Are parish registers a reliable source for early modern occupational statistics?

A comparison of parish registers with census results

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Abstract: The paper investigates the use of parish registers as a source for occupational statistics in the periods before modern occupational censuses. Parish registers, which are available in Austria from the 17th century onward, contain many indications of occupations, but their representativeness is not guaranteed from the beginning. This research compares Austrian parish data of 1890 with data from the Austrian 1890 census, using a measure of dissimilarity for quantifying the differences. It turns out that parish registers are a good source for estimating the occupational structure on the level of sectors. They are not quite as good in measuring occupation on the less aggregated level of branches. They are useless in a measurement of social stratification within those branches or sectors.

Keywords: parish registers, occupational structure, census, measurement of dissimilarity

JEL Codes: N01, N33

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The present study investigates the use of parish registers as a source for occupational statistics in the territory of the present Republic of Austria up to the 19th century. In pre-World War I Austria, usable occupational censuses are available only in 1869, 1880, 1890, 1900, and 1910. For earlier periods, a potential source for occupational statistics may be parish registers.

Parish records register baptisms, marriages and burials in continuous entries. They apply to the territory and population of a single parish each, and are supposed to include every such event there. In some regions, such registers appeared as early as the late Middle Ages. In Roman Catholic areas, they became obligatory from the Council of Trent on, but the implementation took some decades.

In Austria, the Catholic registers are the only such source from the 17th century up to the second half of the 18th century. After the stepwise introduction of religious tolerance, Orthodox and Protestant Christians and the Jewish communities created their own registers. From 1870, the public district authorities had to maintain a civil registry office for people who did not belong to any recognised church. For the vast majority, though, the Catholic Church remained in charge of the vital records up to 1939, when all such matters came under the responsibility of state register offices.

Parish registers and occupational statistics

Parish registers provide plenty of information on occupation, and they have been used this way for a long time. In 1889, the president of the Austrian statistical Central Commission, Karl Theodor von Inama-Sternegg, propagated the use of these sources for research purposes, explicitly referring to social factors (1889, 399). Much later, Imhof recommended parish records as a source in historical demography, referring explicitly to occupations – and he recommended the use of computers because of the large quantity of data (1977, 97–99). Parish registers as a source of occupational data, and the connected problems of terminology and classification, appear also in Weigl's introductory article on Austria (2004, 702–3). In an investigation of a Styrian region, Becker employed indications of occupation and social status in marriage registers as a factor for the choice of marriage partners (1990, 206–219). Jones used parish registers including their information on occupation in her study on a community in Burgundy in the late 17th century (2005). Certainly, the greatest enterprise of the kind was the research project on the occupational structure of Britain from the 14th century to World War I, conducted by the Cambridge Group for the History of Population and Social Structure. The project used sources of various kind for occupational statistics down to the local level, among them baptism registers with millions of entries. It focused on the male population because female occupations are normally not listed in baptism registers (publications include, for instance, Keibek 2017; Kitson 2007; Shaw-Taylor and Wrigley 2014; Yate 2014). In order to test the reliability of the findings, the data derived from parish registers were compared with conscription lists and census results of a neighbouring time period (Kitson et al 2012, 10–15).

The present study goes one step further, comparing occupational data gathered from parish records in one year with census results of the same year. Normally, one would not transcribe parish registers when there is a contemporary census available. Quite different from parish data, census data can be digitised easily and at low cost. The transcription and analysis of parish registers for this study had a purely methodological purpose. The exercise aims at estimating the deviation between data from two sources that are supposed to yield the same result. For that purpose, we used the occupational census results of 1890 as the benchmark, and recorded and analysed parish registers of 1890 as well.

Areas of investigation

The 1890 census data are available for about 360 political districts and municipalities in the Austrian part of the Austro-Hungarian Monarchy (Hungary conducted a similar census at the same time). About 70 of these districts lay in the territory of the present Republic of Austria. We chose three districts of different type for this case study: Baden in Lower Austria, to the south of Vienna; Gmunden in the south of Upper Austria; and Zell am See in the

Table 1: Population. population movement. and occupation in the districts of Baden. Gmunden. and Zell. 1890

		Baden			Gmunden			Zell		
		males	females	total	males	females	total	males	females	total
Area (km²)				771			1,411			2,745
Population density (persons per km²)				132.9			38.8			11.6
Population		50,382	52,035	102,417	26,400	28,304	54,704	15,970	15,916	31,886
of which (%)	Occupied in agriculture, manufacturing, services	65.1	34.9	49.7	64.5	38.4	51.0	67.2	55.0	61.1
	Other income	4.4	6.7	5.6	6.3	8.3	7.3	10.4	12.3	11.3
	Unemployed relatives	30.5	58.5	44.7	29.2	53.3	41.6	22.4	32.7	27.5
	Born in the district of residence	55.4	53.5	54.4	80.8	80.8	80.8	85.9	89.2	87.5
	Born in a different district of the same province	18.1	21.1	19.6	10.6	11.4	11.0	4.3	3.6	4.0
	Born in a different province	18.2	17.3	17.7	7.2	6.6	6.9	8.8	6.4	7.6
	Born abroad	8.4	8.1	8.2	1.5	1.3	1.4	0.9	0.8	0.9
	In settlements with up to 500 inhabitants			12.0			54.8			82.9
	In settlements with 500–2,000 inhabitants			31.5			41.1			17.1
	In settlements with 2,000–5,000 inhabitants			34.6			4.2			0.0
	In settlements with more than 10,000 inhabitants			21.9			0.0			0.0
	0–14 years old	31.4	31.2	31.3	30.8	31.2	31.0	30.7	31.5	31.1
	14–24 years old	16.5	17.4	17.0	13.8	12.8	13.3	14.5	15.0	14.7
	24–60 years old	45.2	43.4	44.3	45.1	44.5	44.8	46.2	44.2	45.2
	19–42 years old (males), 14–45 years (females)	38.4	49.6		32.3	43.6		34.3	45.8	
	42–60 years old (males), 45–60 years (females)	23.4	11.3		26.6	13.6		26.4	13.4	
	14–60 years old	61.7	60.9	61.3	58.9	57.2	58.0	60.7	59.2	59.9
	more than 60 years old	6.9	7.9	7.4	10.3	11.6	11.0	8.6	9.3	9.0
	Never married	62.9	59.3	61.1	61.0	58.3	59.6	74.5	71.9	73.2
	Married	33.7	32.0	32.8	35.2	32.8	34.0	23.1	22.9	23.0
	Widowed	3.2	8.5	5.9	3.7	8.8	6.3	2.4	5.2	3.8
	Separated or divorced	0.2	0.3	0.2	0.1	0.1	0.1	0.0	0.0	0.0
Not in marriage, % of persons aged 14+		53.7	56.5	55.1	52.0	54.7	53.4	69.6	69.4	69.5
Births		1,800	1,707	3,507	823	749	1,572	483	483	966
of which (%)	Illegitimate	18.3	19.7	19.0	19.3	21.1	20.2	33.7	31.7	32.7
	Stillbirths	4.7	4.0	4.4	3.8	2.1	3.0	2.5	3.1	2.8
Marriages				804			352			201
Deaths		1,561	1,531	3,092	755	712	1,467	428	389	817
Births	per 1,000 of the population			34.2			28.7			30.3
Marriages				7.9			6.4			6.3
Deaths				30.2			26.8			25.6
Deaths age 5+				16.4			17.8			18.8
Deaths age 0–5 per 1,000 births		418	387	403	339	284	313	263	190	227
In occupation		32,792	18,150	50,942	17,037	10,877	27,914	10,739	8,746	19,485
of which (%)	Agriculture	27.9	35.5	30.6	44.2	66.8	53.0	74.9	83.4	78.7
	Mining and manufacturing	56.0	38.0	49.6	43.1	14.6	32.0	16.3	7.4	12.3
	Trade, transport, other services	15.7	9.2	13.4	12.0	8.0	10.4	8.4	4.4	6.6
	Domestic servants	0.4	17.2	6.4	0.7	10.7	4.6	0.3	4.8	2.3

Sources: Österreichische Statistik XXXI/3, XXXII/2–3, XXXIII/2–3.

Notes: other income = living off rental income, pensioners, in education, in institutions, in foster care, unknown

south-western part of the Province of Salzburg. The three districts display quite distinct characteristics in size, natural environment, demography, sectoral structure, and settlement patterns (Table 1).

Zell is situated in a mostly mountainous area culminating in some of the higher mountain ranges of the eastern Alps. Baden lies in a mostly flat or mildly hilly area, while Gmunden combines areas of moderate elevation with mountainous stretches of considerable height. Among the three, Baden was the smallest district by area, with about 770 square kilometres. Gmunden was about twice that size, Zell was about twice the size of Gmunden. In terms of population, it was the other way round: Baden was by far the largest district, with slightly more than 100,000 inhabitants. Gmunden had 55,000 inhabitants, Zell had 32,000.

Regarding occupation and the sectoral structure, Baden and Zell are on the opposite ends of the spectrum: In Baden, the manufacturing sector comprised about half of the labour force (among males, 56 per cent), agriculture accounted for 31 per cent. In Zell, 79 per cent of the labour force fell upon agriculture, and only 12 per cent on manufacturing. Agriculture there focused much on livestock breeding and dairy, with a correspondingly high labour demand throughout the year. The service sector was largest in Baden, with about 20 per cent of the labour force, domestic servants included. It was smallest in Zell, with 9 per cent. In the shares of all sectors, Gmunden lies between the other two districts. The large manufacturing sector in Baden was quite varied in itself, with a strong metal industry, brick production, construction, apparel industry, and food production, and sizeable textile and wood industries. Gmunden was one of the big locations of salt mining in Imperial Austria and had, therefore, an unusually strong mining branch.

The labour market participation differed between the three districts as well. It was by far highest in Zell, due to the large agricultural sector. In agriculture, most women were in fact working, and in the case of Zell the census data are relatively close to reality. According to the census, in both Gmunden and Zell the absolute number of female workers in agriculture is 97 and 91 per cent, respectively, of the number of male workers. In Baden, the census is evidently wrong, counting too many women in agriculture as non-working relatives. In addition to the partly questionable assessment of the work done in subsistence production, we find equally questionable attributions of people to non-occupational branches. In Zell, the share of these branches is particularly high, due to large proportion of persons "in education, institutions, and foster care". The reason for this particular situation is the large proportion of illegitimate births in this district. About a third of all births happened outside wedlock, and many of these children were placed in foster families. Consequently, the proportion of "unemployed relatives" within the household appears as comparably low, foster children being unrelated to the family where they lived. One might argue that attributing foster children to a separate branch is inadequate to their real situation, and they should be registered as unoccupied relatives of their mothers, that is mostly as unoccupied relatives in the agricultural sector.

The difference between the three areas in the sectoral structure was related to differences in both the migration history and the age structure. The strong secondary sector in Baden attracted many migrants from outside the district, from other Austrian provinces, and even from abroad. Only 54 per cent of the Baden population had been born in this district, as opposed to Gmunden and Zell, where 81 per cent and 88 per cent, respectively, had been born in their district of residence. A quarter of the Baden population had been born outside Lower Austria, whereas in Gmunden and Zell less than 10 per cent had immigrated from outside the respective province, although both districts border other provinces, and Zell even borders Germany.

The large number of immigrants to Baden shaped the age structure of this district. While the proportion of children does not differ much between the three districts, the share of young adults up to their early forties is uncommonly high in Baden, whereas the share of elderly people is lower than in the other districts. Migrants were typically young adults, which resulted in a larger proportion of people in their fertile years, a higher marriage rate, and a higher birth rate. The high death rate in Baden is due to an enormously high child mortality rate, combined with the relatively large number of children. The mortality in other age groups, elderly people being underrepresented, rather dampened the death rate in Baden.

Regarding settlement structure, all districts appear rural. In Baden, the share of the population living in the smallest kind of settlements, that is, in villages with less than 500 inhabitants, was lowest. In this district, only one in eight persons lived in such villages. In Zell, on the other hand, 83 per cent of the population lived in villages of that kind, and there was no settlement larger than 2,000 inhabitants in that district. Baden itself, the main place of the district, had close to 20,000 inhabitants. In terms of settlement structure, again, Gmunden is to be placed between the two other cases.

The 1890 census: Strengths and weaknesses

The 1890 occupational census divided the population into 29 branches and ten positions within each branch, including non-working relatives and by-employment by sector. All data distinguish between men and women. The results are not perfect, in part due to problems inherent in the nature of specific occupations, in part due to con-

ceptual misspecifications (Pammer 2012). The census delivers questionable results in the following respects.

In the census, every person was supposed to have a main occupation in one branch and thus in one sector. By-employment in other sectors is indicated separately. In reality, however, some occupations, while being characterised as a single occupation in most types of sources, by their nature happened in varying environments. The two most important occupations of this kind, omnipresent in all kinds of sources of the time, are "day labourer" and "lodger". A "lodger" *("Inwohner")* is literally a tenant living in a rented place, that is someone who did not own landed property, did not live as a servant in a foreign household, and did not pursue a defined trade. The meanings of "day labourer" and "lodger" overlap, and sometimes we find the same person called "day labourer" in one source (for instance, in a baptism register), and "lodger" in another (for instance, a burial register). People of this kind did work that varied according to conditions changing from season to season, and from day to day, and according to the local options. In a rural setting, they would do occasional work mostly in agriculture, and partly in other sectors. Elsewhere, work in manufacturing, transport, or tourism might prevail. Although there is an overlap between "day labourers" and "lodgers", one distinction remains: "lodgers" usually do not appear in an urban setting. Out of more than 700 "lodgers" mentioned in the 1890 parish registers of the district of Baden, only five lived in the city of Baden itself, although almost one fifth of the district population lived in the city. By contrast, in the same district, about 10 per cent of "day labourers" resided in the city. Thus, "day labourers" were probably more rural than urban, but "lodgers" were not urban at all. In comparison of the three districts investigated here, the share of "lodgers" is by far largest in Zell, that is, the district with an overwhelmingly dominant agricultural sector. Thus, it would have made sense to attribute "lodgers" to agriculture in the census, and to seek other results for "day labourers", but it is unknown how the census officials proceeded in reality.

The census considered that some people pursued several occupations at the same time. This is not to be mistaken as casual work like that of day labourers, but those were clearly defined occupations pursued continually at the same time. Typically, many rural artisans were cottagers at the same time, or, an inn-keeper would own a butcher's shop or a bakery, and possibly a farm in addition. At the very best, the census would attribute these persons to a main occupation and count the rest as a by-employment in one of four sectors (agriculture; manufacturing; trade, finance, transport; military and civil service, other services, persons of independent means, on welfare, or in institutions). Which occupation appears as a by-employment, and which as the main one, is not clear from the beginning. It seems that there was a tendency to attribute people rather to a non-agricultural sector and regard an agricultural activity as a by-employment. Consequently, in the census the percentage of people pursuing a by-employment is higher in industry or service than in agriculture. The reason is not necessarily the respective share in the overall income or overall working time. In addition, the percentage of people supposedly pursuing a by-employment seems to be too low in any case (about 5 percent of the labour force), which suggests that the census dealt inadequately with the whole question.

Other problems of the sectoral classification become obvious in a comparison of successive censuses. For instance, the share of "House-owners and pensioners" shrank between 1890 and 1900 and grew again from 1900 to 1910. Clearly, this is not the result of a real change but of changing classification standards. The whole branch is a heterogenous mixture of people living off landed property, pensions, or charitable funds, and therefore includes well-off people of independent means as well as poor people on welfare. Retired farmers, who normally received their living from their successors on the farm (often their children), were also in this branch.

Regarding the stratification within branches, the 1890 census distinguishes between independent workers, white-collar workers, blue-collar workers, and day labourers; this was the working population. Moreover, the census provides the numbers of relatives and of domestic servants. This means, the servant of, for instance, a physician was in the same branch as the physician himself, but in a position apart from the working population. In agriculture, the category "domestic servants" is generally thinly populated because servants living in the house were mostly counted as agricultural blue-collar workers, rightly so as their work was part of the agricultural business. Since domestic servants in industry or service households are obviously working people, though not in the profession of their employers, we formed a separate occupational branch of "domestic servants" out of domestic servants of all other branches.

A major problem of all Austrian censuses of the pre-World War I era is the categorisation of women by position in their occupation. According to the 1890 census, the proportion of self-employed people was much lower in the female population than among males. This is plausible in a number of industrial branches because women rarely ran, for instance, a blacksmith's shop or a construction business. There was quite a number of self-employed women in the garment industry, though. The share of women in self-employed persons in this branch was 50 per cent in Zell, 43 per cent in Gmunden, and 42 per cent in Baden. In agriculture, on the other hand, the number of women in an independent position was quite large in reality, but low according to the census. In reality,

Table 2: Information about persons contained in a typical Austrian parish register

Register	Role in the register		Legitimacy	Name	Day of birth	Day and parish of marriage	Day of death	Day of baptism	Day of funeral	Address	Age	Legitimacy status	Marital status	Religious denomination	Occupation	Cause of death
Baptisms	Child			Y	Y		Y/N	Y	N	Y		Y		Y		N
	Father		leg	Y	N	B	N	N	N	Y	N	Y/N	Y	Y	Y	N
			ill	Y/N	N		N	N	N	Y/N	N	Y/N	Y	N	Y/N	N
	Mother		leg	Y	N	B	N	N	N	Y	N	Y/N	Y	Y	N	N
			ill	Y	N		N	N	N	Y	N	Y/N	Y	Y	Y/N	N
	Grandfathers	pat	leg	B	N	N	N	N	N	B	N	N	B	B	B	N
		mat		Y	N	N	N	N	N	Y	N	N	Y	Y	Y	N
		both	ill	N	N	N	N	N	N	N	N	N	N	N	N	N
	Grandmothers	pat	leg	B	N	N	N	N	N	B	N	N	B	B	N	N
		mat		Y	N	N	N	N	N	Y	N	N	Y	Y	N	N
		pat	ill	B	N	N	N	N	N	B	N	N	B	B	B	N
		mat		Y	N	N	N	N	N	Y	N	Y/N	Y	Y	Y/N	N
	Godparents			Y	N	N	N	N	N	Y/N	N	N	Y/N	Y	Y/N	N
Marriages	Groom			Y	Y/N	Y	N	N	N	Y	Y	Y	Y	Y	Y	N
	Bride			Y	Y/N	Y	N	N	N	Y	Y	Y	Y	Y	Y/N	N
	Newlyweds' fathers		leg	Y	N	N	N	N	N	Y	N	N	Y	Y	Y	N
			ill	N	N	N	N	N	N	N	N	N	N	N	N	N
	Newlyweds' mothers		leg	Y	N	N	N	N	N	Y	N	N	Y	Y	N	N
			ill	Y	N	N	N	N	N	Y	N	Y/N	Y	Y	Y/N	N
	Witnesses			Y	N	N	N	N	N	Y/N	N	N	Y/N	Y/N	Y	N
Burials	Decedent			Y	Y/N	Y/N	Y	N	Y	Y	Y	Y/N	Y/N	Y	Y	Y
	Decedent's spouse			Y/N	N	Y/N	Y/N	N	N	Y/N	N	N	Y/N	Y/N	Y/N	N

Notes: In addition, all registers inform about the priests acting at baptisms, marriages, and burials. Baptism registers name the midwifes present at births. ; Y = information usually available; N = information usually not available; Y/N = information available in part of the cases; B = information available only in Baden, not in Gmunden and Zell; pat = paternal; mat = maternal; Legitimacy: leg = legitimate; ill = illegitimate.

most farmer women were co-owners of the farm. Often marriages of farmers went hand in hand with the transfer of half the property to the incoming partner, which might be the man as well as the woman. Female farmers were responsible for certain parts of the business, and they were involved in important decisions. In their role, they were as indispensable as the male partners, which is why widowed farmers of both sexes usually remarried quickly. Obviously, female farmers could not simply be replaced by hired workers. In spite of their essentially independent role, many female farmers were not counted as independent farmers in the 1890 census, but probably as blue-collar workers, and some of them possibly as non-working relatives. In later censuses, many of them were wrongly attributed to a newly added category of "co-working relatives". We encounter similar problems in some other branches such as the restaurant industry and trade. To sum up, the census underestimates the proportion of independently working women, and therefore of all independently working people. Generally, we cannot calculate a sum of all self-employed people across all branches because there is no consistent definition of this position in the census. For instance, a typical pensioner, an independent carpenter, and a prison inmate were equally counted as self-employed.

According to the guidelines for the census, the classification by branches followed the actual activity of a person, not the industry where they worked. The census bureau called this the "subjective occupational work" as opposed to the "business" (Österreichische Statistik XXXIII/1, p. I). For instance, according to this principle, a bricklayer employed in a paper mill was supposed to be classified as a worker in the construction branch, which included bricklayers. He would not appear as a worker in the paper industry, which was a different branch. However, it is unclear how this principle was implemented in reality: In the category of bricklayers, the census lists self-employed persons, blue-collar workers, and day labourers, which is all possible. But it lists also white-collar workers in the same category, which is hard to imagine.

Generally, all branches in the census contain white-collar workers, although the "subjective occupational work" of these people was normally office work, and not operating a spinning machine or a kiln, or tailoring a suit. If the actual activity was supposed to be the decisive criterion, all office workers would have to be put in a common category. In other words, contrary to the stated principle, the census classified either by industry throughout, or by some intransparent mix of "subjective occupational work" and industry affiliation.

Parish registers: General characteristics

Parish registers were written in parishes by the parish priests. They list baptisms, marriages, and burials that happened in the respective parish; normally the entries were made immediately or soon after the event. Baptism was the norm for almost everyone, there was no civil marriage up to 1870, and dead people normally were buried under the assistance of a priest. In 1890, the population was overwhelmingly catholic in the three districts considered here: 97 per cent were Catholic in Baden, and 99.9 per cent in Zell am See. In Gmunden, 90 per cent of the population were Catholic, the rest was mainly Protestant; the Protestant parish records are available and do not differ in any relevant way from the catholic ones. Thus, the churches were involved in almost every case, and parish registers provide an exhaustive picture of the natural changes of population. In many cases, they even inform about migration movements though this was not the primary aim of the documentation. Clearly, the registers did not only serve the needs of the church, but fulfilled also public functions because in the underdeveloped early modern states, parishes were the only reliable local branch of a centrally organised bureaucracy.

In some regions, the entries in parish registers are more detailed than in others. In what is the Republic of Austria today, the registers usually start in the 17th century. Table 2 lists the details contained in typical Austrian registers.

All kinds of registers provide ample information about occupations. However, there are caveats:

1. Life cycle effects: Obviously, births, marriages, and deaths, are life cycle related, and occupations may change during the life cycle. In 19th century Austria, typically farmers would have started out as farm servants before becoming farm owners themselves, which may have happened even as late as at an age of forty years when their elderly predecessors retired and concluded a retirement contract with the new owners. Farm servants who did not manage to become farm owners themselves would either stay in service indefinitely, or leave it at some stage and pursue mixed occupations like day labour as described in the previous section. This means, baptism, marriage, and burial registers may each depict an occupational structure typical for a particular phase in the life cycle, and underreport the occupational structures in other phases.

2. Direct occupational effects: The occupation as such may determine the probability of appearing in a parish register. The opportunity to marry differed between occupational groups, favouring the middle and upper classes. It differed also between age groups, in many cases in interaction with the occupational status. For instance, farm servants who lived on their employer's farm, typically remained unmarried. When they left service in order to take over a farm themselves, they would marry at the same time, a spouse being necessary for running a farm. In almost all regions, the majority of births happened among married women, and depended accordingly on the occupations of the parents. Illegitimate births happened mostly in the lower classes, but in spite of a rising frequency of illegitimacy during the 19th century, birth rates in the lower classes remained lower than those in the middle and upper classes. This means, upper and middle class occupations are likely overrepresented in baptism and marriage registers. Finally, occupation related death risks (apart from the life cycle effect) cannot be excluded a priori.

3. Insufficient documentation of women's occupations: Similar to the census, the parish registers provide unsatisfying and incomplete information about women's occupations. Although in a number of cases we find information about a woman's own occupation, in many other cases women are characterised just with their husbands' (or, if they were widows, their late husbands') occupations. If there was no husband, often information about a woman's father is used instead. For the whole issue, no universal and mandatory rule existed, although the printed table heads of registers reveal the standards expected to be followed: In baptism registers, fathers and godparents were to be characterised by occupation, whereas for mothers such an information was not mandatory. Instead, baptism registers had to list the names and occupations of the maternal grandparents (that is, the grandfathers). A corresponding information about the paternal grandparents was not required; in Lower Austria, the parishes entered it nevertheless, but this was a voluntary exercise. On the other hand, marriage registers requested the same information for brides as for bridegrooms, and one can expect some information about the newlyweds' occupations, and solid information about their parents. Burial registers demand information on the occupations of men and, "if need be", that is if the decedent was a woman, on the occupations of husbands or fathers. None of these rules were followed universally, and a number of parish priests followed their own habits and wrote down more information about women than demanded. The characterisation of women by husbands' or fathers' occupations is often, though not

Table 3: Baptisms, marriages and burials in parish registers in Baden, Gmunden, and Zell, 1890

			Baden	Gmunden	Zell	Total
Baptis registers	Children		3,452	1,623	995	6,070
	Parents and their spouses		6,491	3,012	1,783	11,286
	Grandparents and their spouses		11,550	3,242	1,782	16,574
	Godparents and substitutes, signatories, their spouses		6,164	2,745	1,785	10,694
	Total		27,657	10,622	6,345	44,624
Marriage registers	Newlyweds		1,608	816	514	2,938
	Parents, foster parents and grand parents of newlyweds, and their spouses		3,066	1,530	936	5,532
	Witnesses, their spouses and their parents		2,595	1,469	863	4,927
	Total		7,269	3,815	2,313	13,397
Burial registers	Decedents		3,190	1,585	854	5,629
	Spouses of decedents		1,104	606	296	2,006
	Parents, foster parents and grand parents of decedents		2,997	1,237	499	4,733
	Total		7,291	3,428	1,649	12,368
Total number of persons with multiple counting			42,217	17,865	10,307	70,389
Multiple counting of persons across all kinds of parish registers: Number of appearances of the same person in various cases reported		1	26,360	11,065	5,938	43,363
		2	5,603	2,360	1,255	9,218
		3	1,046	440	308	1,794
		4	261	124	89	474
		5	53	34	36	123
		6	15	14	14	43
		7	8	0	6	14
		8	0	0	4	4
		9	4	0	3	7
		10	0	1	0	1
		11	2	0	0	2
		13	0	0	3	3
		14	0	0	2	2
		16	0	0	1	1
		18	0	0	1	1
		20	0	0	1	1
		30	0	0	2	2
		33	0	0	1	1
Total number of persons without multiple counting			33,352	14,038	7,664	55,054
among whom (%)	Never married		21.2	21.6	32.2	22.8
	Married		73.9	72.9	63.4	72.2
	Widowed		1.7	2.0	1.9	1.8
	Married or widowed		0.0	0.0	0.0	0.0
	Divorced		0.0	0.0	0.0	0.0
	Family status unknown		3.1	3.5	2.5	3.1
	Alive in 1890		67.3	70.5	74.8	69.2
	Alive in 1885–1889		5.3	0.2	0.5	3.3
	Alive in 1880–1884		2.5	0.0	0.2	1.5
	Deceased before 1890		14.0	6.4	8.6	11.3
	Deceased before 1896		0.3	0.0	0.0	0.2
	Persons with information on life status before 1880/from 1895		1.9	0.0	0.0	1.2
	Life status unknown		8.7	22.9	15.9	13.3

Sources: Parish registers, Baden, Gmunden, Zell, 1890.

always, unsatisfactory or misleading. In cases of farmers or cottagers, the husband's occupation informs about the wife's occupation indeed because typically a farmer's wife is a female farmer. For occupations in the manufacturing sector, in trade, transport, and bureaucracy, such an inference is obviously not possible. A metal worker's wife

is not normally a metal worker herself; on the other hand, she need not necessarily be unoccupied but may well work in any occupation. In some cases, the information about women's fathers' occupations seems totally out of place: In the parish registers, we find unmarried women at an age of fifty years or more, who are still characterised by their fathers' (possibly late fathers') occupations.

4. Reference period of data: Baptism registers regularly deliver information on the occupations of grandparents. In all likelihood, in many cases these data were copied from the parents' own baptism certificates. The same is true for the information on newlyweds' parents upon marriage, equally copied from baptism certificates of bride and groom. That is, these data indicate grandparents' occupations, or the occupations of the parents of the newlyweds, in a previous period. In many cases, it is not even clear whether these people were still alive. The same is true for the parents of decedents. When a child died as an infant, with information on the occupations of parents supplied in the burial register, these parents could already be dead themselves. Even a child's father mentioned in a baptism register together with his occupation, could already be deceased. For the people mentioned in the 1890 parish registers of the three districts, we could determine that 69.2 per cent were alive in that year, and 11.3 per cent were already deceased. For 6.2 per cent, we have some information about their life status in preceding or later years, but not in 1890. For 13.3 per cent, we have no information (Table 3). This point may be irrelevant in other research designs. For instance, a long-term investigation of occupational change may possibly not focus on the situation in one single year but may count in decades. In such a setting it does not matter much whether a person has died a few years before the pertaining information is entered in a parish register.

5. Implicit information: If parish registers are supposed to be used as a surrogate for census, we can also consider entering information implicit in the data provided directly. The most important case is the implicit information about spouses. If a woman is characterised as the wife of, for instance, a farmer, we know for sure that there is not only a female farmer present, but also a male farmer in addition. There are also many cases that do not mention the marriage status of a particular person, but allow plausible assumptions regardless. A godmother described as a farmer, would normally be married to a farmer. Similarly, a farmer acting as a marriage witness (all marriage witnesses were male), would normally be married to a female farmer.

6. Multiple counting: Every person appeared in parish registers at least two times, at birth and at death. In reality, many people appear much more often, even within a short period. They may have multiple children, multiple grandchildren, they can get married repeatedly, they can serve as witnesses to marriages, and as godparents. The likelihood of a more frequent appearance in parish registers may be related to a person's occupation. Compared to the lower classes, people in middle and upper class occupations may not only be likelier to marry and have children at all, they may also be likelier to remarry after the death of a partner, to be asked to act as witnesses at marriages, and as godparents at baptisms. If this multiple reporting is not corrected, a distorted picture of the occupational structure may emerge. The 1890 parish registers of the three districts mention 70,389 persons. In fact, these were only 55,054 persons, among whom 11,691 who appear repeatedly (Table 3). Multiple counting is most frequent in Zell: There, it inflates the number of persons by 34 per cent, as opposed to 27 per cent in Baden and Gmunden.

For the present study, the coding of the occupations mentioned in the parish registers could not follow one of the standard classifications (HISCO or PSTI). Since we try to emulate the census results using parish sources, we must use the classification used in the census. Doing so, we encounter problems that doubtless were also present when the Statistical Office coded the census data. It is unknown what conclusion they reached. The problems concern the subsumption of several large and ill-defined occupational groups under occupational classes of the census classification. The solution differs from group to group:

One of them is "house owners": In the parish registers, people were characterised as house owners quite often. When this happens in combination with a trade (for instance, "blacksmith and house owner"), the solution is easy. In such a case, the census takers would have regarded the trade as the main occupation, and we can proceed similarly with the parish data. But often there is no such combination, and being a house owner is supposedly the only occupation. In fact, the census classification contains a category called "house owner". It appears in the combination "Persons living off rentals, and house owners". The typical example for such a house owner would be the owner of an apartment building in a city such as Vienna who lived off the tenants' rent. In contrast, house owners in the countryside were usually cottagers who did agricultural work as much as their property allowed, and supplemented their income with occasional other work. They definitely were not landlords living off rent. For this study, we attributed them to the independent farmers in spite of the modest size of their agricultural business. The census does not distinguish between owners of small and large farms anyway, and the parish registers use sometimes different terms for the same farm, such as "farm", "half farm", or "cottage".

Similarly, we attributed "lodgers" *("Inwohner")* to agriculture, in line with the argument made above. "Lodgers" were uncommon in urban settings, and appear most frequently where the agricultural sector is large. We classified them as agricultural day labourers.

As for persons called "day labourers" in the parish registers, the solution is less clear-cut. "Day labourers" were clearly underrepresented in urban settings, and, according to the census, their share in agriculture is larger than their share in practically all branches of the other sectors. But they were not unknown outside agriculture. The assumption is, in an area with dominant agriculture, day labourers will work more in agriculture than in other occupations. In an area with large manufacturing or service sectors, a major part of their work will be done in manufacturing or service. We divided them up among agriculture, manufacturing, and service, leaving the relative size of these sectors unaltered. An attribution to single branches of manufacturing is impossible.

In a number of cases, the parish registers indicate the occupation in generic terms such as "labourer", "clerk", or similar. The term "labourer" would not be used for agricultural workers, but "labourers" may have worked in any other branch or sector apart from agriculture. The same is true for "clerks". For this study, we divided this category between manufacturing, commerce and transport, and other services, again in proportion to the number of other persons working in these sectors.

Agricultural workers would be called "blue-collar workers" in the census. In the parish sources, the term would be "servants". However, "servant" is an ambiguous term because it could equally be used for farmhands and for domestic servants in households of any branch other than agriculture. Some variations of the term clearly refer to non-agricultural domestic servants, but many open cases remain. Again, we attributed "servants" to agriculture in proportion of the share of other agricultural occupations in the total of occupations, and counted the remainder as domestic servants.

Parish registers from Baden, Gmunden, and Zell am See

For the calculation of occupations, we approach the parish registers from two different angles. The first approach is the pragmatic use of these sources at face value, case by case, not taking into consideration multiple counting, the reference period of data reported, whether the persons mentioned are alive or not, and so on. Such an approach would be necessary in any large-scale investigation.

The alternative approach would be prohibitively labour-intense and expensive in any normal study. It aims at creating a data set without double counting, with the correct assessment of the family status, the identification of spouses, and whether the persons listed are alive at the time of registration, or dead already. Such an exercise requires the identification of persons appearing repeatedly in the sources, a non trivial task given the unsatisfying quality of many records. Furthermore, it requires the tracking of every person whose details are incomplete, which is extremely laborious and time-consuming. It can be done for a study like the present one, but not for a study involving hundreds of thousands, or millions of cases.

We then compare both approaches, and other variations, and determine their effects on the ensuing occupational statistics.

In order to compare the occupational structure as documented in the 1890 census, with the occupational structure as derived from parish registers, we use a modified version of the Krugman index (Appendix 2). The index, and the numbers listed in Table 4, can be interpreted as a percentage of dissimilarity: a value of, for instance, 0.07 indicates that the outcomes of the two sources differ by 7 per cent. This means effectively that 93 per cent of the cases end up in the same occupational category in both approaches, and 7 per cent end up in different categories.

The results are displayed in Table 4, in two parts: "Total population" groups the occupied population and the unoccupied relatives along the same lines in separate groups. For instance, people employed in the metal industry form one group, the relatives of such people form another. "Occupied population" uses the same categorisation, but unoccupied relatives are omitted here. We use three levels of aggregation:

1. Groups denoting a stratification within branches, for instance, "self-employed in construction", "white-collar worker in construction", "blue-collar worker in construction", "day labourer in construction". There are 130 such groups for all occupations as given in the census, and some additions to that: We added groups for "unspecified position" within branches where information is missing, and we treated domestic servants as a separate group. For the calculations that include unoccupied relatives, we arrive at 163 groups.

2. Groups denoting just branches, without distinguishing between different positions within the branch. The branch structure remains the same. For the occupied population, we have 31 such groups. For the sample including unoccupied relatives, there are 62 groups.

3. Groups denoting sectors, without distinguishing between branches within sectors and positions within branches. We distinguish between six such groups: Agriculture; manufacturing; commerce, finance and transport; other services; people living of independent means, on welfare, or in foster care; domestic servants. In the total population, we use the same grouping for unoccupied relatives, that is, there are then twelve groups.

Section I in Table 4 shows the results for the whole uncorrected sample. Here, persons who appear repeatedly in the sources are counted each time again as if they were separate persons. Section II display the results for the corrected sample without such multiple counting, that is, every person appears not more than once in the sample.

Table 4: Indices of similarity in occupational structure between census and parish registers

Grouping by	Total population			Occupied population		
	Baden	Gmunden	Zell	Baden	Gmunden	Zell
I. WITH MULTIPLE COUNTING						
Sector	0.089	0.093	0.163	0.098	0.066	0.148
Branch	0.165	0.170	0.198	0.191	0.150	0.189
Branch and position within	0.373	0.421	0.525	0.533	0.526	0.631
II. WITHOUT MULTIPLE COUNTING						
II.1. Total population						
Sector	0.090	0.089	0.149	0.091	0.059	0.126
Branch	0.169	0.170	0.194	0.192	0.153	0.183
Branch and position within	0.374	0.414	0.493	0.529	0.521	0.609
II.2. Female population						
Sector	0.135	0.147	0.166	0.151	0.039	0.127
Branch	0.209	0.224	0.211	0.288	0.170	0.188
Branch and position within	0.359	0.444	0.525	0.611	0.663	0.700
II.3. Male population						
Sector	0.169	0.131	0.146	0.088	0.047	0.142
Branch	0.246	0.170	0.199	0.177	0.135	0.196
Branch and position within	0.486	0.433	0.497	0.493	0.434	0.564
II.4. Only persons demonstrably alive in 1890 and in the district						
Sector	0.069	0.104	0.161	0.061	0.080	0.138
Branch	0.161	0.158	0.191	0.154	0.140	0.175
Branch and position within	0.350	0.380	0.448	0.497	0.491	0.573
II.5. Only child's parents in birth registers						
Sector	0.125	0.142	0.205	0.149	0.123	0.170
Branch	0.195	0.214	0.239	0.214	0.205	0.212
Branch and position within	0.374	0.463	0.562	0.509	0.564	0.632
II.6. Only newlyweds in marriage registers						
Sector	0.237	0.258	0.310	0.178	0.201	0.190
Branch	0.296	0.310	0.318	0.268	0.258	0.252
Branch and position within	0.455	0.496	0.494	0.498	0.494	0.473
II.7. Only decedents in death registers						
Sector	0.226	0.214	0.157	0.185	0.216	0.141
Branch	0.308	0.247	0.251	0.331	0.269	0.251
Branch and position within	0.392	0.370	0.461	0.556	0.514	0.599
II.8. II.5–7. combined						
Sector	0.085	0.107	0.167	0.095	0.084	0.147
Branch	0.175	0.167	0.211	0.182	0.154	0.192
Branch and position within	0.339	0.373	0.477	0.459	0.456	0.543
II.9. Only child's grandparents at birth and newlyweds' parents						
Sector	0.211	0.129	0.172	0.243	0.063	0.086
II.10. Only godparents and their substitutes in birth registers						
Sector	0.108	0.174	0.213	0.040	0.075	0.167
II.11. Only witnesses at weddings						
Sector	0.238	0.225	0.268	0.126	0.090	0.224

Notes: Numbers are modified Krugman indices for the similarity between the occupational structure as indicated in the 1890 census, and the occupational structure derived from parish registers. Total population: same grouping by branches/sectors for the occupied population and unoccupied relatives; occupied population: relatives not considered; house owners and lodgers (Inwohner) attributed to agriculture throughout; for sectoral calculations: day labourers attributed proportionally to agriculture, manufacturing, commerce/transport, and services; workers in unspecified non-agricultural work proportionally attributed to manufacturing, commerce/transport, and other services; grouping by sector: 12 groups in the total population, 6 groups in the occupied population; grouping by branch: 62 groups in the total population, 31 groups in the occupied population; grouping by branch and position within: 163 groups in the total population, 130 groups in the occupied population. Vertical position: position within a branch, with distinction between self-employed persons, white-collar worker, blue-collar worker, and day-labourer.

We see that the correction improves the results only moderately. In the sectoral grouping, the impact of multiple counting is largest in Zell, simply because multiple counting is most frequent there. The difference is 14.8 per cent of misplaced cases in the uncorrected sample versus 12.6 per cent in the corrected one, unoccupied relatives excluded. Including relatives, the results are 16.3 per cent versus 14.9 per cent. In the other two districts, the differences between the corrected and the uncorrected sample are minimal. These results suggest that a straightforward use of parish registers without the tiresome work of correcting for multiple counting will not necessarily yield much worse results.

A separate calculation (II.4.) restricted the sample to the persons who were demonstrably alive and living in the respective district in 1890. We left out all persons who were already deceased, and all persons whose life status in 1890 could not be established without doubt. Clearly, many people in the latter group were in fact alive in 1890, but we miss the proof thereof. Compared to the full sample, the results of this limited calculation are partly better, partly worse. Again, we see that the prohibitively laborious tracking of people will not reliably result in data more similar to the census numbers.

However, the numbers displayed in Table 4 show also the limits of an approach through parish registers. Inevitably, the results depend very much on the level of aggregation of cases. For instance, if the parish data estimate the share of the textile industry too high, and the share of the garment industry too low, these differences will be visible in a calculation on the level of branches. They will disappear on the level of sectors because both branches are in the same sector (manufacturing). On the highest level of aggregation, the differences between the two sources are always lowest.

In fact, they are quite low in our case. On the level of sectors, at one point we find a deviation between parish data and census of just 5.9 per cent: This is the result for the occupational structure (unoccupied relatives excluded) in the district of Gmunden (Table 4, II.1.). In other constellations, the differences are 6.6 or 8.9 per cent (Gmunden), and 8.9 to 9.1 per cent (Baden). They are largest in Zell, with 12.6 to 16.3 per cent of cases classified differently in the two sources. The Zell parish registers overestimate the share of manufacturing, and underestimate the share of children in foster care, who are attributed to a separate branch in the census. Foster children do not appear in baptism or marriage registers. They probably appear in burial registers, but there they are described with their unmarried mothers' occupations, and are not listed as foster children. In this respect, the parish registers provide actually a more realistic picture than the census. Altogether, the parish registers come close to the census results as long as the calculations happen on the level of sectors.

On the level of branches, the differences are larger. They lie in the range of 15 to 20 per cent for all districts, both in the corrected and in the uncorrected sample, and in the sample restricted to persons demonstrably alive in 1890 and in the district. In part, the deviations are probably caused by mistakes in the census, but the major part is due to distortions in the parish registers. The parish registers underestimate the size of agriculture in Gmunden and Zell because of the low marriage and birth rates among agricultural workers. In Zell, they overestimate the weight of gastronomy for the simple fact that in Zell innkeepers, almost all of them women, were vastly overrepresented among godparents in baptism registers. In all districts, cases with missing information were much more frequent in parish registers than in the census.

The results look completely different at the lowest level of aggregation. When it comes to assessing both the branch structure and the stratification within a branch, the parish registers yield results that deviate enormously from the census results. The differences start at 37 per cent, and go up to more than 63 per cent. These deviations are systematic, caused by the setting in which parish registers were generated. In all districts, self-employed persons in agriculture are strongly overrepresented, and agricultural workers are equally strongly underrepresented. Farm owners got married by default and had children as a matter of course, whereas farmhand usually got not married. Illegitimate births were frequent, but the birth rates among unmarried persons were still lower than those among married people. In addition, the baptism registers normally do not list the fathers of illegitimate children. Consequently, male farmhands normally appear neither on occasion of their illegitimate children's baptism nor in marriage registers. In Zell with its large agricultural sector, almost 70 per cent of the difference between census and parish registers is due these specifics within agriculture. In the other districts, the eventual effect was somewhat weaker, according to the smaller share of agriculture there. But the mechanism was the same. In Baden and Gmunden, imprecise information created the major part of the differences. All groups of "unspecified position" within branches differ from the census completely because the census does not contain such a category. Blue-collar workers in branches apart from agriculture are usually underrepresented, partly because they were not reported precisely, and fall thus to the "unspecified position", partly because they were really underrepresented among parents of newborn children and among newlyweds. Altogether, parish registers do not provide usable information on the stratification within branches.

The parish registers also allow a distinction between male and female occupations. One takeaway is the usability of parish registers for both sexes. In Baden, the estimates of women's occupations deviate far more from

the estimates of men's occupations. But in Gmunden and Zell, the estimates for women are even closer to the census than the estimates for men. Altogether, the number of women with defined occupations is lower than the corresponding number of men, but the relation differs from sector to sector. Domestic servants were mostly women, with a share of 85 to more than 90 per cent. The share of women among people living off independent means, or on welfare, was close to 50 per cent, or up to 60 per cent, depending on the region. In agriculture, the sexual proportion was exactly balanced in Zell. In the other districts, the female share in agriculture was relatively high as well, with 42 per cent in Gmunden and 31 per cent in Baden. In the secondary and tertiary sector, the share of women was generally much lower, down to 6 or 7 per cent in commerce and transport in Baden and Gmunden. Zell was a special case, with a female share of 31 per cent in the secondary sector, and an overall number of female occupations just 10 per cent lower than the number of male occupations; this is very much a result of the large share of agriculture in this area.

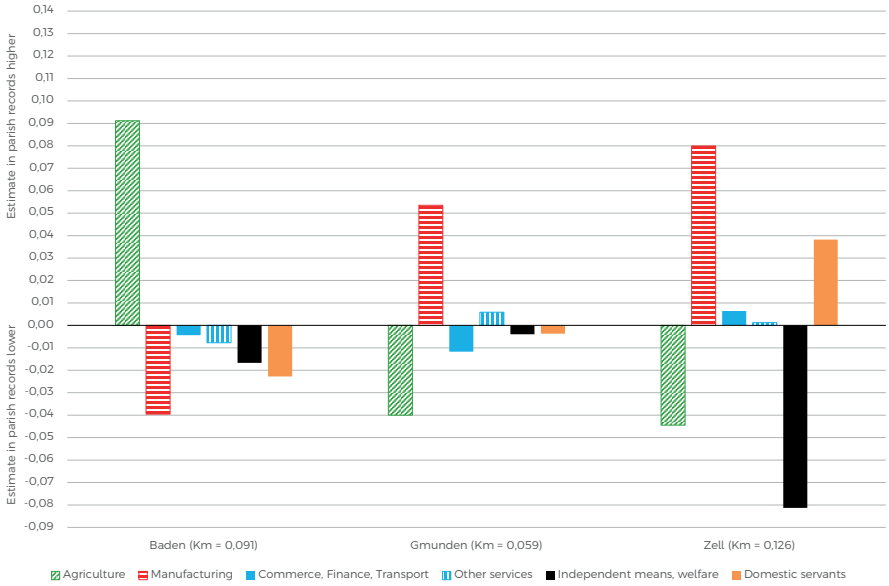
The Krugman index can be disaggregated into its components, allowing an insight into which particular conditions are responsible for an observed degree of dissimilarity. Graphs 1–3 display such a disaggregation for the population excluding unoccupied relatives, once for both sexes together, and for females and males separately. The graphs display the differences between census data and parish data as positive or negative deviations (the index then uses the absolute values). In Gmunden, the deviations are minimal from the beginning. In Baden, the parish registers deliver higher estimates of agriculture, and lower ones for manufacturing, for both sexes. In Zell, the share of manufacturing is much higher in the parish data for both sexes. The share of people living off independent means, on welfare, and in foster care, is much lower in the Zell parish records for both sexes, a result of underreporting of foster children. Among females, the share of domestic servants is higher in Zell, meaning that these women should be attributed to the agricultural sector, which is rated too low in the parish records anyway. However, such a correction is suggested only in view of the census data, in other words, in a setting where the solution is already known.

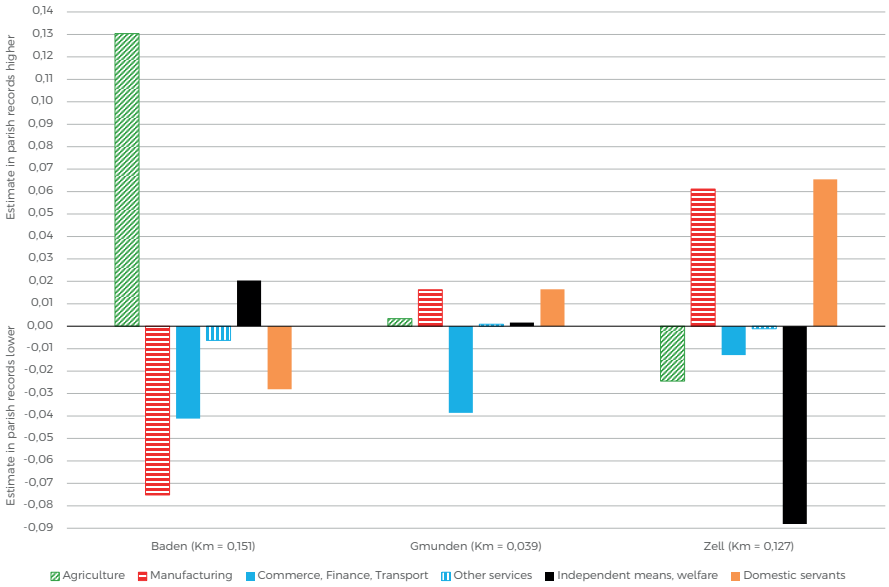
In addition to these calculations, which use information on all persons appearing in parish registers, we did similar estimates restricting the sample to persons who fulfil specific roles and are mentioned in only one type of register (Table 4, II.5–11.). We consider parents, grandparents and godparents of newborn children, newlyweds, their parents and their marriage witnesses, and decedents, in separate calculations. The aim of the exercise is to assess whether single types of parish registers can be used as a basis for occupational statistics in case the other types do not mention occupations.

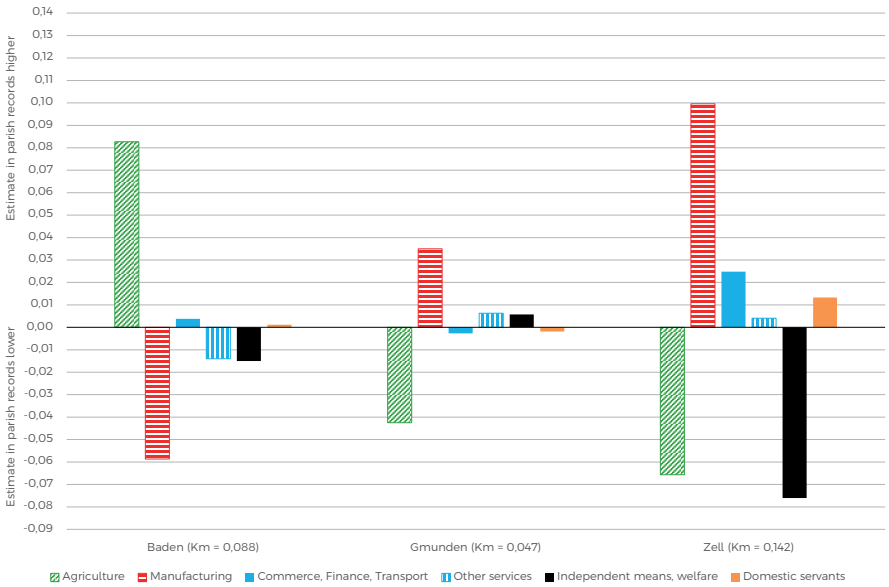
The results suggest that, compared with the full sample, a restriction to one these groups generally yields estimates that deviate further from the census results. In some settings, however, the results are quite close to the census data. Actually, among all these estimates, the closest repetition of census data would be based on godparents in Baden. For parents of newborn children, the differences to the census are in the range of 12 to 21 per cent on the highest level of aggregation. For newlyweds and for decedents the differences are higher, up to 31 per cent.

On the other hand, the occupational structure among grandparents of newborn children, and parents of newlyweds, is closer to the census results, at least in Gmunden and Zell, less so in Baden. As mentioned before, in many cases the priest copied this information from the baptism certificates of the parents of newborn children, and of the newlyweds at marriage, meaning they documented an occupational status several decades back. In an area that saw only slow sectoral change, this did not matter much: In Gmunden and Zell, the occupational structure of the 1860s was probably not so different from the situation in 1890. In a more dynamic area such as Baden, the occupational structure may have changed more from one generation to the next. Still, the outcome depends much on regional specifics. By comparison, the Katowice area in Upper Silesia, an area with fast economic development in the late 19th century, provides a picture different from Baden: There, the occupations of newlyweds did not differ much from the occupations in their parents' generation in spite of economic change (Dul 2023).

How do we have to rate these results? How relevant is a difference of 15 percent, or 25 per cent, between occupational statistics derived from parish registers, and data delivered by a general census? The parish data are not perfect, but the census was not perfect either. Are the differences perhaps not more than the inevitable uncertainty and fuzziness that comes with historical sources as a matter of course? It would be so indeed if the differences between the two sources occurred randomly. In fact, there is a random element, particularly in the cases where the information is imprecise – describing a person as "white-collar worker" does not even inform about the sector this person belonged to, but this lack of information does not happen systematically. But partly the differences are systematic: The probability of being mentioned in a parish register is systematically connected with occupation, directly and indirectly. This has a minor effect on estimates of the sectoral structure, and a not too large effect on estimates of the branch structure. It has an enormous effect, however, on estimates of occupation in connection with a social stratification, that is, of positions within branches and sectors. After all, the chances of getting married and having children, and being parents to children who die in childhood, were







Graphs 1–3: Occupational structure, differences between data from parish registers and census data, 1890. Population excluding unoccupied relatives. Top: Males and females combined. Center: Females. Bottom: Males.
The graphs show the deviation between the two estimates. Upward columns indicate estimates higher in parish registers; downward columns indicate estimates higher in the census.

distributed unequally, leading to an underrepresentation of the lower classes in parish records.

Conclusion

Parish registers are a useful source for occupational statistics, but they do not provide the whole range of information like the one provided in a modern census. They deliver a reasonably good picture of the occupational structure on the sectoral level, that is in a highly aggregated version. On the level of branches, that is in a lower aggregation, the results are less reliable. On the lowest level of aggregation, with subgroups for position within branches, parish registers are useless.

The results are best if all kinds of parish registers are used at once, balancing their specific shortcomings mutually. In areas where occupational data can be derived from one type of register only (for instance, only from baptism registers), the results will be distorted more strongly.

The differences between occupational statistics based on parish sources, and statistics based on a census, are partly random, and partly systematic:

1. Imprecise descriptions of occupations occur randomly. In a direct comparison of sources, imprecise denotations of occupations in parish registers cannot be reconciled easily with the census data. This may be unwelcome, but it produces a blurred result rather than a wrong one.

2. Entries in parish registers did not occur in equal frequency for all parts of the population. There is a social bias in the probability of being mentioned there, with lower class persons being systematically underrepresented. This is the reason why the registers do not deliver useful information on the social stratification within branches or sectors. Incidentally, in spite of this systematic bias, the sectoral structure, and to a lower extent the branch structure, is still visible in parish registers.

In this study we investigated the similarity and dissimilarity between two sources, one of which is available from the 17th century on, and the other from the 19th century on. The remaining question is: Can we use the two sources combined, using the financially demanding parish registers for the first two hundred years, and the less costly census after? Or, will such an approach result in an inconsistent time series, with a break where the sources change? The results of the present investigation suggest that parish registers can be part of a long-term study combining different sources as long as the analysis is restricted to a higher level of aggregation. An attempt to examine details of the occupational structure, in particular the social stratification within the population, will fail.

Appendix 1: Sources and tracking individuals in parish registers

This study uses all entries in baptism, marriage, and burial registers of the parishes located in the districts of Baden, Gmunden, and Zell in 1890. All persons mentioned in these entries (see Table 2) were included in the dataset, with the exception of the parish priests and the midwifes present at births.

The dataset was then corrected and amended in the following respects:

Multiple counting: Persons who appear repeatedly had to be identified. In the eventual dataset, they appear only once, with indications of all the cases where they are mentioned. In many cases, identifying people required tracking them.

Life status: For a number of people appearing in the records, it is clear by default that they were alive in 1890. For other people, the parish sources give explicit information on this point ("still alive", or "of blessed memory"). In many cases, however, there is no explicit information, which required tracking of those persons.

Explicit reference to spouses: For persons who are described as married explicitly, it is possible to add that spouse straightforwardly. For other persons, the marriage status had to be established by tracking.

Tracking is a fuzzy process following a combination of approaches. It involves scanning multiple registers in order to find people's marriage records, burial entries, or baptisms of their children before and after 1890. This requires scanning parish registers beyond the primary region of interest, including other districts and provinces. Identifying people is not a trivial task, due to the prevalence of a small number of Christian names, often in combination with not so rare family names. Even rare Christian names may be misleading if they are passed on within the same family. Often the solution lies in the identification of people's parents, maiden names of wifes and mothers included, which may require tracking people through previous generations.

Tracking was unsuccessful in many cases. Many people appearing in a parish's record had a personal history in other parishes. They may have been born elsewhere, may have been married elsewhere, or they may have left the place later, and died elsewhere. Their details will definitely appear in some parish's registers, but there is no way to find that parish.

A woman may have remarried after her husband's death, meaning she changed her name. Often a rough guess allowed finding such a woman: Remarrying often happened within an exceedingly short time period after the death of the previous spouse. Scanning the marriage registers in the few months following such a sad event repeatedly delivered the new marriage, and the new name. More difficult, an illegitimate mother may have

got married at some point in some place, again meaning she changed her name. Finding such a marriage is close to impossible because most indices of marriage registers indicate the names of grooms, but not, unreasonably, the names of brides.

Some information provided by the parish registers does not help in practice because tracking is factually impossible. For instance, the information that a certain person lived "in Vienna" is factually useless. Vienna had about 115 parishes, and examining them over a lengthy time span is impossible.

The best source for gathering personal details of a person is marriage registers. In these registers, we find the names of the parents, the birthplace, and the age, of each of the newlyweds. In theory, this would be the perfect base for identifying people in baptism registers, where the names of grandparents are listed, and in burial registers, which display age at death. However, one problem arises from the fact that many priests seem to have lacked skills in basic arithmetical operations, being unable to calculate age correctly by subtracting the birth year from the death year. For this reason, we arrive at differences between information in marriage registers and burial registers even in cases where the identity of the respective persons is beyond doubt.

Appendix 2: Measurement of deviation in occupation structures

In order to measure differences in the occupational structure as found in the 1890 census, and as suggested in parish registers, we use an adapted Krugman Specialisation Index (Krugman 1991, 75–76). The Krugman Index can be used for comparing regions with respect to any characteristic that is measured by a categorial variable, for instance, shares of industries, shares of occupational groups, and so on. Of course, it can also be used to compare the results of different measurement procedures for the same item, such as the measurement of occupational shares in different sources. The Krugman Index is calculated originally as

$$K = \sum_{i=1}^{I} |b_i - \bar{b}_i|$$

where b_i is the share of the i-th occupational group as measured in a parish register, and $\bar{b}_i$ is the share of the same group in the reference data set, in our case, the census data. K can vary between 0, when all occupational groups have the same share in the population in both measurements, and 2, when there is no similarity at all, that is, all groups that have a share >0 in one measurement have a share of 0 in the other measurement. For greater clarity, we use a slightly modified index:

$$K_m = \frac{\sum_{i=1}^{I} |b_i - \bar{b}_i|}{2}$$

K_m varies between 0 and 1. A K_m of 0.5 means that the two measurements yield the same assignment to occupational groups for half of the population, and different results for the other half. A K_m of 0.1 means that the two measurements yield identical occupational identifications for 90 percent of the population, and different ones for the remaining 10 percent.

K_m being a sum of differences, it may easily be disaggregated in order to determine which occupational groups contribute most to the overall deviations. Although large occupational groups will often be more likely to determine the outcome, a given K_m may be the result of any combination of specific deviations, such as deviations in the shares of just two large occupational groups, or in the shares of many small groups. Groups that have a share of 0 in both measurements do not alter the result. The analysis is also possible for subsets of occupational groups in order to determine deviations in the shares of branches in a particular sector.

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