
Rural History Conference 2013, Bern, 19-22 August 2013

**Land rental values in Northwestern Germany in a European context,
c. 1600–1920**

Dr. Johannes Bracht

Westfälische Wilhelms-Universität Münster
Institut für Wirtschafts- und Sozialgeschichte

Domplatz 20-22

48143 Münster

Germany

jbracht@uni-muenster.de

This version: August 2013

Work in progress; please do not quote without the author's permission

Abstract

The paper presents the first long time series of land rental values for Germany. Following an indirect approach deflated leasehold prices from different regions in Westphalia (northwestern Germany) are interpreted as an indicator for land productivity. The first part of the paper is devoted to a discussion of methodological aspects of the index construction and deflation. Secondly I will explain the institutional setting of leasehold ownership in the specific context of the northwestern Germany. Thirdly the land/labour-relationship, the urbanization of the 19th century and climatic factors are discussed. The main purpose is to draw a comparison between this index and indexes for France and England provided by R. Allen, G. Clark and P. Hoffman and to define northwest Germany's position in the agricultural development until c. 1920.

1. Introduction

Recent studies on agricultural productivity before 1900 have provided new insights in long term agricultural development in almost all countries of (Western-) Europe. This is not only true for England, the Netherlands, and Belgium, which proved to have had the most progressive agriculture and agricultural producers in the early modern era. Impressive research has also been published on the agriculture of Spain, Sweden and France. Data and research about German agriculture is almost missing, apart from the articles and books of KOPSIDIS (1996; 2004; 2009), KOPSIDIS/ HOCKMANN (2010) and KONERSMANN (2011). Reasons for this lack in research may be the diversity of political systems, the extreme variety of measurement systems and currencies even within territories, and the complexity of early modern landownership, on the one hand.

On the other hand, German economic agrarian history has not been well established for two decades or even more and former economic historians were more engaged in the exploration of the peasants' budget and income. The data on agricultural output and factor prices is improvable. Long series of yields, rents and wages are still missing. In recent years Michael Kopsidis undertook much research on 19th century agricultural productivity in Westphalia and his work is the reason why Westphalia is the best investigated region of Germany in agricultural cliometric concerns (KOPSIDIS 1996 and 2004). Because of the high growth rates of agricultural output in the 19th century, Kopsidis declared the Westphalian agricultural development to be an "Agricultural Revolution", consisting of two distinct periods of growth: In a first period from 1770 to 1830 agriculture grew sufficiently to feed

the growing population even though the institutional setting was still in the feudal system of divided property between peasants and landlords. In a second period from 1830 to 1880 Westphalian agriculture was driven by market demand for grain and dairy products of the growing industry district *Ruhrgebiet* (see figure 1, Dortmund is the eastern centre of this area). Independent from agrarian reforms such as the abolition of the dues and separation of the commons, but obviously promoted by the railway construction starting from the 1840s the farmers more and more produced crops demanded in the *Ruhrgebiet*.

Yet there are still many questions left. It is rather unclear when agricultural growth in 19th century started to accelerate. More or less unknown is the long-term quantitative agricultural development before 1800, in Westphalia and rather big parts of Germany as well.¹

This paper presents two time series of leases of two estates in two different regions in Westphalia (Northwestern Germany).² The reason why we selected leases for investigating agricultural productivity is the character of leasehold as the least “feudal” way of exchanging the factor land. Much more than the land market the market for leases forms an instrument of short-term price adjustment. The short duration of leasehold contracts precluded speculation and thus led to prices which closely followed the relative productivity of land. Following the indirect approaches of ALLEN (1988), HOFFMAN (1996) and CLARK (2002) I consider leases as market prices for using the resource land. Assuming that productivity growth should be reflected either in rising rents or falling prices or rising wages, real leases are regarded as one important indicator for agricultural development (HOFFMAN 1996, pp. 82-85). In doing so we must take into account that leasehold property in Westphalia was not affected by agrarian reforms. Leased plots were neither part of commons, usually separated between 1770 and 1850, nor burdened with feudal dues like tithes or corvée, although the peasant land, which most of the leaseholders also possessed, certainly was.

However, the value of leases is not equal to land productivity. Land productivity is defined as output (mostly in kind) divided by input (in this case the amount of land). Leases as

¹ Agricultural history in the former GDR, however, has emphasized quantitative aspect, mostly regarding dues and corvée in the manorial economies.

² The project *Reale Bodenrenten in Westfalen, 16.-20. Jahrhundert* [Real land rental values in Westphalia, 16th to 20th cent.] at the *Westfälische Wilhelms-Universität Münster* was designed by Georg Fertig and is conducted by Ulrich Pfister. Funding by the “Deutsche Forschungsgemeinschaft” [DFG] is gratefully acknowledged. Data collection was carried out by Annika Feldkamp, Christin-E. Härtel, Gereon Hüwe, Katharina Impelmanns, Julia Jochem, Marlen Keß, Stephanie Klages, Anna Lindenblatt, Kersten Stemmer, Jonas Stephan and Gerrit Tiefenthal. Special thanks are devoted to Friederike Scholten. For helpful notes I also owe thanks to Martin Uebele.

monetary values reflect the monetary proceeds less all input costs (seed, wages, and capital costs). Since capital and labour costs in a preindustrial agricultural family economy are low, the determining costs are seed and family maintenance. If we exclude all kinds of subsidies and cross-funding between production factors and sectors, the highest possible leases are equal to the net proceeds. In this case entrepreneurial profit is zero. This discussion is to be continued in a subsequent section.

2. The estates and the data

The manorial estate *Nordkirchen* is situated in the centre of Westphalia, 26 km both from Münster and Dortmund. The manorial estate *Assen* (community Lippborg) is situated in a crop-export region east of the Ruhr district, 43 km from Dortmund.

Until the 20th century leasing and leasehold property was by no means a common form of landownership in Germany. Rather the practice of leasehold seems to have been concentrated on the region of Cologne and the left bank of the lower Rhine since the 13th century.³ Nevertheless there were noble estates with leases in Westphalia as well and we can exploit estate accounts with leases at best from c. 1500 onwards. In this paper I only analyse plots of arable land, excluding whole farms, meadows, pasture land and woods. In view to the interpretation of the lease as a proxy for the Ricardian rent it is important to note that none of the leasehold land was burdened with tax paid by the tenant. Tax on leasehold property was paid by the landlord, if at all.⁴

Short-term leasing was the most prominent usage of single plots, but we also noticed plots changing from short-term leasehold to hereditary leasehold or, very often, from leasehold to demesne production and the other way round. Until the 1750s in only 5% of all entries we can find explicit information about short-term leasehold. In the first half of the 19th century in 50% of all entries we know for sure that they concerned short term leasehold. After 1850 90% of all account entries were specified with information about the term and duration of leasehold. Actually, for the early modern it is not clear whether a leasehold is given out with a specific duration or implicitly hereditary. Therefore in the

³ See for a historical overview of leasehold development BAVEL (2008) and REINICKE (1989), for the distribution of leasehold in the first quarter of the 20th century HUPPERTZ (1939).

⁴ *Hovesaat*-land was exempt from tax until 1861, because it was originally supposed to be used for self-sufficient demesne production. Actually this was only one use of *Hovesaat*-land, another one was leasehold.

process of data registering it was also not clear, whether an account entry was referred to a new lease or a lease in force. In the subsequent analysis I make no difference between the two forms.

In total our Nordkirchen data base contains of 54,000 entries. Due to the criteria described above circa 45,000 were usable for the analysis. The Assen data base contains 20,500 entries in total and 18,900 were usable.

In the process of data preparation the entries of consecutive accounts referring to identical plots were linked. Thus the result is a collection of about 2900 time series of plots, each containing up to 250 consecutive account entries. Since some plots were split up or merged with other plots, a second series of 'plot changes' or 'new plot combinations' was established. We expected to find changes of the amount of the rent in particular in these transitions, but subsequent analysis showed that the changes were largely in accordance to the general trend.

3. Index construction

In scholarly literature several ways of index construction are documented and tested. Mean prices indices require information about parcel sizes. One should also be able to assume that the sample of prices each year is representative. A Mean prices index does not necessarily require any information about quality. Each year or period is analysed independently from the preceding one (ALLEN 1991; TURNER ET AL. 1997).

The Nordkirchen and Assen data, however, do not provide information on plot sizes apart from a cross section from the 1830s. I used two other methods for index construction. The first method is to calculate growth rates between two consecutive leases referring to the same object and to build a chain of price and growth relatives. This so called "Chain index" has been used by ISSERLIS (1938) for constructing a freight rates index. The second method used is the "repeat sales method", established by BAILEY ET AL. (1963). This method can be considered as particularly adequate in a situation in which objects are traded infrequently. A central point of the construction is an OLS-estimation of the annual index points.⁵ The differences between the two methods and the strengths and shortcomings are not the point in this paper. Both indexes differ considerably and we should be aware that

⁵ Following the good description in KLOVLAND (2006).

the long term evolution of leases is accompanied by uncertainty of measurement. The simplified chain method index presents the higher amplitude. In essence, however, both methods indicate the same trends and are thus reliable.

4. Output prices

For interpreting rents from a consumers or producers perspective it certainly would be appropriate to construct a consumer or output price index including specific prices and variable shares of the arable production. This has been made in a former version of this paper (BRACHT 2011). Since this paper focusses on the comparison of the rents in different European countries I chose the most common price level indicator, the wheat price.

The grain prices 1600-1863 are official prices (after 1740 '*Martini*'-prices from November 11th) from the capital of the former territory and the later centre of Prussian administration, Münster. They are provided in various forms in archives and in editions (GERHARD/ KAUFHOLD 1990, pp. 68-71; SCOTTI 1842, vol. 1, pp. 374-381). The output prices used here were administrative instruments used both for fixing the dues in kind and transforming them into monetary dues, and for adjusting wages and other prices to the grain price level, at least before 1806. SCHOLTEN (2012) showed, however, that grain auction prices in Nordkirchen followed the trend of the Prices of Münster. Both Nordkirchen market prices and the prices of the Münster authorities showed the same volatility. Hence, the suggestion that the latter reflect aspects of poor-relief policy is misleading. We can consider Münster prices as market prices for the entire territory. The prices 1864-1880 are mean wheat prices for Westphalia derived from KOPSIDIS (1996), pp. 531-537, and calibrated to the price series 1600-1863.

5. The evolution of nominal and real land rents

Despite the difference in levels between the two indices based on different methods figure 2 suggests a consistent pattern of the evolution of nominal land rents over time. Before 1700 there is stickiness and very little variation. In the 1690s (Nordkirchen) and after 1709 (Assen) we see an upswing up to the 1720s, and between the 1720s and the 1770s and beginning 1780s (Assen) a long-term decrease. Some leases in Nordkirchen actually have not changed

between 1600 and 1771. After the 1770s we notice an upswing until 1806-12. In the following 50 years the indexes differ much. The repeat sales method indicates a slight decline in Nordkirchen and Assen. The chain method indicates increasing leases in Nordkirchen and a sharp decline in Assen. Afterwards all indexes show the same increasing general trend. They agree in indicating a period of stability between 1848 and 1852 and a tremendous growth until 1878/80 and a following period of stability. The methods differ, however, in the amount of growth rates. Both chain indexes show higher growth rates than the repeat sales indexes.

Both estates differ as well. On the one hand Assen soils were more fertile. On the other hand Assen was situated in crop export region and directly on the river Lippe, navigable since 1826. The distance to Hamm, connected to the railway to the Ruhr since 1847, was 19 km. Obviously Assen was better connected to the markets than Nordkirchen, which was 25 kilometres from Dortmund, right in the core of the Ruhr district, but without railway connection until 1928. The Assen leases show a higher nominal level throughout the whole period. Furthermore the volatility was higher, indicating stronger responses of lessors and leaseholders to changing terms of trade. This is in line with Kopsidis' Interpretation of the directly adjacent district Hellweg, a crop export region long since, which showed both the highest gross yields and the highest growth rates in the 19th century.

The volatility of nominal leases is small compared with the one of prices. For this reason the short term variations of the real leases result from short term variations of prices (figure 3). Even if we smooth the real rent indices by using 5-year-averages, which also evens out short-term differences between the two indices, we note that the minima and periods of low real leases coincide with price maxima.

There are periods of depreciation of money as well as years of subsistence crises and dearth. Years of money devaluation were tightly connected to the periods of war in this part of Germany: Thus we see extraordinarily high prices between 1756 and 1763, the period of the Seven Years' War. There is also evidence of a devaluation of money during the years of the Napoleonic wars and the Napoleonic regime in Westphalia 1802-1813 (French regime in Westphalia 1806-1813). In these cases it is quite unclear to what extent the silver content of the coins had been reduced, which and how much information about the devaluation was available on the markets and how far prices before and after the periods of

devaluation are comparable (KINDLEBERGER (1991); PFISTER (2010), p. 10). Apart from these two periods many years of dearness and subsistence crises occurred. 1629, 1651, 1740, 1761, 1771, 1816, 1830, 1846/47 and 1855 are years of well known and documented crises. Especially the crisis of 1740- and 1816/17 were concerning the population of the whole continent. In the years 1633, 1698 and 1794 short-term crises obviously occurred, though they are not documented yet. In 1662, 1674/75, 1684, 1693, 1709 and 1794 demographic crises are documented (PFISTER/ FERTIG 2010, p. 33). Short term maxima usually do not appear in the smoothed indices, unless they happened in consecutive years or at least in a short period (1623-1629⁶ or in the 1690s). Although the population decreased in these periods of subsistence crises the nominal rent remained the same. Only the real land rents declined due to high output prices.

What we see in a long-term perspective, however, are several distinct periods in the evolution of real leases: From 1650 to 1680 we see a period of falling prices and only slightly rising or even static nominal leases (Nordkirchen), resulting in a slight increase in real leases. This can be interpreted as a reconstruction after the Thirty Years' War.

Between 1680 and 1700 the trend turns around, because prices were rising faster than the leases. In the first two decades the leases caught up with prices, in Assen we notice a rapid growth between 1709 and 1719, in Nordkirchen nominal leases continued rising from 1690 to 1724. Prices, however, had already returned to a low level and were only little volatile, although continuously falling until 1737. Thus, throughout the whole period from 1680 until the late 1730s real leases continued rising. This period was definitely ending with the crop failure 1739/40 (ABEL 1974, 169-187).

After 1739/40 both the fall of nominal leases and the rise of output prices, even we exclude the Seven Years' War inflation, resulted in a decrease of real leases until 1769/1770. In the last quarter of the 18th century output prices even accelerated growth and grew faster than the nominal leases. The inflation of the Napoleonic years devaluated the leases even more. Thus, real leases show a continuously decreasing trend from the 1730s until 1816/17, the year of the Tambora crisis.

What we see after the Tambora crisis are static nominal leases but low level output prices, resulting in comparatively high real land rents between 1819 and 1841. This result matches the interpretation of "golden 1820s" for rural wage labour. For landowners the

⁶ The high prices 1623, 1629 and 1633 were obviously not a result of the devaluation 1620-1623 (commonly known as *Kipper- und Wipper-Zeit*).

1820s and 1830s were golden decades as well. After 1842 the output prices climbed and reached the highest level since the Napoleonic years. After 1858 the nominal leases rose as well. Only between 1850 and 1870 nominal leases increased faster than output prices, probably caused by the final period of the Prussian reforms. Since 1880 the nominal leases were more or less static, probably due to the grain tariffs introduced by Bismarck. The collection of further prices data for the years 1880 to 1910 is in progress.

6. What do the leases tell us about agricultural productivity?

The research on leases and rents is widely established and accepted as one feasible method to gain evidence of agricultural productivity and growth. However, some scholars have made critical remarks, which ought to be considered seriously (GRANTHAM 2000).

1. A core precondition of the interpretation of leases as indicators for productivity is a perfect mechanism of price formation. It assumes that productivity gains are reflected in the prices of production factors. Agricultural productivity gains are supposed to increase the prices for land, labour, capital and to decrease output prices. One serious objection to this assumption is that the price formation on the lease market is too slow. Price adjustment is only possible when lease contracts expire. Since the lease terms usually were six, nine or even twelve years, only long-term trends can be interpreted as productivity indicators. Furthermore the landlord may be short of information about the leaseholders' output and thus may miss a guideline in his rent-policy.

2. Also based on the assumption of perfect price formation is the assumption of the lease as a rack-rent, or in other words: a price for the short-term use of land, which represents a certain ratio of the market price of the piece of land, which is the highest price a landlord can obtain. Due to the mass of land-seeking leaseholders, the rent will rise and will leave no entrepreneurial profit to the leaseholder. However, there are two objections to this assumption: On the one hand, lessors/landlords may have accepted lower rents than the rack-rent to attract and bind reliable leaseholders. On the other hand, paternalistic attitudes could have driven the landlord to accept lower rents than the rack-rent.

Both critical objections are worth considering. First, leases actually indicate delayed changes compared with prices. Whereas the price trend changed downwards around 1710,

1816, and upwards 1680 and in the late 1730s, the nominal leases showed reaction to the trend with 10-20 years delay, if at all. Particularly falling prices were not completely reflected by falling nominal leases (1720s and 30s, 1820s and 1830s). It would be misleading, to interpret the low prices in these two periods as productive gains. Both in the 1720s and the 1820s very good grain yields flooded the markets and depressed the prices for years. Climatic changes actually influence the measures of productivity. But the agricultural producers did neither increase production nor reduce costs by changing agricultural methods. Thus neither falling prices nor rising real leases in this period indicate agricultural progress.

Secondly, the relations between lesser/landlord and the leaseholders were very stable. In 1859 about 50% of the leased plots were leased for more than 20 years to people having the same surname as the current leaseholder. Keeping stable relations to leaseholder might have been intended by the landlords. This might have been rational, because frequent changes of leaseholders were causing costs, because leaseholders had less incentives to work sustainable and avoid exploiting resources. Furthermore, in the 17th century leases were obviously sticky and the price formation did not work. In this era landlords presumably have had an idea of what was a "fair lease" of a plot. Landlords leased a plot or did not, but they did not lower or increase a lease. However, since the 18th century more and more leases were contracted in auctions. This indicates economic optimization. Close coordination between landlords and stewards in the 19th century provided the circulation of economic thoughts and strategies. We should assume that at least in the 18th century the landlord intended to accrue the highest possible lease. And at least the stewards were well informed about the production performance of the leaseholders, since they were locally present and directed the demesne economy.

Most scholars assume that the lessors successfully accrued the total Ricardian rent.⁷ Nonetheless we must consider the possibility of entrepreneurial profit and thus unobserved Ricardian rent in the leases. Nominal leases tell us which amounts of money had been negotiated between lessor and leaseholder. Expected gross proceeds determined by yields and output prices were the most relevant basis for negotiations. The real leases represent the theoretical price equilibrium between supply and demand. There is evidence from the

⁷ See for example HOFFMAN 1996, p. 97, who assumes that „zero entrepreneurial profits“ and rental markets „leaving tenants no more than what they would earn in the labour market and making the cost of entrepreneurial input equal to the wage rate“.

mid-19th century that leases did not comprise all the revenues of the plot but left an entrepreneurial profit to the farmer. Between 1822 and 1835 the Prussian state conducted an evaluation of the agrarian economy situation in Westphalia in order to adjust the land tax. In complex cost estimations the Prussian administration determined the monetary net proceeds relevant for the determination of taxable income (*Steuerreinertrag*) including labour cost (which was actually done by the family members) calculated in day wages, capital and other input costs, but excluding any other costs for the factor land like leases or dues. The output was calculated with gross yields down to different soil qualities and average market prices. If the entrepreneur were the owner of the land the tax net proceeds equaled the entrepreneurial profit and the Ricardian land rent as well. The most important reference for controlling and assessing the net proceeds in this valuation process were actual leases dated 1790 to 1828. Leases below the tax net proceeds were assessed as evidence for the correctness of the estimation, due to an assumed entrepreneurial profit left for the leaseholder. In Westphalia as a whole, leases amounted to 66% on average of the net proceeds estimate.⁸

In figure 4 I compare the Nordkirchen leases of the year 1835 with the corresponding net proceeds determined by the administration. As we can see, nearly all leases on arable land of 1835 are lower than the net proceeds of the corresponding plots leased out. In this selection of plots the aggregated leases amount to 71% of the net proceeds. Furthermore recent research has shown that the net proceeds estimates, though accurately done, were rather low due to the application of a low output price level and to high cost deductions (BRACHT 2013, pp. 63-74). If the entrepreneurial profit were lower in the 17th century and higher in the 19th century, the real leases include unobserved productivity growth. Changes in the partition of the land rent and the entrepreneurial profit should be considered in future research.

These things considered, there are only few long-term trends, which can be interpreted in terms of productivity. Between app. 1640 and 1690 production probably recovered after Thirty Years' War and it corresponds to a return of the land-man ratio to pre-war levels. By contrast, the strong decreasing trend of both nominal and real leases between 1730 and 1780/1800 (with the intermezzo of the Seven Years' War) indicates some kind of extensification of land use. There is only little evidence for increasing real leases in

⁸ KOPSIDIS 1996, p. 163.

the second half of the 18th century, although this is suggested by both former and recent research addressing the population growth in the second half of the 18th century (ABEL 1966; KOPSIDIS 2006, p. 326).⁹

Over the whole period of examination real leases calculated by the chain method fluctuate around a mean value of 115 litres wheat per hectare (Nordkirchen) and 206 litres wheat /ha (Assen). The real lease indexes calculated by the repeat sales method indicate even decreasing real rents. This means that the real value of the rent nearly did not change within nearly three centuries. This result is surprising. Two alternative interpretations can be given.

- Assuming that real leases reflect productivity changes correctly, we must conclude that there were no productivity gains along the whole period. Actually, gains in the 19th century are documented and can be taken for granted (KOPSIDIS 1996). This means that we should consider productivity losses before 1800, which is not impossible, because we know almost nothing about the production and rotations before 1800. But more likely is that the productivity gains in the 19th century were completely unreflected by leases.
- Accepting that real leases do not reflect productivity exactly and actual productivity gains are to some extent unobserved, the conclusions are as follows: In 1825 the leases amounted at least 66% of the net proceeds. In other words: The net proceeds exceeded leases for at least 50% (see above). If there were no entrepreneurial profit in the 17th century, the productivity gains between 1600 and 1880 would have been about these 50%. However, following the argumentation on the price formation it is not likely that there was no entrepreneurial profit in the 17th and 18th century left to leaseholders. It is likely, however, that the productivity gains in the 19th century were completely unreflected by leases, and that undocumented entrepreneurial profit in 17th cent. amounted about 50% as well.

In both cases the stability of leases is considerable. We must conclude that the productivity gains between 1600 and 1820 can be estimated to be a maximum of 30-40% but probably they were lower and nearly +/-0%. One explanation for static can be found in the rural labour organisation. Rural Westphalia was only partly organized in open fields. Small hamlets and single farms were spread throughout the landscape. In the Region of Nordkirchen and Assen open fields were very few, but individually tilled plots were

⁹. For estimates of population size, see PFISTER/ FERTIG (2010).

widespread since the middle ages. Transport and cooperation costs were traditionally low. Thus medieval rural Westphalia started on a rather high level of productivity. Although landlords owned big parts of the land and exercised most of the manorial rights, the landownership of peasant land was individual and hereditary. Most peasants were enabled to dispose individually. Furthermore, leasehold property was excluded from the feudal relationship between peasant and landlord. Neither was leasehold land part of the commons nor it was burdened by feudal dues. Leaseholders were enabled to work individually, independent and presumably efficient already during the early modern period. Leasehold land was likewise not affected by the agrarian reforms enacted during the first half of the 19th century, namely, separation of the commons or abolition of feudal dues. Any productivity gain resulting from institutional change therefore escapes our analysis. This may explain both a comparatively high level of real leases already in the 16th and 17th centuries and their modest growth during the third quarter of the 19th century.

Such favourable conditions may have fostered high leases, even with loss of some entrepreneurial profit. On the other side the rotation system was still comparatively extensive in 1825. Productivity gains in the 19th century mostly resulted from intensification (KOPSIDIS/ HOCKMANN 2010). We can conclude that rural Westphalia started from a pole position with “modern” landownership and labour organisation. Westphalia ended up in the 19th century with a comparatively backward system, which included high potential for improvements.

7. European comparison

Around 1800 the yields of Northwest Germany were on the level of high yield countries in Northwest Europe (GB, Northwest France, Flanders, Netherlands, Denmark) (KOPSIDIS (2006a, 493-496; 2006b). Nevertheless, even in Northwest Europe yields have spread in a great variety. We have good data in productivity growth in 19th cent. Westphalia provided by Prussian statistics and individual farm accounts. There is reliable evidence for a gross output growth between the estimation of 1822/35 and 1878/80 in particular for those regions that are near the *Ruhr* district. In the Nordkirchen region, called “Kernmünsterland”, yields of wheat increased from about 8 hl/ha to 17 hl/ha by 115%, rye from 11 hl/ha to 14 hl/ha by

27%. Gross output of barley, oats and hay rose as well (KOPSIDIS 1996, pp. 157/158, 543).¹⁰ The wheat yields amounted 40% of the average English yields in 1800, and 65% in 1870. According to a product mix of oats, wheat, barley and rye, which is based on information of 1822/35, we should expect growth in gross yields of 64% (BRACHT 2009). Likely the product mix changed towards a higher share of wheat, so a growth of 70% should be plausible – though the average yields in 1878 still amounted only 65% of the English yields in 1860 (CLARK 1991, p. 447).

Although Westphalian producers shortened the distance to English yields, there still was considerable distance. As we see, the increase was particularly strong in the case of wheat, which was the most market oriented crop. Contemporary farmers emphasized in diaries and memoirs in the early 1850s high yields, due to modern technology, especially draining, and high prices, due to growing market demand. KOPSIDIS (1996), who described the period 1830-1880 as the “the second stage of the Westphalian Agricultural Revolution”, identifies decreasing transportation costs as a result of railway construction from 1846 onwards as the most important contributing factor in this process.

Both the low level of yields and the extraordinarily growth is reflected in the nominal leases (figure 5). Obviously growth was fostered by urbanisation and industrialisation in the Ruhr district. Over the whole period English rents (in gramm silver per hectare) have been higher than the Westphalian. Some similarities can be recognized. Both rents had a peak between 1715 and 1725. The English and the Westphalian rents both had a peak at the end of Napoleonic era, to be followed by a period of decrease. However, whereas the Westphalian nominal rents dropped until the last quarter of the 18th century, the English rents rose since the 1750s due to the Industrial Revolution. Around 1750 the rents in the Paris Basin took off as well. The Westphalian leases reflect a typical “catch-up development” during the urbanisation starting a hundred years later than the English, about 1850. Since the 1870s the English nominal rents dropped, whereas the Westphalian remained stable. This is probably a response to the German imports tariffs on grain.

In figure 6 nominal rents were deflated with the price of wheat to gain a standard basis of comparison with the rent series of other (West-) European countries. The series with 5-year-averages (Clark 2002; Hoffman 1996; and both Westphalian) indicate an astonishingly

¹⁰ Agriculture in the region around Nordkirchen was comparatively intense with on average 77% of arable land being sown. In total Westphalian agriculture was rather extensive still in the 1830s with 61% of arable land being sown, less than in an ordinary three-field system (KOPSIDIS 2009).

parallel development between 1650 and 1750. Clarks English real rents developed similar to the Westphalian even until 1800. We should consider exogenous continental influences, such as climatic change in the form of the end of the Little Ice Age c. 1700 (MANN et al. 2009) as the reason. At least the Assen rents were on the same level of real value as the rents in the Paris Basin and in the England of the Agricultural Revolution. If we consider the repeat sales method applicable, the Nordkirchen real rents had a considerable level, and the Assen rents were high above. Obviously structural features as landownership, labour organisation and parcelling in Westphalia favoured agricultural productivity.

After 1800 the trends definitely diverge. The Westphalian agriculture remained on a rather extensive level having many years of fallow and a low standard of technology. Remarkable changes occurred not until the 1840s. The boom of English real rents after 1800 was caused by a high level of nominal rents and falling prices, whereas in Westphalia prices after 1840 rose, although output and thus nominal rents also increased. The consequence were high income gains on the side of the producers, here the leaseholders.

8. Conclusion

This study develops the first long series of real land rents for a German region. In constructing indices of nominal rents it relies on a simplified version of the chain index and repeat sales methods. The latter constitutes an innovation in historical research into land rents. Whereas the two indices differ in levels during some periods, their real values evolve in a broadly similar manner: The decline that accompanied the huge population losses during the 1620s and 1630s was followed by a gradual increase of real land rents. This trend culminated around 1730 at values that surpassed the level prevailing during the first two decades of the seventeenth century by some 10%. Between c. 1600 and 1730, excluding the high prices of 1698, the real land rent evolved largely in parallel with the long-run movement of population size. This suggests that during this period the real land rent was largely driven by the man-land ratio and the resulting labour intensity of land cultivation. The parallel movement of real land rents in England and Westphalia in addition suggest an influence of exogenous forces, such as the end of the Little Ice Age around 1700.

Between ca. 1730 and the late 1760s real land rents fell by more than a third, which erased all gains made since the middle of the 17th century. Favourable climatic conditions raised the real land rent during the 1780s and the 1820s, but this did not imply sustained

recovery. Rather, the minima reached during the Seven Years' War, the Napoleonic Wars and the food crisis in 1855, were finally overcome only in the course of the moderate increase setting in during the late 1850s. By 1880 real land rental values surpassed the level prevailing during the late 1810s and the early 1850s by about 30%. This is modest by comparison with the evolution of grain yields. The reason can be found in high prices due to market demand and growing entrepreneurial profit due to delayed adjustment of the nominal rents to output growth.

From a methodological point of view an important finding is the demonstration that most leasehold contracts did not attribute the whole land rent to landowners and that a profit accrued to the leaseholder. During the 1820s and early 1830s this made up about 30% of the total land rent. Shifts in the distribution of the land rent may thus lead to an under-estimation of productivity growth. Leases are therefore no exact indicator of land productivity. In dense connection with output data leases can be used for a better understanding of net proceeds and the producers' and landlords' income. An important challenge for future research into the history of the land rent, therefore, consists in the development of testable hypotheses regarding the factors that determine the rate of the land rent that accrued to landowners.

However, leases can nevertheless be used to estimate productivity, because the value of the production might have exceeded, but not fallen below the rent. The rent is the lower border of the productivity. On this background the Westphalian agriculture was rather competitive in the early modern era, but lost advantages in landownership and field systems during the 18th century, when Westphalian agriculture diverged from the Northwest Europe. Having retained rather extensive agricultural systems, Westphalia saved productivity gains that were supposed to be realized in the second half of the 19th century.

Appendix

Figure 1: Nordkirchen and Assen in Westphalia (borders of 1815)

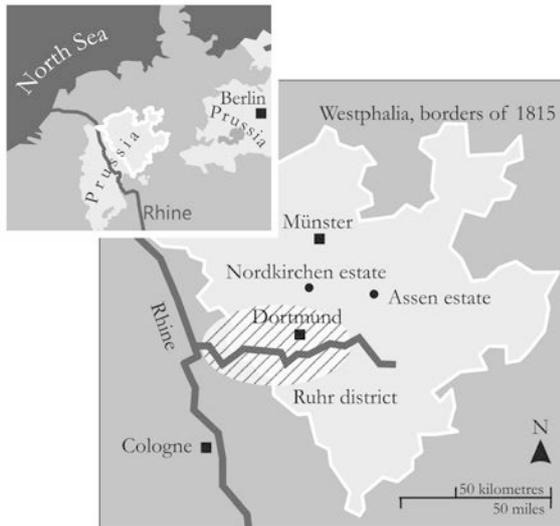
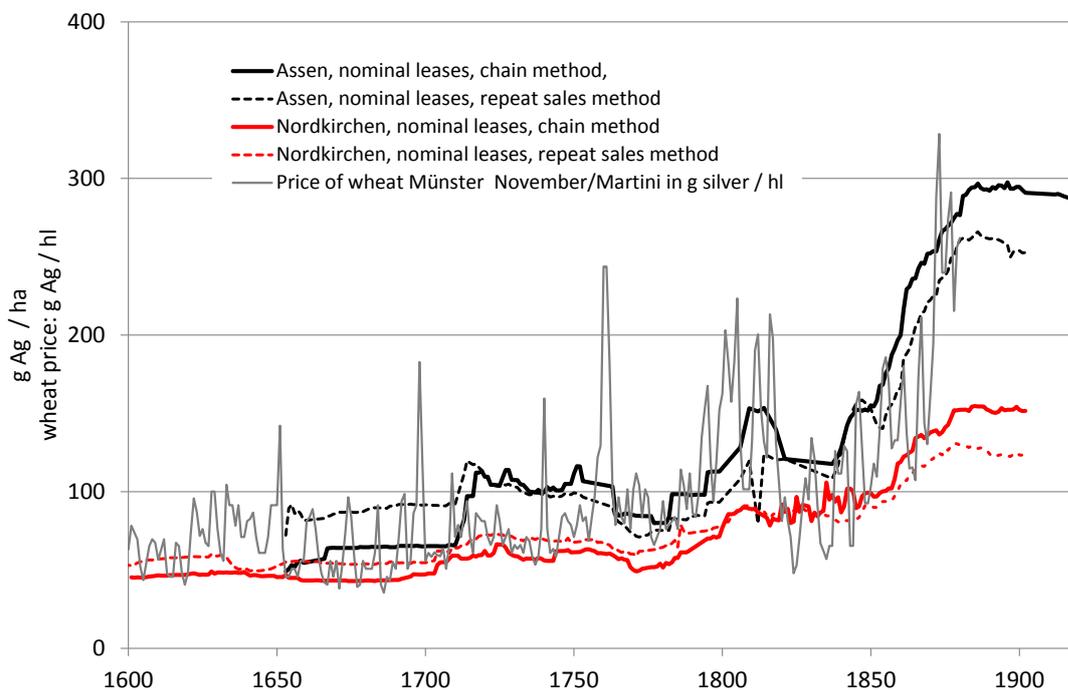
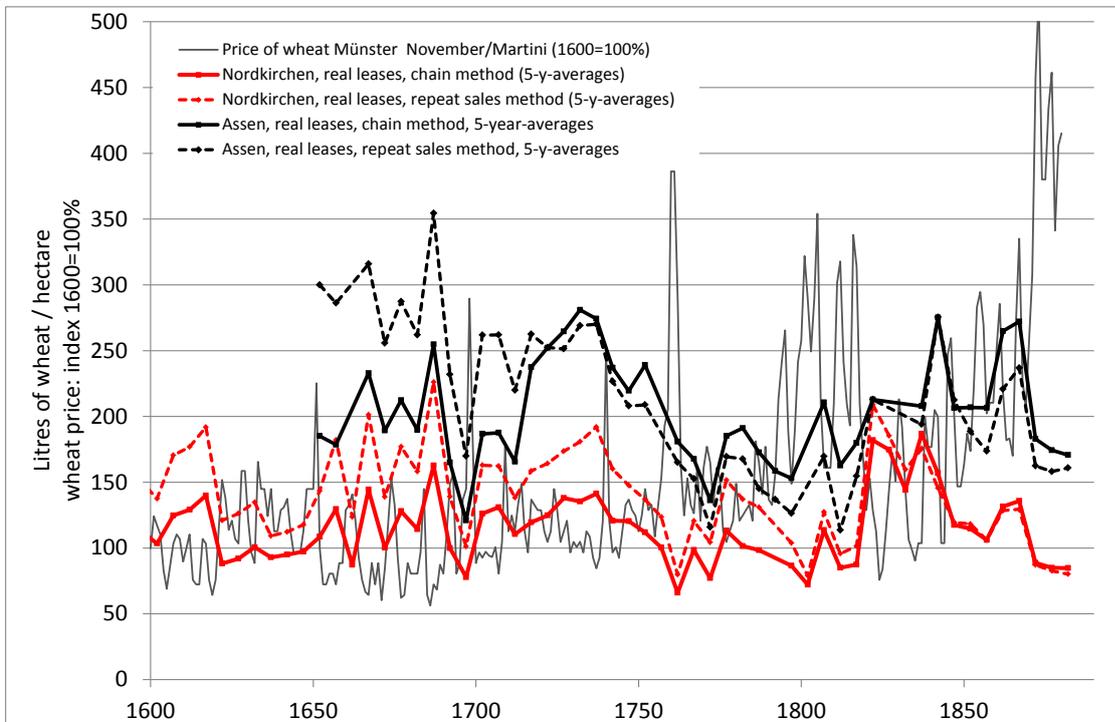


Figure 2: Nominal rent indices and output prices, Nordkirchen estate, arable land, 1601-1880



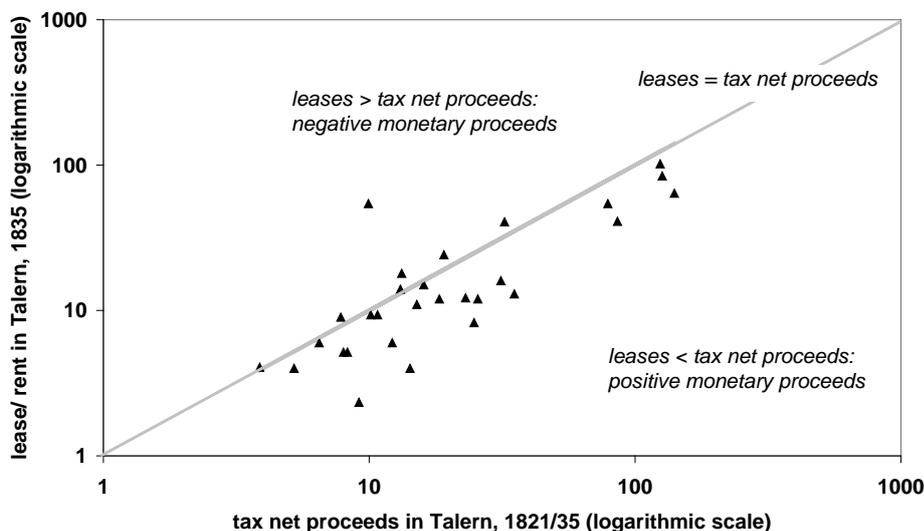
Sources: *Leases*: Westfälisches Archivamt, Nordkirchen und Assen. *Prices*: see text. Calibration of the series is based on the Cadastres surveys (Wertschätzungen) 1822/35, which include lease surveys of the decades preceding 1825, here the cross section of 1825: average parcel lease in Nordkirchen and the surrounding communities amounted 5,22 Taler/ha, in the district of Assen 7,24 Taler/ha. Wheat price: Original prices are in Taler/Scheffel. The Prussian Scheffel amounted 54.96 litres. Original currencies: (1601-1826 Taler/Schilling/Pfennig (1690-1743 (1771): 19,5 g Ag/Taler [=Taler/feine köln. Mark = 1/12]; 1771-1826: 17,55 g Ag/Taler [=Konventionsfuß, Taler/feine köln. Mark = 1/13,33], 1826-1874 Taler/Silbergroschen/Pfennig, 16,71 g Ag/Taler [=Graumann-Fuß, Taler/f. k. Mark = 1/14], after 1875 Mark/Pfennig (5,57 g Ag/Mark). No tax adjustment (see text).

Figure 3: Real land rents indices, Nordkirchen and Assen, arable land, 1600-1880 in litres wheat per hectare



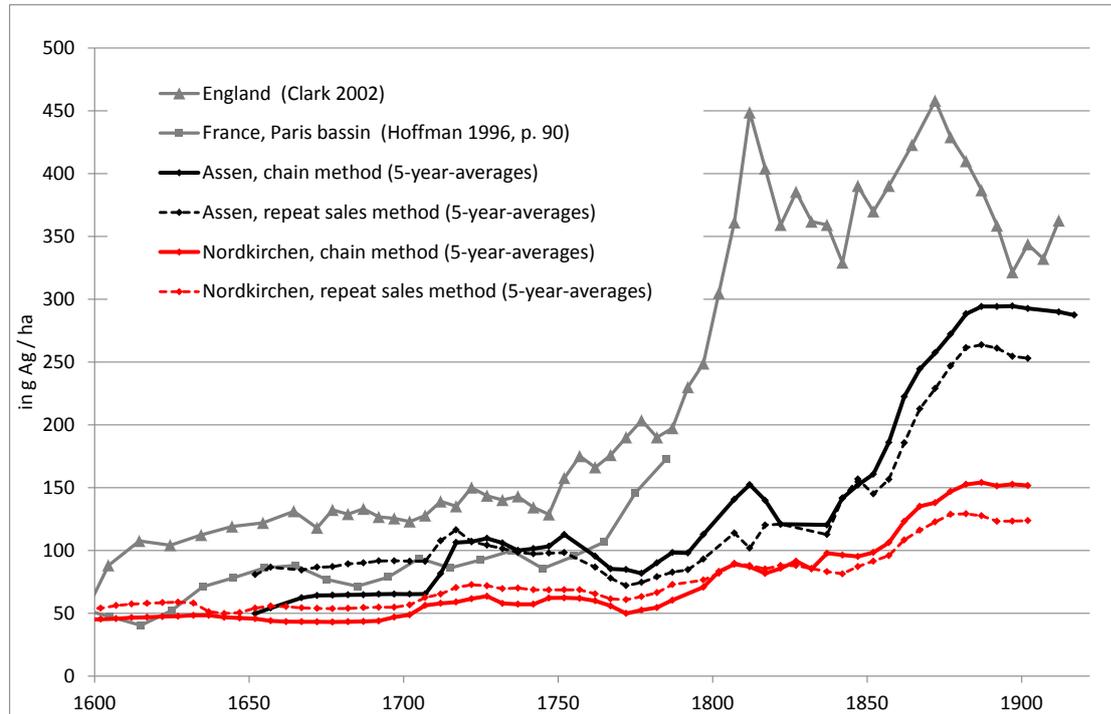
Sources: see Figure 2. Currency adjustment was unnecessary, because prices and leases of the same time were registered in the same currency. Grain prices until 1827 were registered in Taler/Schilling/Pfennig, 1828 in Taler/Silbergroschen/Pfennig and after 1875 in Mark/Pfennig. Grain vessels before 1829 were registered in Malter (Münster) = 279 litres; 1829-1871 in Prussian Scheffel = 54.96 litres; 1871-1880 in Zentner = 50 kilogramm = 64 litres (weight of wheat = 0,773 kg/litre).

Figure 4: The level of leases on arable land 1835 in comparison with net proceeds 1821/35 (Nordkirchen estate)



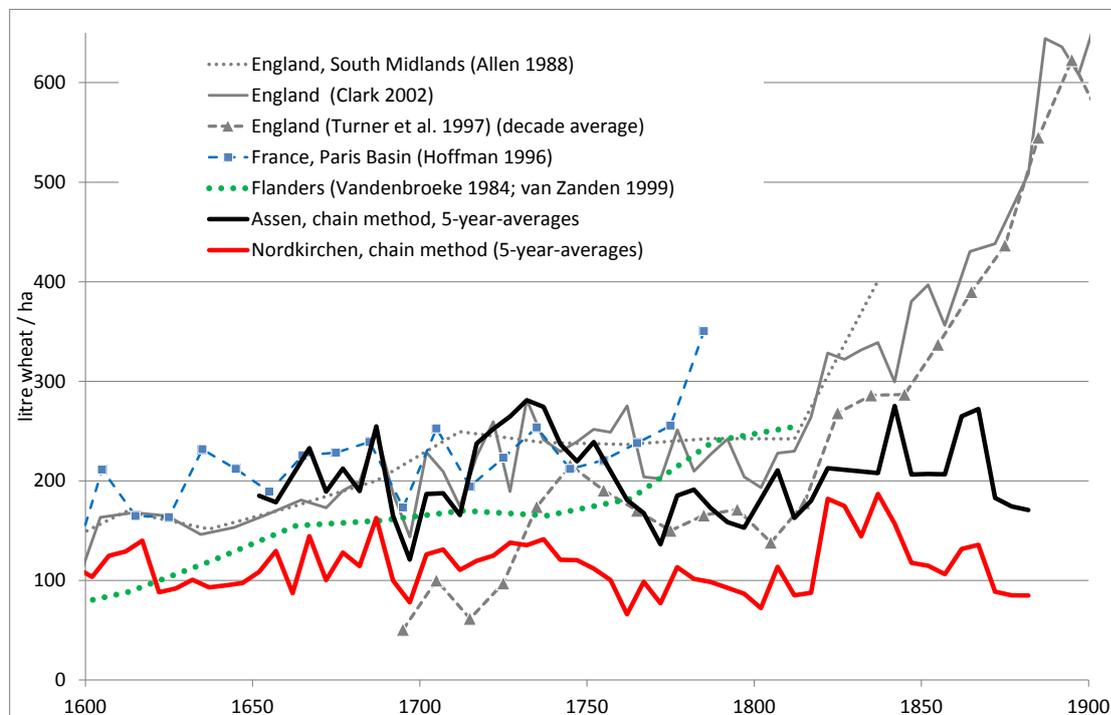
Sources: Archiv des Landschaftsverbands Westfalen-Lippe, Archiv Nordkirchen, Akten, A7254 and A2595.

Figure 5: Comparison of nominal land rental values 1601-1910



Sources: CLARK (2002), p. 297; HOFFMAN (1996), p. 90; calibration of the Nordkirchen and Assen leases: see text.

Figure 6: Comparison of real land rental values 1601-1880



Sources: *England*: ALLEN (1988), p. 43; CLARK (2002), p. 297; TURNER ET AL. (1997), table A2.3, rent assessed. All deflated with CLARK (2004), Appendix, table 1; *France*: HOFFMAN (1996), p. 90, deflated with BAULANT (1968); *Flanders*: VANDENBROEKE (1984), quoted from VAN ZANDEN (1999). *Nordkirchen* and *Assen*: see text. 1 bushel = 36.39 litres; 1 acre = 0.405 hectare.

References

- [SCOTT] Sammlung der Gesetze und Verordnungen welche in dem königlich preußischen Erbfürstenthume Münster... vom Jahre 1359 bis ... 1806 und resp. 1811 ergangen sind, Münster 1842.
- ABEL, Wilhelm (1966): Agrarkrisen und Agrarkonjunktur in Mitteleuropa vom 13. bis zum 19. Jahrhundert, 2nd ed. Hamburg/ Berlin 1966.
- (1974): Massenarmut und Hungerkrisen im vorindustriellen Europa. Versuch einer Synopsis, Hamburg/ Berlin 1974.
- ALLEN, Robert C. (1988): The price of freehold land and the interest rate in the seventeenth and eighteenth centuries, in: *Economic History Review* 41 (1988), 33-50.
- BAILEY, Martin J./ Muth, Richard F./ Nourse, Hugh O. (1963): A Regression Method for Real Estate Price Index Construction, in: *Journal of the American Statistical Association* 58 (1963), 933-942.
- BAULANT, Micheline (1968): Le prix des grains à Paris de 1431 à 1788, in: *Annales: E.S.C.* v. 23, n. 3 (1968), 520-540 (http://gpih.ucdavis.edu/files/Paris_1380-1870.xls (sheet starches, wheat 1)).
- BAVEL, Bas J. P. van (2008): The emergence and growth of short-term leasing in the Netherlands and other parts of northwestern Europe (eleventh-seventeenth centuries). A chronology and a tentative investigation into its causes, in: Bavel, Bas van/ Schofield, Philipp R. (eds.), *The Development of Leasehold in Northwestern Europe, c. 1200-1600*, Turnhout 2008, 179-213.
- BAVEL, Bas J. P. van/ Thoen, Erik (eds.) (1999): *Land Productivity and Agro-Systems in the North Sea Area (Middle Ages - 20th Century). Elements for Comparison*, Turnhout 1999.
- BITTERMANN, Eberhard (1956): *Die landwirtschaftliche Produktion in Deutschland 1800-1950: Ein methodischer Beitrag zur Ermittlung der Veränderungen des Umfanges der landwirtschaftlichen Produktion und der Ertragssteigerungen in den letzten 150 Jahren*, Halle 1956.
- BRACHT, Johannes (2011): Land rental values as an indicator for long-term agricultural productivity, Westphalia 1600-1900 (Conference-paper Zaragoza 2011).
- (2013): Geldlose Zeiten und überfüllte Kassen – Sparen, Leihen und Vererben in der ländlichen Gesellschaft Westfalens (1830-1866), Stuttgart 2013.
- CLARK, Gregory (1991): Yields per acre in English agriculture, 1250-1860: evidence from labour inputs, in: *Economic History Review* 44 (1991), Issue 3, 445-460.
- (2002): Land rental values and the agrarian economy: England and Wales, 1500–1914, in: *European Review of Economic History* 6 (2002), 281-308.
- (2004): The price history of English agriculture, 1209-1914, in: *Research in Economic History* 22 (2004), 41–124.
- DAELEMANS, Frank (1986): Pachten en welvaart op het platteland van belgisch brabant (15de-18de eeuw), in: *A.A.G. Bijdragen* 28 (1986), 165-183.

- FEDERICO, Giovanni (2005): *Feeding the world. An Economic History of Agriculture, 1800-2000*, Princeton 2005.
- GERHARD, Hans J./ Kaufhold, Karl Heinrich (1990): *Preise im vor- und frühindustriellen Deutschland. vol. 1*, Stuttgart 1990.
- GRANTHAM, George (2000): *The French Agricultural Productivity Paradox: Measuring the Unmeasurable [Review of Hoffman, Growth in a traditional...]*, in: *Historical Methods* 33 (2000), 36-46.
- HOFFMAN, Philip T. (1996): *Growth in a traditional society: the French countryside, 1450-1815*, Princeton 1996.
- HUPPERTZ, Barthel (1939): *Räume und Schichten bäuerlicher Kulturformen in Deutschland*, Bonn 1939.
- ISSERLIS, L. (1938): *Tramp Shipping Cargoes, and Freights*, in: *Journal of the Royal Statistical Society* 101 (1938), 53-146.
- KINDLEBERGER, Charles Poor (1991): *The Economic Crisis of 1619 to 1623*, in: *Journal of Economic History* 51 (1991), 149-175.
- KLOVLAND, Jan Tore (2006): *A Repeat Sailings Index of Ocean Freight Rates for the 1850s. (Discussion paper SAM 40 2006, Department of Economics, Norwegian School of Economics and Business)*.
- KNIBBE, Merijn T. (2006): *Lokkich Frysiân. Landpacht, arbeidsloon en landbouproductiviteit in het Friese Kleigebied, 1505-1830*, Groningen/ Wageningen 2006.
- KONERSMANN, Frank (2011): *Land and labour intensification in the agricultural modernization of southwest Germany, 1760-1860*, in: Olsson, Mats/ Svensson, Patrick (eds.), *Growth and Stagnation in European Historical Agriculture*, Turnhout 2011, 141-165.
- KOPSIDIS, Michael (1996): *Marktintegration und Entwicklung der westfälischen Landwirtschaft 1780-1880. Marktorientierte ökonomische Entwicklung eines bäuerlich strukturierten Agrarsektors*, Münster 1996.
- (2006a): Article "Ernteerträge", in: *Enzyklopädie der Neuzeit*, Bd. 3, cols. 490-495.
 - (2006b): *Europäische Ernteerträge 1400 - 1880: quellenkritische Betrachtungen*, in: *Zeitschrift für Agrargeschichte und Agrarsoziologie* 54,1 (2006), 98-102.
 - (2006c): *Agrarentwicklung. Historische Agrarrevolutionen und Entwicklungsökonomie*, Stuttgart 2006.
 - (2009): *Boserup meets Thuenen: Markets and farming intensity in preindustrial Westphalian peasant agriculture, circa 1830*, in: Pinilla, Vicente (ed.): *Markets and Agricultural Change in Europe from the Thirteenth to the Twentieth Century*, Turnhout 2009, 107-135.
- KOPSIDIS, Michael/ HOCKMANN, Heinrich (2010): *Technical change in Westphalian peasant agriculture and the rise of the Ruhr, circa 1830-1880*, in: *European Review of Economic History* 14 (2010), 209-237.
- LE GOFF, Tim J. A./ SUTHERLAND, Donald M. G. (2000): *What Can we Learn From Leases? A Preliminary View*, in: *Histoire & Mesure* 15 (2000), 289-320.

- MANN, Michael E. et al. (2009): Global Signatures and Dynamic Origins of the Little Ice Age and Medieval Climate Anomaly, in: *Science* 326 (2009), 1256–1260.
- OLSSON, Mats/ SVENSSON, Patrick (eds.), *Growth and Stagnation in European Historical Agriculture*, Turnhout 2011.
- PFISTER, Ulrich (2010): Consumer prices and wages in Germany, 1500–1850 (=CQE-Working-Papers 15/2010), (http://www1.wiwi.uni-muenster.de/cqe/forschung/publikationen/cqe-working-papers/CQE_WP_15_2010.pdf)
- PFISTER, Ulrich/ FERTIG, Georg (2010): *The Population History of Germany: Research Strategy and Preliminary Results*, 2010 (=MPIDR WORKING PAPER WP 2010-035).
- REINICKE, Christian (1989): *Agrarkonjunktur und technisch-organisatorische Innovation auf dem Agrarsektor im Spiegel niederrheinischer Pachtverträge 1200-1600*, Köln/ Weimar/ Wien 1989.
- SCHOLTEN, Friederike (2012): *Adelige Gutswirtschaft und Getreidemärkte in Westfalen 1650–1850*, Master-Thesis Münster 2012.
- SCOGNAMIGLIO, D. (2002): *Methoden zur Immobilienbewertung*, Zürich 2002.
- STEELE, Marion/ GOY, Richard (1997): Short Holds, the Distributions of First and Second Sales, and the Bias in the Repeat-Sales Price Index, in: *Journal of Real Estate Finance and Economics* 14 (1997), 133-154.
- TURNER, Michael E./ BECKETT, John V./ AFTON, Bethanie (1997): *Agricultural rent in England 1690-1914*, Cambridge 1997.
- VANDENBROEKE, Christian (1984): Le cas flamand : evolution sociale et comportements démographiques aux XVIIe-XIXe siècles, in: *Annales. Économies, Sociétés, Civilisations* 39 (1984), 915-938.
- ZANDEN, Jan Luiten van (1999): The development of agricultural productivity in Europe, 1500–1800, in: Bavel, Bas J. P. van/ Thoen, Erik (eds.), *Land Productivity and Agro-Systems in the North Sea Area (Middle Ages - 20th Century)*. Elements for Comparison, Turnhout 1999, 357-375.