, exposing their babies to greater risk of infection.

What do our estimates of mortality patterns imply more generally? Consider first their implications for family-building. These very high mortality levels suggest at least the possibility of infant and child mortality that is endogenous in the economic sense of the term. That is, mortality may have been high because many parents did not make investments in their children's survival, even though such investments were technically feasible.[27] This possibility implies that parents were, at some level, using infant and child mortality instead of contraception to reduce their brood's size, or at the very least that breastfeeding practices reflected the opportunity cost of mothers' time. We cannot draw

Table 11. Neo-natal mortality in Auingen, Ebhausen, and Wildberg.

	Auingen						Ebhausen					
	Males			Females			Males			Females		
	Proportion dead w/in			Proportion dead w/in			Proportion dead w/in			Proportion dead w/in		
Quarter-century of baptism	7 days	30 days	N	7 days	30 days	N	7 days	30 days	N	7 days	30 days	N
1600	0.000	0.143	7	0.400	0.400	5	0.000	0.500	4	0.000	0.000	1
1625	0.000	0.333	3	0.200	0.200	5	0.200	0.333	15	0.154	0.385	13
1650	0.000	0.250	12	0.000	0.250	12	0.222	0.611	18	0.294	0.412	17
1675	0.125	0.333	24	0.059	0.176	17	0.191	0.397	68	0.132	0.415	53
1700	0.161	0.484	31	0.000	0.143	21	0.240	0.340	50	0.239	0.543	46
1725	0.136	0.500	44	0.133	0.300	30	0.260	0.403	77	0.317	0.413	63
1750	0.143	0.429	42	0.081	0.324	37	0.295	0.477	132	0.194	0.337	98
1775	0.156	0.521	96	0.125	0.444	72	0.256	0.451	164	0.297	0.483	118
1800	0.042	0.403	72	0.163	0.490	49	0.299	0.484	157	0.280	0.483	143
1825	0.196	0.523	107	0.126	0.442	95	0.233	0.495	210	0.213	0.506	174
1850	0.230	0.434	113	0.129	0.495	93	0.224	0.543	210	0.096	0.385	187
1875	0.143	0.328	119	0.118	0.312	93	0.215	0.449	205	0.221	0.395	172

	Wildberg					
	Males			Females		
	Proportion dead w/in			Proportion dead w/in		
Quarter-century of baptism	7 days	30 days	N	7 days	30 days	N
1625	0.389	0.555	18	0.143	0.429	14
1650	0.291	0.567	127	0.189	0.522	90
1675	0.198	0.489	182	0.155	0.373	142
1700	0.230	0.390	148	0.182	0.358	137
1725	0.177	0.373	158	0.161	0.313	112
1750	0.192	0.330	239	0.259	0.383	162
1775	0.246	0.431	211	0.235	0.416	166
1800	0.250	0.490	200	0.204	0.467	137
1825	0.182	0.360	176	0.142	0.426	176
1850	0.140	0.420	186	0.104	0.376	125
1875	0.162	0.359	142	0.152	0.416	125

Note: Table pertains only to children who died before reaching age one.

Table 12. Infant and child mortality in Auingen, Ebhausen and Wildberg.

	Auingen						Ebhausen					
	Males			Females			Males			Females		
	Proportion dead			Proportion dead			Proportion dead			Proportion dead		
Quarter-century of baptism	One year	Five years	N	One year	Five years	N	One year	Five years	N	One year	Five years	N
1600				0.056	0.100	90	0.047	0.081	86	0.014	0.029	69
1625	0.057	0.075	53	0.098	0.157	51	0.142	0.283	106	0.138	0.181	94
1650	0.324	0.405	37	0.255	0.362	47	0.140	0.186	129	0.124	0.153	137
1675	0.293	0.378	82	0.270	0.333	63	0.322	0.408	211	0.260	0.363	204
1700	0.240	0.388	129	0.186	0.336	113	0.205	0.320	244	0.219	0.329	210
1725	0.260	0.379	169	0.195	0.351	154	0.235	0.324	327	0.191	0.303	330
1750	0.268	0.401	157	0.247	0.413	150	0.282	0.406	468	0.240	0.365	408
1775	0.378	0.555	254	0.309	0.468	233	0.284	0.412	577	0.217	0.381	543
1800	0.291	0.453	247	0.222	0.434	221	0.299	0.398	525	0.243	0.327	588
1825	0.412	0.508	260	0.345	0.455	275	0.286	0.377	734	0.250	0.337	697
1850	0.349	0.441	324	0.274	0.375	339	0.344	0.421	611	0.329	0.426	568
1875	0.253	0.340	471	0.198	0.285	470	0.260	0.331	789	0.211	0.272	817

	Males			Females		
	Proportion dead			Proportion dead		
Quarter-century of baptism	One year	Five years	N	One year	Five years	N
1625	0.228	0.266	79	0.167	0.274	84
1650	0.248	0.312	513	0.198	0.273	455
1675	0.320	0.418	569	0.253	0.363	562
1700	0.292	0.420	507	0.282	0.398	485
1725	0.299	0.419	528	0.228	0.374	492
1750	0.395	0.509	605	0.274	0.423	591
1775	0.327	0.468	645	0.269	0.410	617
1800	0.346	0.438	578	0.233	0.383	587
1825	0.321	0.396	548	0.306	0.422	576
1850	0.387	0.453	481	0.281	0.369	445
1875	0.253	0.312	561	0.223	0.285	561

Table 13. The seasonality of infant mortality.

	Auingen				Ebhausen				Wildberg			
	Males		Females		Males		Females		Males		Females	
	Prop.	N	Prop.	N	Prop.	N	Prop.	N	Prop.	N	Prop.	N
Jan	0.085	200	0.091	208	0.146	445	0.101	434	0.110	509	0.081	533
Feb	0.108	167	0.091	187	0.136	404	0.072	401	0.116	481	0.117	452
Mar	0.102	206	0.070	187	0.109	432	0.095	432	0.124	493	0.086	489
Apr	0.121	199	0.088	181	0.136	398	0.108	360	0.143	470	0.072	475
May	0.088	181	0.070	171	0.117	386	0.110	417	0.134	454	0.079	419
June	0.140	143	0.096	146	0.107	356	0.090	355	0.130	399	0.107	403
July	0.135	171	0.086	162	0.130	345	0.105	380	0.144	445	0.134	424
Aug	0.143	217	0.116	224	0.115	400	0.123	374	0.164	450	0.102	453
Sept	0.183	229	0.107	206	0.124	412	0.090	376	0.143	475	0.138	420
Oct	0.145	221	0.143	182	0.156	435	0.098	387	0.137	468	0.110	484
Nov	0.132	190	0.077	194	0.094	385	0.125	383	0.112	481	0.099	424
Dec	0.140	178	0.067	194	0.156	429	0.092	393	0.151	489	0.115	479

Note: The table reports the proportion of all children born in a given month who died before reaching the age of one month.

firm inferences on this point without more detailed analysis of fertility and mortality. To the extent that these mortality levels are *exogenous* in the economic sense of the term, they imply considerable differences between fertility and the number of children actually raised. A five-year mortality rate of 40% implies that even in a population with a Total Fertility Rate (TFR) of 10, parents see only six children enter late childhood.

What do these mortality estimates imply for mortality later in the life-cycle? At a future stage of research, we will combine our census-type listings with the family reconstitution to estimate adult mortality parameters directly. But in the absence of such unusual data sources, we can estimate adult mortality levels by combining data on infant and child mortality with model life tables. Knodel (1988, pp. 53–60) takes this exercise seriously, although he begins by noting that the Coale-Demeny life tables do not fit mortality in his populations very well. We share that view for our communities.[28] For this illustration, we limit ourselves to females and focus on the 'East' life tables. An infant mortality rate of .360, which is on the high side for our three communities, corresponds to Coale-Demeny level 3, with an expectation of life at birth of 25 years, and an expectation of life at age 10 of 41 years. An infant mortality rate of .216, on the low side for our communities, corresponds to Coale-Demeny level 9, which implies an expectation of life at birth of 40, and at age 10 of 52 years.[29] For comparison, Knodel (1988, Table 3.3) concludes that mortality in his Württemberg village of Öschelbronn was most consistent with an expectation of life at birth of 32.6 years and at age 10 of 37.8 years. High though the mortality in our villages was, therefore, it was not as high as that estimated for other Württemberg communities. Overall, these mortality patterns imply that most newborns in Württemberg before the late nineteenth century faced very poor chances of ever reaching late childhood. But if the model life-table relationships discussed above are even tolerably accurate, any child who survived the 'fatal years' could expect to live into late adulthood.

6. Marital fertility

We now turn to marital fertility. Württemberg has enjoyed little of the sustained attention paid to the historical demography of England, France, and other European countries, so

our three reconstitutions mark a considerable advance on what is known about marital fertility in this area. Two earlier studies offer the chance for comparison. Knodel (1988)'s 14 German communities include the Württemberg village of Öschelbronn, and Medick (1996) reconstituted the families of the Württemberg village of Laichingen. Both studies faced the problem that the most common indicators of marital fertility use information inefficiently: the age-specific marital fertility rate, for example, reduces the fertility experience of all women in a five-year age cohort to a single number. For this reason, Knodel (1988) reports many of his results for all 14 German communities combined, even though there was very considerable demographic variation across villages, including in key indicators such as infant mortality and marital fertility. Because we are interested in the social and economic underpinnings of marital fertility, we report results for our communities separately, even if in some instances the number of observations in a given cell is smaller than one would like. This we view as a limitation of the measure, not of our source; the next stage in our project relies on statistical approaches that make more efficient use of family reconstitution data.

We focus on the 150 years after 1750, dividing our couples into the marriage cohorts of 1750–99, 1800–49, and 1850–99. We adopt the same selection criterion as Knodel and Medick: our results pertain to first marriages that lasted until the wife was at least 45 years old. We also exclude prenuptial births. Figure 10 reports age-specific marital fertility rates for our communities.[30] All three communities fit squarely within the fertility patterns suggested by the studies of Öschelbronn and Laichingen, with high natural fertility and little or no fertility control until the end of our period. In fact, the estimates reported here put considerable interpretive flesh on the results Knodel and Medick reported. Knodel did not single out either Öschelbronn or the underlying institutional and economic context of his communities, and thus did not underscore the connection between the unusually high marital fertility in Öschelbronn and any features of its economy or institutions. Medick focused on proto-industrialization and the way it worked in Laichingen. Because his demographic results comprised a small part of his study, he was not in a position to

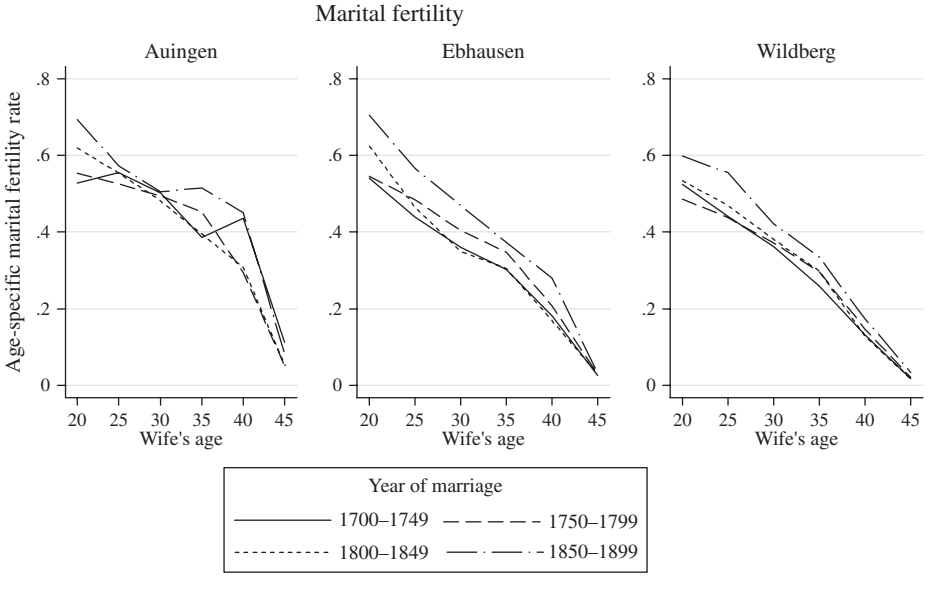

Figure 10. Age-specific marital fertility in Auingen, Ebhausen, and Wildberg.

compare his findings with other places, and he did not consider the role of the social or institutional framework in his demographic results. By analyzing three Württemberg communities that exhibit broadly similar fertility patterns, we are now in a position to conclude that this is what marital fertility looked like in Württemberg, whether in a proto-industrial or an agricultural context, and to explore how it was related to the institutional framework discussed above.

The results for Auingen illustrate the limitations of measures such as the age-specific fertility rate, and implicitly, the reasons that Knodel often combined all 14 communities in reporting such measures. The Auingen figures exhibit less fertility decline with age than is present in the Coale–Trussell natural fertility schedule. This is true even abstracting from the estimates for the period 1850–99, where the fertility rates at ages 40–44 and 45–49 are based on fewer than 50 women. While conclusions must be drawn with caution at this point in the analysis, Auingen women appear to have continued to bear children after the age of 30 at a rate not typical of other European populations. The underlying reasons for this difference, which may relate either to the proximate determinants of fertility or to volitional behavior, we reserve for future research.[31]

The Coale and Trussell (1978) parameters 'M' and 'm' provide a convenient summary of a fertility schedule, even if later studies have highlighted some of these parameters' drawbacks. The Coale–Trussell model fits the parameters 'M' and 'm' such that

$$\frac{f(a)}{n(a)} = Me^{mv(a)}$$

where f(a) is the fertility schedule for the 'target' population and n(a) is a natural fertility standard derived from populations believed not to be practicing fertility control. The estimated parameter 'M' can be thought of as scaling the level of natural fertility in the target population. The v(a) schedule reflects deviations from the natural fertility schedule brought about by fertility control.[32]

Knodel (1988)'s estimates of 'M' for the Württemberg village of Öschelbronn range between 1.01 and 1.18 (as shown by his Table 10.4) and his estimates of 'm' are consistent with a natural-fertility regime until the end of the nineteenth century (Table 11.1). We also computed these two parameters for the Württemberg village of Laichingen from the data in Medick (1996, Table 4.1). Here, 'M' was about 1.3 for most of the eighteenth and nineteenth centuries; natural fertility in Laichingen, therefore, was initially some 30% higher than in the natural fertility standard. Laichingen's value of 'm', by contrast, implies significant fertility control starting in the late eighteenth century. The age-specific fertility rates for both Öschelbroon and Laichingen are indeed very high: in Laichingen, married women in their twenties had between 500 and 600 births per thousand woman-years of exposure throughout the entire period analyzed (1658–1884), and fertility continued to be high over the age of 40, with 208 births per thousand woman-years for Laichingen women aged 40–44 in 1825–49.

Table 14 reports 'M' and 'm' for our three communities, summarizing the information in Figure 10. Most of these estimates are reassuringly similar to those found for the two previously studied Württemberg communities. Values of 'M' are one or greater, indicating a high level of natural fertility. The estimated 'm' values suggest little or no fertility control in Ebhausen or Wildberg. The negative values of 'm' reported for Auingen require some discussion. The Coale–Trussell model does not rule out this possibility: negative values of 'm' mean that fertility falls more slowly with age than in the natural fertility standard, which is already apparent in Figure 10. But because this result is unusual we investigated it more deeply. Table 14 reports a second set of 'M' values, estimated simply

Table 14. Estimates of the Coale–Trussell 'M' and 'm' for Auingen, Ebhausen, and Wildberg.

Place	Couples married	'M' estimated as ASMFR at 20 as a ratio of natural fertility standard	From nonlinear least squares		
			'M'	'm'	R^2
Auingen	1750–99	1.204	1.060 (.088)	−.374 (.068)	.99
Auingen	1800–49	1.358	1.089 (.168)	−.366 (.126)	.98
Auingen	1850–99	1.508	1.000 (.217)	−.691 (.161)	.98
Ebhausen	1750–99	1.186	1.113 (.060)	−.024 (.052)	.99
Ebhausen	1800–49	1.358	1.149 (.139)	.067 (.122)	.98
Ebhausen	1850–99	1.531	1.360 (.160)	−.002 (.114)	.98
Wildberg	1750–99	1.057	1.050 (.009)	.130 (.009)	.99
Wildberg	1800–49	1.161	1.175 (.024)	.289 (.024)	.99
Wildberg	1850–99	1.300	1.216 (.129)	.025 (.104)	.98

Note: ASMFR = age-specific marital fertility rate. The estimate of 'M' in the third column is the marital fertility rate ages 20–24 divided by the Coale–Trussell natural fertility standard for those ages. The estimates in the last three columns are nonlinear least squares estimates of the model in levels. Standard errors are in parentheses. See text for discussion of the negative 'm' values.

by taking the ratio of target to natural fertility in the age group 20–24. For Ebhausen and Wildberg, the two estimates of 'M' are similar, while in Auingen the simpler approach yields much higher levels of 'M'. This difference implies that the Coale–Trussell model has trouble fitting the idiosyncratic fertility profile of Auingen. We also re-estimated the model by fixing 'M' at the value implied by the simple ratio in Table 14, and estimating only 'm'. These 'm' estimates were still negative, but had much smaller absolute values than those in Table 14.[33]

But why was marital fertility so high in this society? Knodel's investigation of the proximate determinants of fertility implies that high levels of natural fertility in pre-transition southern Germany reflected a combination of low breastfeeding and high fecundability. Tables 11 and 12 imply there was little breastfeeding in our three communities: infant mortality was high, and many of those infant deaths occurred in the first month of life.

Our reconstitutions also imply high fecundability. Fecundability refers to the monthly probability that a woman becomes pregnant if not using birth control, and thus summarizes the risk of pregnancy in a natural-fertility population. There are several ways of estimating fecundability. One simple approach uses Knodel and Wilson's adaption of Bongaarts' model. Since in the absence of prenuptial births, women are not breastfeeding in the first birth interval, the timing of births in that interval yields an estimate of fecundability. Knodel (1988, Table 10.6) reports the proportion of all first births that occur in the tenth, eleventh, and twelfth month of marriage (omitting prenuptial pregnancies and women with premarital births). We replicated his approach for our three communities, obtaining similar estimates and thus comparable levels of fecundability. There is thus no puzzle about how women in our Württemberg communities bore so many children.

These findings provide an important enhancement to our understanding of this 'insider-outsider' demographic regime. This was a society in which access to marriage, and thus to marital fertility, was rationed. 'Outsiders' did not marry at all, and even 'insiders' married very late. But once a woman became an 'insider' by gaining access to marriage, she enjoyed an unusually high level of marital fertility which, at least in some cases, endured to a relatively advanced age. This 'central European' version of Hajnal's European Marriage Pattern thus differed from the English version in which a larger proportion of people gained access to marriage, but then had relatively low fertility within marriage. In the central European version, by contrast, demographic 'insiders' had

extraordinarily high fertility while demographic 'outsiders' had extraordinarily low fertility. The net effect on population growth may have been similar, but the socioeconomic causes and consequences were very different.

7. The repeal of the *politische Ehekonsens*

The system of economic, social, and demographic controls on access to marriage (and thus to marital fertility) in Württemberg was abolished in several steps in the second half of the nineteenth century. Württemberg abolished guilds, one of the institutional underpinnings of the marriage controls, in 1864. Other changes, including the right to migrate freely within Germany, only came with the Reich in 1870. The *politische Ehekonsens* was repealed in two stages. Württemberg relaxed the marriage controls starting in 1862, but this resulted in a long struggle between proponents and opponents that ended with the death of King Wilhelm I in 1864 (Matz (1980, Chapter 4)). The new King Karl I appointed liberal ministers who started the legislative process towards reform, and also used their influence to weaken the operation of the *Ehekonsens* while it still prevailed. From 1862 to 1871 the *politische Ehekonsens* was still the law, but a law whose hitherto severe local implementation was increasingly weakened by oversight at the national level. When Württemberg joined the Reich, it had harmonized its law with the pre-existing law of the North German confederation, and the *politische Ehekonsens* in Württemberg came to a complete end on January 1, 1871 (Matz 1980, pp. 139–140).[34]

We have already seen the large fluctuations in demographic behavior in our communities which coincided with abolition of the marriage controls. It may therefore be surprising to learn that there is some dispute in the historiography over whether the rules implicit in the *Ehekonsens* were ever applied, at least with enough consistency and force to create real impediments to marriage. Some of the disagreement arises from the widely held view, perhaps most forcefully put forward by Jürgen Schlumbohm, that pre-modern states, particularly in German-speaking central Europe, did not enforce most of their laws, ordinary people did not comply with them, and hence the legal system did not affect people's choices. Instead, Schlumbohm argues, we should adopt Michel Foucault's view that medieval and early modern legal systems were not functional, but rather served a purely symbolic purpose: they amounted to the assertion of sovereignty by a 'theatre state'.[35] In the specific context of the *Ehekonsens*, Knodel (1967, p. 293) shows that the German marriage restrictions affected marriage and illegitimacy rates. This is different from the question of whether they impeded population expansion: because the *Ehekonsens* apparently increased illegitimate fertility, it had less effect on population overall. Matz (1980, p. 233) expresses doubt about the effectiveness of the marriage laws on the grounds that only about 6% of the marriage applications he analyzed were rejected. Schraut (1989, p. 137) interprets evidence from the Württemberg city of Esslingen as 'an expression of the low degree of effectiveness of the legal obstacles to marriage.' Ehmer (1991, p. 74) speculates that the marriage restrictions may have been more effective as an instrument of social control against the lower strata than as a tool for influencing actual demographic behavior.

Some of the disagreement reflects the source material available and the fact that the demographic implications of the *Ehekonsens* were complex. People denied the right to marry might simply leave the community or even the entire country; certainly the nineteenth-century period which saw the highpoint of the marriage restrictions also saw epidemic emigration from Württemberg to America and eastern Europe. For this reason, the restrictions on marriage might not have much impact on observable celibacy rates. Furthermore, while it seems likely that the *Ehekonsens* would lead to later first marriages,

that is not necessarily so: people deemed unfit to marry would not necessarily become more fit just by waiting, and those forced by the regulation to wait might instead just emigrate.

Efforts to determine the effects of the *politische Ehekonsens* empirically have remained inconclusive. The challenge can be seen in Matz's careful tabulations of administrative reports on the number of marriages prevented in Württemberg in the mid-nineteenth century. He reports the number of marriages prevented as a percentage of marriages permitted. The resulting estimates display huge cross-sectional variation. In Stuttgart the figure is 0.35%, while in some rural *Kreisen* it exceeds 9% (Matz 1980, pp. 204–206). But what does this mean? We do not know whether the 9% include couples applying for a second time, or couples who were denied permission the first time but were approved the next. We do not know how many people denied the right to marry in their home community simply migrated to another jurisdiction which they hoped might be more liberal. The 9% could *over*-estimate the number of couples who actually never married because of the *politische Ehekonsens*. Probably most important was the law's deterrent effect: we cannot know how many couples looked at the 9%, concluded that they themselves would also be denied the right to marry, and consequently never even applied.

A different way to approach the question is to ask what happened when the marriage restrictions were abolished. If they were binding constraints, we should see at least some immediate impact: a rise in marriage and a fall in illegitimate fertility. Knodel (1967) takes this approach. His study implicitly uses 'differences in differences' to compare German states that had abandoned the *politische Ehekonsens* before 1871 to those, like Württemberg, that still had it when the Reich abolished the restrictions. His strategy only really shows how effective the *Ehekonsens* was in the years just prior to its repeal; marriage restrictions might have exercised a much lesser (or greater) effect in the eighteenth century. Knodel concludes that around the time of its abolition the *Ehekonsens* had measurable effects on both proportions married and illegitimacy rates. Knodel's pioneering study relied on published, state-level data. Thus Württemberg is a single observation, one that implicitly averages large cities (where we know the *politische Ehekonsens* was enforced less strictly) with small communities of fewer than 2,000 inhabitants such as Auingen, Ebhausen, and Wildberg – the size of community in which a majority of the German population still lived into the late nineteenth century.[36]

Our sources allow us to examine how the repeal affected behavior within an individual community, thus relying on a much sharper 'before and after' design: we are looking at the same community under two different institutional regimes. Consider Figure 3 again. The repeal of the *politische Ehekonsens* was followed by marriage booms in all three of our communities. The number of marriages celebrated annually then fell to levels typical before the boom, suggesting that there was a stock of young people who had wanted to get married but could not do so because the of *Ehekonsens*. Once these people married, the volitional (i.e. informal) controls on marriage that Hajnal emphasized returned annual marriage counts to a lower level.

Figure 5 shows that the marriage boom also created a brief baby boom. This is the expected consequence of a large number of new marriages in a natural-fertility population. With age-specific marital fertility rates exceeding 500 for women in their twenties, we would expect every new marriage to produce a child every other year, over and above the births attributable to couples married before the end of the *Ehekonsens*. This baby boom also soon subsided, as the age-structure of the married population trended back toward what it had been under the pre-abolition regime.

One interesting feature of Figures 3 and 5 is the difference between Auingen on the one hand and Ebhausen and Wildberg on the other. All three communities exhibited sharp

reactions to the end of the *politische Ehekonsens*, but the effect seems more muted in Auingen. There are several potential explanations for the difference. The restrictions may have been enforced differently in Auingen before repeal; the outside opportunities for those prevented from marrying may have differed; or Auingen may have had a different local economic situation after repeal. The contrasting amplitude of the response to abolition of the marriage controls in different local contexts opens up intriguing avenues for deeper research.

A long tradition holds the marriage restrictions responsible for the unusual ubiquity of illegitimacy in south German societies. Indeed, Württemberg was a more moderate case than Bavaria, where Matz (1980, Figure 2) reports that 20–25% of all births in the mid-nineteenth century were illegitimate. In Württemberg as a whole, the figure was more like 12% in the 1830s and 1840s, rising to 16% in the late 1850s. In Bavaria, the marriage controls were more severe, were explicitly retained in that territory after it joined the Reich, and were not abolished until 1916 (Ehmer, 1991, p. 55). The historiography proposes several direct connections between illegitimacy and the *politische Ehekonsens*. One suggests that demographic 'outsiders' who were denied the right to marry had little reason to respect the norms of family life espoused by 'insiders'; such women might bear illegitimate children with several different men because controlling their sexual urges would not in any case allow them to enjoy the settled family life and secure economic situation that such control offered 'insiders.' Another argument implies that 'outsiders' simply replicated the lives of 'insiders' as best they could: often a couple that was denied the right to marry formed a 'consensual union' and had a brood of children who would have been, had their parents lived elsewhere, legitimate.[37] Other women bore children before marrying; sometimes the husband was these children's father, sometimes not.

The marriage restrictions were accompanied by an increase in illegitimacy in our three communities. Figure 11 displays how illegitimacy developed during the period of the *politische Ehekonsens*. (Figure 11 is identical to the period 1820–1914 reported in Figure 9). The percentage of children born illegitimate increased up to c. 1870, declined by about one-half immediately upon repeal, and stayed at a lower level for the rest of the nineteenth century. The immediate reduction in illegitimacy evident in Figure 11 does not support, on its own, any particular interpretation of the relationship between the *Ehekonsens* and non-marital fertility, but the existence of the relationship cannot be denied.[38]

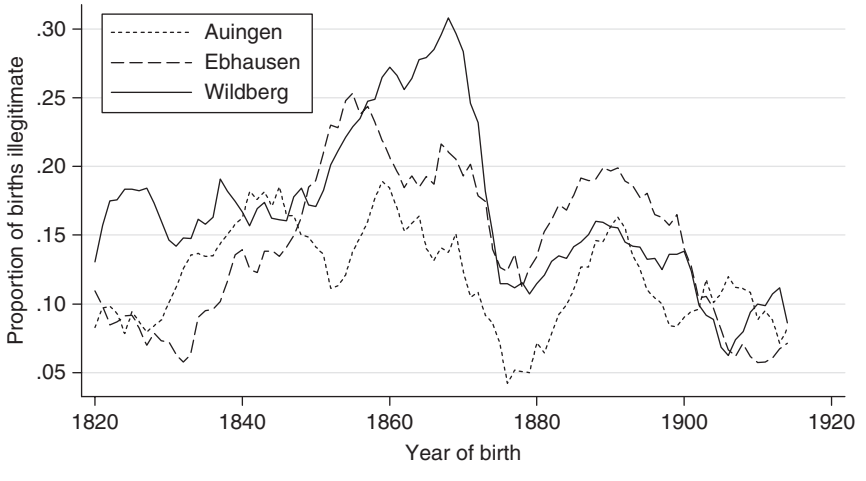

Figure 11. Proportion illegitimate during the repeal of the *politische Ehekonsens*. Note: Figures are centered seven-year moving averages.

8. Conclusion

This paper provides an initial overview of a distinctive demographic regime observable in three Württemberg communities over a period of about three centuries ending in 1914. The populations we study are of particular interest because they lived under a set of economic, social, and demographic controls that were quite typical for central Europe but unknown in France, the Low Countries, or England, the European societies that have been the focus of most historical demographic research. These controls shaped demographic behavior both indirectly and directly, in ways that show up clearly even in these early results.

The pervasive regulation by local elites of the economic and demographic decisions of the lower social strata made Württemberg – including our three communities – poorer than other parts of western Europe, and less able to take advantage of the new opportunities offered by the growth of the European economy in the eighteenth and nineteenth centuries. This stagnant economy meant more out-migration and less opportunity to marry and form new households in one's community, or even one's country, of birth. Economic and demographic regulation in these central European communities effectively divided the population into 'insiders' and 'outsiders,' forcing the latter to attempt to evade the pervasive restrictions on the life-choices they were allowed to make.

These controls also exercised a direct impact on demographic behavior, with implications that show up starkly even in the simple measures we report here. The *politische Ehekonsens* had long required that couples wishing to marry obtain permission from local authorities. Permission was often denied, meaning that many young adults faced a choice between remaining single or leaving for other places. Some who remained had children anyway, but fewer than if they had been married. When these restrictions were removed between 1862 and 1870, an immediate marriage boom ensued, followed by an increase in the total number of births and a sharp reduction in the proportion of all children born to unwed mothers.

This dramatic reaction to the end of the state demographic controls in the late nineteenth century strongly suggests that the various precursor controls exercised on the local level over the entire earlier period exerted important and as yet unappreciated effects on demographic behavior. The regulations created a two-tiered demographic system. The upper tier consisted of those who could marry and enjoy full adulthood while continuing to live in this society: these 'insiders' followed a demographic pattern characterized by high marital fertility but also unusually high mortality of their offspring, for reasons which we suspect to be economically endogenous but which require deeper investigation. The lower tier consisted of those who were denied access to marriage and the right to practise an occupation independently: these 'outsiders' followed a demographic pattern characterized by epidemic emigration (for males), rising illegitimate fertility (for females), and high mortality among extra-marital 'outsider' infants. The deeper operation of this 'two-tiered' system in these German villages, and its implications for demographic and economic development in central Europe over the three centuries before and during the transition to modern economic growth, open up perspectives for wider comparative analysis.

Acknowledgements

We gratefully acknowledge financial support from the Economic and Social Research Council of Great Britain; the Leverhulme Trust; and the Economic Growth Center (Yale University). Markus Küpker and Janine Maegraith provided excellent research assistance. We are grateful to Adèle Rossouw and Marian Schmidt for additional help. For comments and suggestions we thank seminar participants at INED, Queen's University (Kingston), UCLA, the University of Copenhagen, and Williams College. This paper is part of a larger ongoing project; for detailed background information

on the communities in question, see Ogilvie et al. (2009); for a more formal treatment of population and economic shocks, see Guinnane and Ogilvie (2008). We thank Cambridge University Press for permission to reproduce the map in Figure 1.

Notes

1. Galor and Weil (2000) is the key reference in 'unified growth theory,' the most influential strand of recent theoretical work on long-run growth. Galor (2011) discusses more recent contributions. Guinnane (2011) discusses the demographic transition, stressing weaknesses in the way the growth-theoretical literature interprets the historical evidence.
2. For suggestive evidence to this effect, see Ogilvie (2003), 196–200; Medick (1996), 359–360, 368–369.
3. Examples of that literature include our own, earlier effort (Guinnane and Ogilvie (2008)), which uses two of the three sets of registers discussed here; Weir (1984); and Galloway (1988). The two volumes of the 'Eurasia project' (Bengtsson et al. (2004) and Tsuya et al. (2010)) include references to more recent studies of this type. The most famous project in this tradition is Wrigley & Schofield (1981).
4. For Wildberg we have two distinct estimates for 1818 (1593 and 1594 persons) as well as for 1821 (1560 and 1786 persons). We use the average of the two totals, although the differences are too small to affect the results reported here. We discuss the sources underlying Figure 2, and the rest of the paper, in section 2 below.
5. For more detail on the economic history of Wildberg, Ebhausen, and the immediate region, see Ogilvie (1997, 2003); Troeltsch (1897); Mantel (1974); Klaß (1987); Königliches Statistisch-topographisches Bureau (1862).
6. For a more complete discussion of these demographic sources, see Ogilvie et al. (2009).
7. See Ogilvie et al. (2009), pp. 85–86, p. 65. Catholics in Auingen remained under the pastoral care of the priest in nearby Magolsheim.
8. That is, the value reported for 1750 is the sum of the counts for 1747–1753, divided by seven. Figure 3 includes all marriages. Below we discuss differences between first and higher-order marriages. Guinnane and Ogilvie (2008) report econometric analysis of marriages, deaths and births as reactions to economic 'shocks,' using the techniques employed by Weir (1984).
9. Figure 5 includes both illegitimate births and stillbirths. The dividing line between stillbirths and live births is not always clear-cut, but the range of error is small relative to the levels in Figure 5. We discuss the issue in more detail in section 7 below.
10. We discuss legitimacy and illegitimacy below.
11. See Wrigley and Schofield (1981). Wrigley et al. (1997) undertake this with family reconstitutions.
12. The year given on the horizontal axis in each graph is the beginning-year of the quarter-century in question: thus '1700' indicates the quarter-century 1700–1724. Exceptionally, '1875' indicates the period 1875–1914. To facilitate comparison to other studies, we present the raw numbers underlying Figures 6–8 in Appendix 2.
13. The idea of marriage as central to demographic behavior goes back to Malthus. Hajnal (1965, 1982) argued that a distinctive 'western European marriage pattern' was central to population patterns in that region. Wrigley and Schofield (1981) is just one study that views nuptiality as the primary control in a pre-modern population.
14. Guinnane (1997) focuses on post-Famine Ireland, but includes comparative discussion for much of Europe.
15. One way to think about the *politische Ehekonsens* is to recall Malthus' objections to 'early and improvident marriages' and the English Poor Laws' supposed role in fostering such marriages. Malthus objected to some marriages and many of his contemporaries doubtless felt the same way. But they had no legal right to forbid them, in contrast to the right possessed and exercised by the Württemberg state and devolved by it to the local communities. On the legal framework and concrete implementation of the *politische Ehekonsens* in Württemberg, see Matz, 1980, esp. 44–5, 120–121, 181, 191; Borscheid, 1982, esp. 243–260; Kaschuba & Lipp, 1982, esp. 312–362; Schraut, 1989, esp. 91–121; Ehmer, 1991, esp. 53–55; Ogilvie, 1997, 61–63; Ogilvie, 2003, 51–54.
16. Tables 3–5 include a bride or groom if she *or* he has a valid birthdate; that is, the number of events recorded from a given marriage need not be equal. For the seventeenth century, especially in

Ebhausen, the register did not record prior marital status at marriage for some brides and grooms. Based on the conventions governing how individuals were identified in written documents in this society, however, brides of unrecorded marital status can be assumed to be unmarried in almost all cases, while grooms of unrecorded marital status can be assumed to be widowers. The ages at marriage reported in our tables are not sensitive to variations in treatment of this problem. If we simply exclude all brides and grooms of unrecorded marital status, the sample becomes smaller without appreciable changes in the mean or median age at marriage reported in the tables.

17. Flinn, 1981 (Appendix 7) and Dennison & Ogilvie, 2013 (Table 1) report only a handful of studies with a female mean age at first marriage outside the range observed in our three communities. These two surveys do not report male age at marriage. Medick, 1996, Table 4.3, reports a similar pattern for Laichingen, with female ages at first marriage peaking at a mean of 27.4 in 1850–74. Knodel, 1988, 122–123 (Table 6.1), finds the same pattern for Öschelbronn, with female marriage age peaking at 27.4 in 1850–74. Kaschuba & Lipp, 1982, 331 (Table II.5), find a very similar pattern but even female higher marriage ages in Kiebingen, with a peak of 30.8 in 1850–54. A similarly high marriage age, typically peaking in the period 1850–70, is reported by Schomerus, 1976, 175 (Table 1) for women marrying factory workers in Esslingen and by Borscheid, 1982, 260 (Table 1), for brides of craftsmen in Nürtingen.
18. The figure cited in the text includes stillbirths and covers the entire period of Knodel's study, roughly the eighteenth, nineteenth, and early twentieth centuries. Öschelbronn experienced a sharp fall in infant and child mortality in the late nineteenth century, similar to the decline we document below for our communities.
19. Medick's estimates apparently include illegitimate children, and he uses a different approach to dealing with children whose date of death is not known, so his figures are not directly comparable to ours.
20. Wrigley et al. (1997) estimate adult mortality from their family reconstitutions. The challenge for this type of analysis is to estimate the numbers and ages of adults at risk of death, which in a mobile population requires potentially heroic assumptions. A second approach is to rely on model life tables to infer adult mortality from the mortality levels estimated for children. We prefer this approach, like Knodel (1988), and return to it at the end of this section.
21. In Ebhausen we lack death dates for 2225 of 9779 (or 23%) of the children linked to a birth. Of those, 686 were born after 1850. In Wildberg we have 11,377 births, of which 34% are not linked to a death. Of these 3942 births missing a death date, 1202 were born after 1850.
22. One might be tempted to infer that a child remained in the community on the basis of information concerning the birth or death of *siblings*. We deliberately do not use such information, as it would definitely be selecting on individuals whose parents had more births and perhaps higher rates of infant mortality.
23. A similar late-nineteenth-century decline in infant mortality is observed for the Württemberg village of Kiebingen by Kaschuba & Lipp, 1982 (Table II.93).
24. Illegitimate children were approximately twice as likely as legitimate ones to be marked as stillborn in all three communities. This difference probably reflects both conditions of pregnancy (since unmarried women were even more likely to have to keep working late in pregnancy than married ones) and the conditions under which such children were born (since unmarried pregnant women were more likely to be poor and 'outsiders' to the mainstream community).
25. Table 11 excludes stillbirths. In the next section we report very high fertility rates early in marriage, another indicator of low breastfeeding rates.
26. The table reports only the proportion of children born in a given month who died in the first month of life. The basic patterns shown in Table 12 are similar to the patterns shown by the proportion that died within the first week or the first year of life. In discussing seasonality we focus on mortality up to the age of one month in order to reduce ambiguity concerning which 'season' the child experiences.
27. The historical demography literature uses the term 'endogenously' differently. See Bourgeois-Pichat (1951).
28. A simple summary is that in our communities infant mortality is higher relative to child mortality than the 'East' model life tables imply. Thus any estimate of adult mortality will depend on whether it is based on infant or on child mortality estimates.
29. Our estimates of mortality to age five imply somewhat less severe mortality, ranging between levels 4 and 10.

30. Following Knodel and others, if the first birth interval is shorter than nine months, we 'back date' the marriage so that the first interval has the same length as the mean for first births that did not involve bridal pregnancy.
31. The estimates of age-specific fertility in Figure 10 and Table 14 exclude women who contribute less than one year of observation to a cell. This avoids the situation where, for example, a woman has a birth just before turning 25, thus producing a rate that is correct but misleadingly high.
32. Since 'm' measures the reduction of fertility at older ages, it is best viewed as an indicator of 'stopping.' Earlier studies estimated 'M' and 'm' by taking logs and fitting a straight line. The estimates we report are based on the preferred approach of estimating the model in 'levels' by nonlinear least squares. As a rule of thumb most demographers consider a Coale–Trussell 'm' greater than 0.2 as evidence of parity-dependent fertility control.
33. We also re-estimated 'M' and 'm' with weights for the number of woman-years of exposure in each cell. This did not yield appreciably different results.
34. Borscheid (1982, p. 243ff and note 88) suggests a more precise periodization of the waxing and waning enforcement of the *politische Ehekonsens.* Building on his dating, we attempted a rough statistical test of the regulations' impact. For each community we estimated a separate AR(2) model of the number of marriages regressed on a fourth-degree polynomial in time plus dummies for every year in the range 1860–80. For Ebhausen and Wildberg the results show strong (positive) departures from trend for the period from the early 1860s to the late 1870s, as suggested by the graph. For Auingen the results are less clear-cut, in part because of the mini-boom in the 1840s noted above. We also adapted this approach to the periods Borscheid suggests; the results suggest that the periodization he describes does not account for the data from any of our communities. We do not believe these econometric analyses (or visual inspection of graphs) are the proper way to test the effects of the *politische Ehekonsens*. At the top of our research agenda is the question of how the restrictions' repeal affected marriage ages and marriage chances as revealed by the micro-level reconstitution data.
35. Schlumbohm (1997), 649–650, 660–661; referring to Foucault (1975).
36. In 1852, 67.3% of the German population lived in settlements under 2,000 inhabitants. See Twarog, 1997, pp. 288–289.
37. The most famous version of this debate focused on Bavaria, but the same arguments are relevant for our communities. See Lee (1977b, 1978) and Shorter (1971, 1973, 1978).
38. One might expect the end of the *politische Ehekonsens* to result in a reduction in average ages at marriage. Tables 3–5 actually suggest such a reduction, except for women in Auingen. But on closer examination the reduction in age at marriage during the quarter-century 1875–99 took place long after the repeal of the *politische Ehekonsens*, and cannot properly be attributed to it. This is not the case in our reconstitutions; if anything, there is at first an increase in the number of older brides and grooms. This observation is consistent with the idea that the repeal's major effect was on a cohort of people in their twenties and early thirties who would not have been allowed to marry under the old regime, and who had been forced to wait to marry past the age when they would have preferred to do so.
39. At least this belief is persistent in the historical demography literature; for example, Kintner (1988, p. 237) claims 'they [Catholics] tended to register stillbirths as infant deaths, thereby inflating the recorded infant mortality rate.'

References

Bassler, G. P. (1974). Auswanderungsfreiheit und Auswandererfürsorge in Württemberg 1815–1855. Zur Geschichte der südwestdeutschen Massenauswanderung nach Nordamerika [Freedom of emigration and provision for emigrants in Württemberg 1815–1855: On the history of the southwest German mass emigration to North America]. *Zeitschrift für Württembergische Landesgeschichte*, *33*, 117–160.

Bengtsson, T., Campbell, C., Lee, J. Z., et al. (2004). *Life under pressure: Mortality and living standards in Europe and Asia, 1700–1900*. Cambridge, MA: MIT Press.

Benz, E. (1999). *Fertility, wealth, and politics in three southwest German villages 1650–1900*. Boston: Brill.

Boelcke, W. A. (1987). *Wirtschaftsgeschichte Baden-Württembergs von den Römern bis heute [The economic history of Baden-Württemberg from the Romans to the present]*. Stuttgart, Theiss.

Borscheid, P. (1982). Lebensstandard und Familie. Partnerwahl und Ehezyklus in einer württembergischen Industriestadt im 19. Jahrhundert [Living standards and family: Partner

choice and marriage cycles in a Württemberg industrial city in the nineteenth century]. *Archiv für Sozialgeschichte*, *22*, 227–262.

Bourgeois-Pichat, J. (1951). La mesure de la mortalité infantile. I. Principes et méthodes [Measuring infant mortality: Principles and methods]. *Population (French Edition)*, *6*, 233–248, 459–480.

Breschi, M., Fornasin, A., & Gonano, G. (2005). Short-term demographic changes in relation to economic fluctuations: The case of Tuscany during pre-transitional period. In R. C. Allen, T. Bengtsson, & M. Dribe (Eds.), *Living standards in the past: New perspectives on well-being in Asia and Europe*. (pp. 314–340) Oxford: Oxford University Press.

Coale, A.J., & Trussell, T.J. (1978). Technical note: Finding the two parameters that specify a model schedule of marital fertility. *Population Index*, *44*, 203–213.

Dennison, T., & Ogilvie, S. (2013). *Does the European marriage pattern explain economic growth?* CESifo Working Papers 4244.

Ehmer, J. (1991). *Heiratsverhalten, Sozialstruktur und ökonomischer Wandel. England und Mitteleuropa in der Formationsperiode des Kapitalismus [Marriage behaviour, social structure, and economic change: England and Central Europe in the period of the development of capitalism]*. Göttingen: Vandenhoeck und Ruprecht.

Feng, W., Campbell, C., & Lee, J. Z. (2010). Agency, hierarchies, and reproduction in northeastern China, 1789–1840. In N. Tsuya, W. Feng, G. Alter & J. Z. Lee (Eds.), *Prudence and pressure: Reproduction and human agency in Europe and Asia, 1700–1900*. (pp. 287–316) Cambridge, MA: MIT Press.

Fertig, G. (2000). *Lokales Leben, atlantische Welt. Die Entscheidung zur Auswanderung vom Rhein nach Nordamerika im 18. Jahrhundert [Local life, Atlantic world: The decision to emigrate from the Rhine to North America in the eighteenth century]*. Osnabrück: Universitätsverlag Rasch.

Flik, R. (1990). *Die Textilindustrie in Calw und in Heidenheim 1705–1870. Eine regional vergleichende Untersuchung zur Geschichte der Frühindustrialisierung und Industriepolitik in Württemberg [The textile industry in Calw and Heidenheim, 1705–1870: A comparative regional investigation of the history of early industrialization and industrial policy in Württemberg]*. Stuttgart: Steiner.

Flinn, M. W. (1981). *The European demographic system, 1500–1820*. Baltimore: Johns Hopkins University Press.

Foucault, M. (1975). *Surveiller et punir: naissance de la prison [Discipline and punish: The birth of the prison]*. Paris: Gallimard.

Fritz, E. (1993). Die Kirche im Dorf [The church in the village]. *Zeitschrift für Württembergische Landesgeschichte*, *52*, 155–178.

Galloway, P. R. (1988). Basic patterns in annual variations in fertility, nuptiality, mortality, and prices in pre-industrial Europe. *Population Studies*, *42*, 275–303.

Galor, O. (2011). *Unified growth theory*. Princeton: Princeton University Press.

Galor, O., & Weil, D. N. (2000). Population, technology, and growth: From Malthusian stagnation to the demographic transition and beyond. *American Economic Review*, *90*, 806–828.

Grube, W. (1954). Dorfgemeinde und Amtsversammlung in Altwürttemberg [Village community and district assembly in Old Württemberg]. *Zeitschrift für Württembergische Landesgeschichte*, *13*, 194–219.

Guinnane, T. W. (1997). *The vanishing Irish: Households, migration, and the rural economy in Ireland, 1850–1914*. Princeton: Princeton University Press.

Guinnane, T. W. (2011). The historical fertility transition: A guide for economists. *Journal of Economic Literature*, *49*, 589–614.

Guinnane, T. W., & Ogilvie, S. (2008). *Institutions and demographic responses to shocks: Württemberg, 1634–1870*. Yale University Economic Growth Center Discussion Paper 962.

Hajnal, J. (1965). European marriage patterns in perspective. In D. V. Glass & D. E. C. Eversley (Eds.), *Population in history: Essays in historical demography* (pp. 101–143). London: Edward Arnold.

Hajnal, J. (1982). Two kinds of preindustrial household formation system. *Population and Development Review*, *8*, 449–494.

Hippel, W. V. (1984). *Die Bauernbefreiung im Königreich Württemberg [The emancipation of the peasantry in the Kingdom of Württemberg]*. Boppard am Rhein: Boldt.

Hoffmann, L. (1905). *Das württembergische Zunftwesen und die Politik der herzoglichen Regierung gegenüber den Zünften im 18. Jahrhundert [The Württemberg guild system and the policy of the*

ducal government towards the guilds in the eighteenth century] (Ph.D. dissertation). University of Tübingen.

Holtz, S. (1996). Vom Umgang mit der Obrigkeit. Zum Verhältnis von Kirche und Staat im Herzogtum Württemberg [Dealing with the authorities: The relationship between church and state in the duchy of Württemberg]. *Zeitschrift für Württembergische Landesgeschichte*, *55*, 131–159.

Kaschuba, W., & Lipp, C. (1982). *Dörfliches Überleben. Zur Geschichte materieller und sozialer Reproduktion ländlicher Gesellschaft im 19. und frühen 20. Jahrhundert [Surviving in the village: The history of the material and social reproduction of rural society in the nineteenth and early twentieth century]*. Tübingen: Tübinger Vereinigung für Volkskunde.

Kintner, H. J. (1988). L'impact des caractéristiques de l'allaitement sur les différences régionales de mortalité infantile en Allemagne vers 1910 [The impact of the characteristics of breast-feeding on regional differences in infant mortality in Germany around 1910]. *European Journal of Population*, *3*, 233–261.

Klaß, J. (1988). *Wildberger Chronik. Effringen – Gültlingen – Schönbronn – Sulz am Eck – Wildberg, 1237–1988 [Wildberg chronicle: Effringen, Gültlingen, Schönbronn, Sulz am Eck, and Wildberg, 1237–1988]*. Wildberg: Schönbronner Verlag.

Knodel, J. (1967). Law, marriage, and illegitimacy in nineteenth-century Germany. *Population Studies*, *20*, 279–294.

Knodel, J. E. (1988). *Demographic behavior in the past: A study of fourteen German village populations in the eighteenth and nineteenth centuries*. Cambridge: Cambridge University Press.

Königliches Statistisch-topographisches Bureau. (1862). *Beschreibung des Oberamts Nagold [Description of the District of Nagold]*. Stuttgart: Kohlhammer.

Lee, W. R. (1977a). *Population growth, economic development and social change in Bavaria, 1750–1850*. New York: Arno Press.

Lee, W. R. (1977b). Bastardy and the socioeconomic structure of south Germany. *Journal of Interdisciplinary History*, *7*, 403–425.

Lee, W. R. (1978). Bastardy in south Germany: A reply. *Journal of Interdisciplinary History*, *8*, 471–476.

Maisch, A. (1992). *Notdürftiger Unterhalt und gehörige Schranken: Lebenbedingungen und Lebensstile in württembergischen Dörfern der frühen Neuzeit [Makeshift livelihoods and appropriate constraints: Living conditions and life styles in Württemberg villages of the early modern period]*. Stuttgart: Lucius & Lucius.

Mantel, J. (1974). *Wildberg. Eine Studie zur wirtschaftlichen und sozialen Entwicklung der Stadt von der Mitte des sechzehnten bis zur Mitte des achtzehnten Jahrhunderts [Wildberg: A study of the economic and social development of the town from the mid-sixteenth to the mid-eighteenth century]*. Stuttgart: Kohlhammer.

Mantl, E. (1997). *Heirat als Privileg. Obrigkeitliche Heiratsbeschränkungen in Tirol und Vorarlberg 1820 bis 1920 [Marriage as a privilege: State marriage restrictions in the Tyrol and in Vorarlberg, 1820–1920]*. Vienna/Munich: Verlag für Geschichte und Politik and R. Oldenbourg Verlag.

Mantl, E. (1999). Legal restrictions on marriage. *The History of the Family*, *4*, 185–207.

Matz, K.-J. (1980). *Pauperismus und Bevölkerung. Die gesetzlichen Ehebeschränkungen in den süddeutschen Staaten während des 19 Jahrhunderts [Pauperism and population: Legal marriage restrictions in the south German states during the nineteenth century]*. Stuttgart: Klett-Cotta.

Medick, H. (1996). *Weben und Überleben in Laichingen, 1650–1900 [Weaving and surviving in Laichingen, 1650–1900]*. Göttingen: Vandenhoeck und Ruprecht.

Müller, R. (2000). *Von der Wiege zur Bahre: weibliche und männliche Lebensläufe im 19. und frühen 20. Jahrhundert am Beispiel Stuttgart-Feuerbach [From cradle to grave: Female and male life courses in the nineteenth and early twentieth century, based on the example of Stuttgart-Feuerbach]*. Stuttgart: Hohenheim.

Ogilvie, S. (1992). Germany and the seventeenth-century crisis. *The Historical Journal*, *35*, 417–441.

Ogilvie, S. (1995). *Population growth and state policy in central Europe before industrialization*. Centre for History and Economics working papers. Retrieved from http://www.econ.cam.ac.uk/faculty/ogilvie/Population-and-State-in-Central-Europe-1995.pdf

Ogilvie, S. (1997). *State corporatism and proto-industry: The Württemberg Black Forest 1590–1797*. Cambridge: Cambridge University Press.

Ogilvie, S. (1999). The German state: A non-Prussian view. In E. Hellmuth & J. Brewer (Eds.), *Rethinking Leviathan: the eighteenth-century state in Britain and Germany* (pp. 167–202). Oxford: Oxford University Press.

Ogilvie, S. (2003). *A bitter living: Women, markets, and social capital in early modern Germany*. Oxford: Oxford University Press.

Ogilvie, S. (2004a). Guilds, efficiency, and social capital: Evidence from German proto-industry. *The Economic History Review*, *57*, 286–333.

Ogilvie, S. (2004b). How does social capital affect women? Guilds and communities in early modern Germany. *The American Historical Review*, *109*, 325–359.

Ogilvie, S. (2006). 'Eine sauere Nahrung'. Frauen, Märkte, und soziales Kapital im frühmodernen Deutschland [A bitter living: Women, markets, and social capital in early modern Germany]. *Jahrbuch für Regionalgeschichte*, *24*, 13–36.

Ogilvie, S. (2010). Consumption, social capital, and the 'Industrious Revolution' in early modern Germany. *The Journal of Economic History*, *70*, 287–325.

Ogilvie, S., Küpker, M., & Maegraith, J. (2009). *Community characteristics and demographic development: Three Württemberg communities, 1558–1914*. Cambridge Working Papers in Economics 0910.

Ogilvie, S., Küpker, M., & Maegraith, J. (2012). Household debt in early modern Germany: Evidence from personal inventories. *The Journal of Economic History*, *72*, 134–167.

Raiser, G. H. (1978). *Die Zünfte in Württemberg. Entstehung und Definition, interne Organisation und deren Entwicklung, dargestellt anhand der Zunftartikel und der übrigen Normativbestimmungen seit dem Jahre 1489 [The guilds in Württemberg: Their rise, definition, internal organization and development, presented on the basis of the guild ordinances and other normative provisions, from 1489 onwards]*. Tübingen: Eberhard-Karls-Universität zu Tübingen.

Reininghaus, W. (1990). *Gewerbe in der frühen Neuzeit [Industries in the early modern period]*. Munich: Oldenbourg.

Sabean, D. W. (1990). *Property, production and family in Neckarhausen, 1700–1870*. Cambridge: Cambridge University Press.

Scharf, H.-W., & Wollny, B. (1995). *Die Eisenbahn im Nordschwarzwald, vol. 1: Historische Entwicklung und Bahnbau [The railway in the northern Black Forest, vol. I: The historical development and the building of the track]*. Freiburg im Breisgau: Eisenbahn-Kurier-Verlag.

Schlumbohm, J. (1994). *Lebensläufe, Familien, Höfe. Die Bauern und Heuerleute des Osnabrückischen Kirchspiel Belm in proto-industrieller Zeit, 1650–1860 [Life courses, families, farms: The peasants and Heuerleute of the Osnabrück parish of Belm in the proto-industrial period, 1650–1800]*. Göttingen: Vandenhoeck & Ruprecht.

Schlumbohm, J. (1997). Gesetze, die nicht durchgesetzt werden – ein Strukturmerkmal des frühneuzeitlichen Staates? [Laws that were not enforced: a structural feature of the early modern state?] *Geschichte und Gesellschaft*, *23*, 647–663.

Schnabel-Schüle, H. (1990). Calvinistische Kirchenzucht in Württemberg? Zur Theorie und Praxis der württembergischen Kirchenkonvente [Calvinist church discipline in Württemberg? On the theory and practice of the Württemberg community church courts]. *Zeitschrift für Württembergische Landesgeschichte*, *49*, 169–224.

Schomerus, H. (1976). Sozialer Wandel und generatives Verhalten. Diskussionsbeitrag zur branchespezifischen Untersuchung generativen Verhaltens [Social change and reproductive behaviour: A contribution to the debate on investigating industry-specific reproductive behaviour]. In W. Conze (Ed.), *Sozialgeschichte der Familie in der Neuzeit Europas* (pp. 173–182). Stuttgart.

Schraut, S. (1989). *Sozialer Wandel im Industrialisierungsprozeß. Esslingen 1800–1870 [Social change in the process of industrialization: Esslingen, 1800–1870]*. Esslingen: Stadtarchiv Esslingen.

Shorter, E. (1971). Illegitimacy, sexual revolution, and social change in modern Europe. *Journal of Interdisciplinary History*, *2*, 237–272.

Shorter, E. (1973). Female emancipation, birth control, and fertility in European history. *The American Historical Review*, *78*, 605–640.

Shorter, E. (1978). Bastardy in south Germany: A comment. *Journal of Interdisciplinary History*, *8*, 459–469.

Staudenmeyer, W. (1972). Die soziale Lage der in der Calwer Zeughandlungs-Compagnie gebannten Zeugmacher [The social position of the worsted-weavers who were legally bound to

the Calw Worsted Trading Company]. In E. Maschke & J. Sydow (Eds.), *Städtische Mittelschichten* (pp. 104–119). Stuttgart: Kohlhammer.
Troeltsch, W. (1897). *Die Calwer Zeughandlungskompagnie und ihre Arbeiter. Studien zur Gewerbe- und Sozialgeschichte Altwürttembergs [The Calw Worsted Trading Company and its workers: studies on the industrial and social history of Old Württemberg].* Jena: Fischer.
Tsuya, N., Feng, W., Alter, G., & Lee, J. Z. (Eds.). (2010). *Prudence and pressure: Reproduction and human agency in Europe and Asia, 1700–1900*. Cambridge, MA: MIT Press.
Twarog, S. (1997). Heights and living standards in Germany, 1850–1939: The case of Württemberg. In R. H. Steckel & R. Floud (Eds.), *Health and welfare during industrialization* (pp. 285–330). Chicago: University of Chicago Press.
Vann, J. A. (1984). *The making of a state: Württemberg, 1593–1793*. Ithaca/London: Cornell University Press.
Veichtlbauer, O., Zeileis, A., & Leisch, F. (2006). The impact of interventions on a pre-industrial Austrian Alpine population. *Collegium antropologicum*, *30*, 1–11.
Weir, D. R. (1984). Life under pressure: France and England, 1670–1870. *The Journal of Economic History*, *44*, 27–47.
Wilson, P. H. (1995). *War, state and society in Württemberg, 1677–1793*. Cambridge: Cambridge University Press.
Wrigley, E. A., Davies, R. S., Oeppen, J. E., & Schofield, R. S. (1997). *English population history from family reconstitution 1580–1837*. Cambridge: Cambridge University Press.
Wrigley, E. A., & Schofield, R. S. (1981). *The population history of England, 1541–1871: A reconstruction*. Cambridge: Cambridge University Press.

Appendix 1. The definition of stillbirths

The definition of a stillbirth was probably neither standardized nor static in our communities, so some of the changes we observe may reflect changes in recording practices rather than (or in addition to) changes in the experience of late-term fetuses. There are two reasons for uncertainty about recording practices. First, religious concerns about the child's soul may have encouraged the baptism of children even if they were really stillborn. Lutherans (like Catholics) held that baptized children go to heaven, while unbaptized children do not. Adherents of such beliefs might baptize children who were actually stillborn.[39] Second, non-religious changes in the understanding of 'birth' might lead to different judgments about an individual child.

The registers of baptism and burial for our communities include various notations that we have sorted into binary categories of 'born alive' and 'stillborn.' Under 'stillborn' we include children listed as 'born dead', including the additional notation 'premature' or 'miscarriage', as well as 'died shortly after the birth.' Several other notations suggest that a child was weak at birth or died soon after, but we do not include these in the stillbirth designation. These include indications that the child was given emergency baptism (*Gähtauf*, *Nottauf*), but did not die immediately; that the child was baptized at home or by the midwife or father, implying emergency baptism; that the child died shortly after the birth or during an emergency baptism; or that the child was weak at birth (without there being any notation of death). Ours is a conservative parsing of the primary-source information, which is why we present results separately in the text using a broader definition of stillbirth. In practice, however, a more expansive reading of the primary sources would not give rise to appreciably different results. For example, we have coded children marked as 'nameless' as not stillborn. One could make a case for these instances being ambiguous, but there is a total of 10 such births in Wildberg (out of a total of 15,509) and 35 in Ebhausen (out of 12,005). They cannot be a major source of estimation error.

Appendix 2.

Table A1. Crude rates in numerical form.

	Crude Birth Rate			Crude Marriage Rate			Crude Death Rate		
Quarter-century	Auingen	Ebhausen	Wildberg	Auingen	Ebhausen	Wildberg	Auingen	Ebhausen	Wildberg
1700–1724	57.54	64.75	41.47	8.69	12.09	9.07	33.81	41.58	33.72
1725–1749	46.75	53.13	36.95	9.24	10.17	8.56	34.95	38.07	36.20
1750–1774	45.67	52.96	39.32	9.13	10.99	8.80	35.03	41.32	40.72
1775–1799	55.06	55.49	39.28	8.21	10.01	9.23	45.52	41.78	35.49
1800–1824	49.03	43.59	39.26	9.40	10.21	9.95	38.75	31.87	36.25
1825–1849	50.20	42.82	38.97	12.73	9.42	10.33	43.57	31.17	36.13
1850–1874	50.36	43.37	44.95	12.74	12.04	14.68	36.31	36.77	42.31
1875–1899	44.10	39.59	37.17	7.85	7.75	6.62	30.97	32.59	33.97
1900–1914	34.06	35.94	31.06	8.71	7.62	7.50	17.76	21.34	28.57

Note: The figures reported here are crude rates per thousand persons, and for the period prior to 1875 correspond to the numbers reported graphically in Figures 6–8. For 1875–1914, however, the graphs combine the estimates into one period of 40 years; here we split 1875–1899 from 1900–1914, to provide more information.