Agricultural Rent and Grain Prices in England during the Long Eighteenth Century

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The reader will easily perceive, that the applause I have bestowed above on the general system of corn-laws in England, is founded entirely on the supposition that they are peculiarly calculated to prevent the fluctuation of the price of grain: - An object that will be allowed to be of the highest importance to the well-being of almost every individual of the state. The object seems, however, to have been entirely overlooked by Dr. Smith, who consider the bounty on corn only as a contrivance calculated to enhance the price of grain, and thus give an exorbitant profit to the farmer and corn merchant: - Considerations which, if ever they influence the legislature, it must be acknowledged, were little deserving their favourable notice, and which were entirely disregarded by me.[1]

The point of departure for this paper was the Corn Law Debates of the later eighteenth and nineteenth centuries that intersected both with the question of poor relief, in which Robert Malthus's arguments on population were employed to demonstrate the futility of any form of relief, and with discussion about the level and function of subsidies and duties on grain exports and imports that led to Ricardo's reformulation of Malthus's rental theory in his *Essay on Profits* (1815), extended into his *Principles of Political Economy* (1817). Rather than seeking to establish the relationship between Corn Law thresholds and contemporary market conditions – one of our findings is that it is difficult to establish any such link – we review sources for agricultural rents and grain prices for the later eighteenth and early nineteenth centuries and use them to assess contemporary argument about rent, wages, profits and prices. Our results show that the response of the new political economy to Corn Law debate, culminating in 1815, had little bearing on contemporary conditions because of its theoretical design, not because of any failure on the part of contemporaries to appreciate its theoretical force. Twentieth century commentary on this framework broadly accepted without question

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[1] James Anderson, "Postscript to Letter Thirteenth – On the Nature and Influence of the Bounty on Corn, and the other Corn-Laws of Great Britain", in his *Observations on the Means of Exciting a Spirit of National Industry; chiefly intended to promote the agriculture, commerce, manufactures and fisheries of Scotland*, Edinburgh 1777 p. 310.

Ricardo's own perspective, but in the conditions prevailing his construction was no more than what Alfred Marshall later called a "toy".[2] We need therefore to examine afresh issues of market conditions, wages, profits and rents if we are to gain insight into contemporary policy argument and options.

Our reconstruction of market dynamics is still a work in progress. We dispense with the customary macroeconomic framework focussed on long-run growth, in which data is aggregated and extrapolated to provide a statistical foundation for trends that are thought to reflect "real conditions". Our interest is by contrast to seek a reconstruction of "real conditions" as apprehended by their contemporaries, and which formed the basis of their arguments and decision-making. The widespread practice of relating Corn Law debate to annualised national grain prices for example fails to reflect how contemporaries would have apprehended developing gluts or shortages. By using wherever possible high-frequency local data we are able to come closer to seeing issues as their contemporaries would have seen them. More broadly, we could say that we are not especially interested in arguments about the rise and decline of sectors and economies, nor even in a "reality" constructed by twenty-first economic historians, but in the conditions under which arguments are formed and decisions made. In this way the study of economic history can gain a new contemporary resonance.[3]

The received historiography of the "Industrial Revolution" has emphasised the dynamic nature of the contemporary economy, together with the emergence of a new urban working class and the steady erosion of the political power of the landed aristocracy. The new political economy of Robert Malthus and David Ricardo directed attention to the economics of distribution: the former's theses on population had direct implications for the analysis of wages, and the latter's account of differential rent was angled towards the long-term rate of profit. These two issues were joined together in argument over the function of the Corn Laws, culminating in a series of pamphlets in 1815 in which rental payments from tenant farmers to landowners were identified as a major mechanism of redistribution. Argument over the price of grain and the costs and benefits of free export and import continued through the 1820s and 1830s, until the Irish Famine, and a general shortfall of wheat in European markets, ended efforts to regulate the grain trade according to political objectives.

Typically, during this period debate intensified during periods of either high, or low, grain prices. Contemporaries would naturally cite current prices, but historians have generally used annual averages in their accounts. Coupled with a general preoccupation with the trends of economic growth, this use of annual averages has obscured the real issue that concerned

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[2] As Tiziano Raffaelli emphasised, Marshall was impatient "with abstract problems of no practical relevance – with 'toys', as he used to define purely academic exercises." "Keynes's Apprenticeship with Marshall in 1905", *History of Economic Ideas* Vol. 8 No. 2 (2000) p. 126.

[3] What we are proposing is the application of the "ideas in context" trope of modern intellectual history to economic history.

contemporaries: rapidly fluctuating prices. Here we are concerned not so much with the cause of fluctuation, although it is very important for our argument; rather, that rapidly rising prices were followed by compensating falls in price, and vice versa. It might appear obvious that peaks and troughs were followed by price falls and rises, but both the structure and timing of this phenomenon have received insufficient attention. We will demonstrate that in a situation of great grain price volatility there was a constant reversion to a mean price. The annual average, or a five-year moving average, is the price to which the market constantly reverted; what people were arguing about were the implications of apparently random deviations from this mean.

Ricardo's account of differential rent emphasised the way that rental payments functioned to secure profitability across land of different qualities for grain that sold at a single price. Given that he assumed wages to be paid from a fixed fund, he was able to treat rents and profits as in a reciprocal relationship, so that in the long-run the extension of cultivation in a closed economy would reduce the rate of profit to such an extent that the economy would arrive at a stationary state. This distributional model was revived in the twentieth century by Piero Sraffa, and together with his edition of Ricardo's collected works this has contributed to a general tendency to focus on the issues of distribution with which Ricardo was primarily concerned – between landlords, agricultural workers, urban workers, capitalist farmers[4] and manufacturers. This distributional model links the marginal efficiency of capital to distinct social groups.

Little attention has however been paid in this context to the actual evolution of contemporary grain prices, agricultural rents, and wages. Important new work has been done on the management of household income – balancing household size against incomes and food prices – but study of the organisation of grain markets has gone out of fashion. We seek to redirect attention to these, not for the purpose of demonstrating the "magic of the market", but in order to suggest that the distributional model deployed by Ricardo and Malthus, and accepted as such ever since, failed to engage with the issues that bothered contemporaries – fluctuations in the price of grain and food security. We suggest that while the idea that rental payments functioned to homogenise differential production costs is an appealing and simple principle, there is little empirical evidence for this. This is a relationship that has a theoretical, but not empirical, significance. Second, an excessive concern with long-run trends shared by both Ricardo in his way, and modern economic historians in theirs, has distracted attention away from the fact of short-run fluctuations in an economy in which the movements of grain prices had major social and political significance.

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[4] In the third edition of *Principles* (1821), in the new chapter on machinery, Ricardo refers to farmers as "capitalists". This was unusual for the time.

Boyd Hilton framed his account of Corn Law policy as entangled in the process of an Industrial Revolution whose nature was at the time not clearly recognised;[5] but such a framework is premature, both in terms of contemporary understanding and the actual dynamics of the early nineteenth century British economy. That Britain underwent an "Industrial Revolution" in the later eighteenth and early nineteenth century is a narrative that first became a general orthodoxy in the 1880s. Used in the context of the early nineteenth century, the idea hides more than it reveals. While the concept of an "Industrial Revolution" has no direct bearing on our arguments here, debate by proxy over the existence and timing of an analogous "Agricultural Revolution" has become embedded in the contemporary preoccupation with economic growth. In the early twentieth century it was commonly thought that the wave of parliamentary enclosures of the last third of the eighteenth century represented a major re-organisation of the human geography of the rural landscape, placing emphasis upon the social costs of industrialisation.[6] In response to this Eric Kerridge argued that the major changes in the English agrarian economy occurred before this period, principally during the seventeenth and early eighteenth centuries.[7] The elements of his "Revolution" involved convertible husbandry, fen drainage, fertilisers, the floating of water meadows, new crops, new systems, and new stock – the cumulation of smaller-scale changes, rather than an intensive large-scale reorganisation of the countryside.[8] That a controversy initiated in the 1960s retained its force is demonstrated by the way that Robert Allen, opening a review of the issue in 1999, could simply assume that there had been an "agricultural revolution" and that the issue was only to decide when it had taken place.[9] More recently it is the sources of growth and its dimensions that have become controversial, transposing this approach from one historiographic idiom to another.[10] We note these disputes only to emphasise that today's arguments over the historical nature of the British agrarian economy are of little help in understanding the politics and economics of the grain

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[5] "British governments in the late eighteenth century made no attempt to control the spontaneous and uncoordinated processes known as the 'first Industrial Revolution'. ... If Liverpool's ministry was the first to strive for a coherent theory of economic policy, it was perhaps the last to regard the industrial revolution as a malignant aberration…". Boyd Hilton, *Corn, Cash, Commerce. The Economic Policies of the Tory Governments 1815-1830*, Oxford University Press, Oxford 1977 p. vii.

[6] This view took little account of the legislative function of Parliament – see Julian Hoppit, *Britain's Political Economies. Parliament and Economic Life, 1660-1800*, Cambridge University Prees, Cambridge 2017 pp. 95ff.

[7] Eric Kerridge, *The Agricultural Revolution*, George Allen and Unwin, London 1967.

[8] The broader arguments are outlined in the first chapter of Mark Overton, *Agricultural Revolution in England. The Transformation of the Agrarian Economy 1500-1850*, Cambridge University Press, Cambridge 1996.

[9] "The timing of the agricultural revolution in England is still debated despite a century of research. Before 1960, the standard view assigned the revolution to the late eighteenth and early nineteenth centuries - during the period of parliamentary enclosures, which were seen as its cause. Prominent revisionist historians such as Havinden, Jones, and Kerridge, however, have argued that output and productivity rose significantly in the sixteenth or seventeenth century, and recently the revisionist view has been reformulated and extended by Allen and by Clark. Overton, however, has now reaffirmed the earlier faith. This article evaluates - and rejects - the evidence for Overton's counter revisionism and offers new evidence that shows there were two agricultural revolutions marked by rising output and productivity." Robert C. Allen, "Tracking the Agricultural Revolution in England", *Economic History Review* Vol. 52 (1999) p. 209.

[10] See Gregory Clark, "Growth or Stagnation? Farming in England, 1200-1800", *Economic History Review* Vol. 71 (2018) pp. 55-81; and the response by Stephen Broadberry, Bruce M. S, Campbell, Alexander Klein, Mark Overton, and Bas van Leeuwen, "Clark's Malthus Delusion: Response to 'Farming in England 1200-1800". *Economic History Review* Vol. 71 (2018) pp. 639-64.

trade – how and why contemporaries framed their arguments in the ways that they did, how and why the policy measures adopted had the impact that they had (if any).

Most of the central scholarly literature on the historical purpose and actual impact of the Corn Laws was published decades ago; while in no way superseded, today it is generally referred to only in summary.[11] Boyd Hilton provided a more recent overview of the political context of economic policy, but the leading economic evaluations of English grain markets, grain production and grain prices remain two articles by Susan Fairlie and one by Lucy Adrian.[12] Some of their work – especially Adrian's emphasis on the utility of the *London Gazette* reports of prices in provincial markets from 1770 – has been taken up more recently,[13] but ignoring the emphasis on price fluctuations and the structure of supply that Fairlie and Adrian made.[14] Or more exactly, modern research takes note of fluctuations only to seek to eliminate them in favour of trends; for in modern parlance fluctuations are "shocks", hence random factors exogenous to any model or system. But in an agrarian economy, as James Anderson noted, it is the fluctuations that matter most, not the trends. The general problem was illustrated many years ago: even using annual average prices, which smooth temporary peaks and troughs, W. G. Hoskins demonstrated that English wheat prices had consistently varied between 20s. a quarter and 64s. a quarter over a period of 140 years, for most of this period there being a falling, not a rising, trend in prices.

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[11] Thomas Tooke, *A History of Prices, and of the State of the Circulation, from 1793 to 1837, preceded by a Brief Sketch of the State of the Corn Trade in the Last Two Centuries*, 2 vols., Longman, Orme, Brown, Green and Longmans, London 1838; William Freeman Galpin, *The Grain Supply of England during the Napoleonic Period*, dissertation, University of Pennsylvania 1925; Donald Grove Barnes, *A History of the English Corn Laws from 1660-1846*, George Routledge, London 1930; C. R. Fay, *The Corn Laws and Social England*, Cambridge University Press, London 1932.

[12] Susan Fairlie, "The Nineteenth-Century Corn Law Reconsidered", *Economic History Review* Vol. 18 No. 3 (1965) pp. 562-75; Susan Fairlie, "The Corn Laws and British Wheat Production, 1829-76", *Economic History Review* Vol. 22 No. 1 (1969) pp. 88-116; Lucy Adrian, The Nineteenth Century Gazette Corn Returns from East Anglian Markets", *Journal of Historical Geography* Vol. 3 No. 3 (1977) pp. 217-236.

[13] Liam Brunt, Edmund Cannon, "The Truth, the Whole Truth, and Nothing but the Truth: The English Corn Returns as a Data Source in Economic History, 1770-1914", *European Review of Economic History* Vol. 17 (2013) pp. 318-39; D'Maris Coffman, David Ormrod, "Corn Prices, Corn Models and Corn Rents: What Can We Learn from the English Corn Returns?", in Martin Allen, D'Maris Coffman (eds.) *Money, Prices and Wages. Essays in Honour of Professor Nicholas Mayhew*, Palgrave Macmillan, Basingstoke 2015 pp. 196-210.

[14] Marcus J. Chambers and Roy E Bailey, "A Statistical Analysis of Wheat Price Fluctuations in England: 1685-1850", *Journal of Agricultural Economics* Vol. 50 (1999) pp. 564-88 do recognise the importance of fluctuations in the older literature, but they are primarily interested in a "speculative storage model", which they find confirmed. They concede the limited ambition of their approach: "...the purpose of the statistical analysis is to test the predictions of a simple theory, not to describe the multitude of changing forces impacting on the wheat market over the century and a half covered by the data" (p. 582).

Fig. 1 Annual Average Wheat Prices in England 1620-1760[15]

Fig. I
ENGLISH HARVEST FLUCTUATIONS, 1620-1760
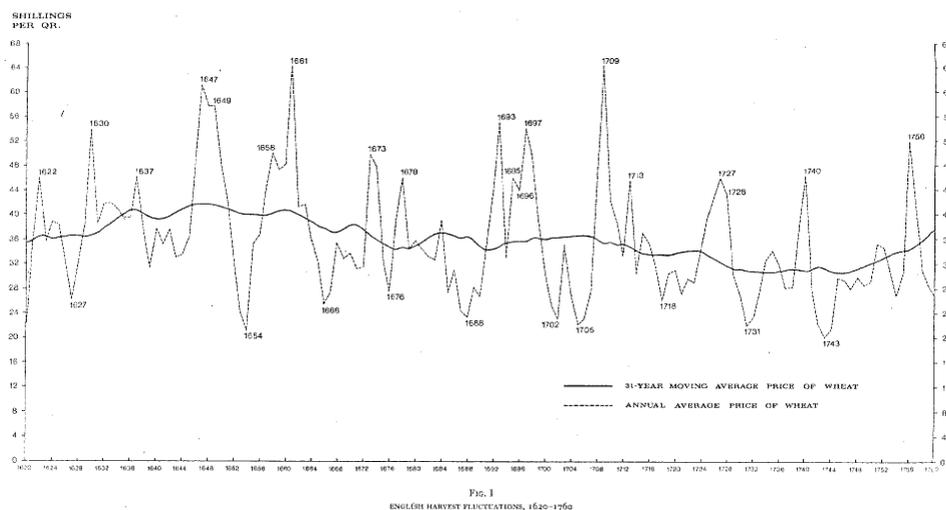
This suggests that an important feature is that the price constantly reverted to a mean despite rising population and increasing output. That is, there are factors that push prices down as well as up. This mechanism is to be found not in the production side (rents) but in the marketing side (merchants, millers). Contemporaries were stimulated to argue about grain prices by high or low prices; we aim to shed light on this by highlighting the way that prices moved away from peaks and troughs. This is not some abstract "magic of the market" but a result of trading and stock-holding. We have no record of either of these – indeed Parliament sought in the mid-1820s to assess European stock-holding – but we do have monthly and weekly county price series from 1770, from 1820 for individual markets. While there are a number of well-known problems with this data, we can show that local markets fluctuated together, reflecting a uniform impact upon differentiated markets.

1. Our Sources

We will first present our data with some preliminary analysis, and then follow this with some more general observations about grain markets and conditions of production.

We begin with data on rentals from two distinct regions – Staffordshire and East Anglia – to establish whether there is any common pattern in rentals, and what conclusions can be drawn from this regarding courses and output. Then we consider the current practice of using annual averages for grain prices when assessing arguments over trade policy. This practice can be shown to obscure the process of price formation, since expectations of a future harvest play an increasingly important role in grain prices as the new harvest approaches, and climatic factors plays a major role in altering these expectations. Using the price data published in the *London Gazette* from 1770, we show that, despite its limitations, there is

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[15] W. G. Hoskins, "Harvest Fluctuations and English Economic History, 1620-1759", *Agricultural History Review* Vol. 16 (1968) graph interleaved pp. 14-15.

sufficient uniformity in movements between markets and over time to demonstrate that we should where possible use weekly data, and not annual averages, when evaluating arguments about the grain trade and the Corn Laws. No reliable data on profits are available for a variety of reasons, but it should be possible to form some conclusions about profitability from price movements seen in the light of rental payments.

2. The Rental Data

J. R. Wordie finally published the rental data from his 1967 thesis on the Leveson-Gower Staffordshire estate in 1981,[16] and in 1975 R. A. C. Parker had generously supplied Keith Tribe with copies of his handwritten notes from Suffolk and Norfolk County Record offices.[17] This material has been invaluable, since the only detailed modern study of agricultural rents is (yet again) primarily concerned with the long-run trend of rentals. Here the authors systematically aggregated the local data they had recorded and published only the aggregated data. The only part of their work that has been of any use for our purposes is one series of annual rental values per acre.[18]

The local rental data from the research of Parker and Wordie therefore remains unique and invaluable. Wordie recorded a long rental series for the Trentham estate, and commented in detail on the changes in estate management over the eighteenth century. Parker's data came from Holkham estate accounts and papers held in the County Record Offices for Norfolk and Suffolk, the following being selected for their detail and edited as indicated:

> Binham and East Bradenham 1790-1819 [Parker notes]
> Badmondisfield (Suffolk) Rental (Rounded to nearest £, excluding expenditure) 1792-1840 [West Suffolk CRO, Parker notes]
> Castle Rising 1741-1866 (excludes outstanding arrears and repairs) [Howard of Castle Rising estate accounts, Parker notes]
> Coke Estate Norfolk Gross Rents for 1820-1842 [Parker 1956 p. 239]
> Holkham Rentals due and paid 1814-1824 [Parker 1956 p. 228]
> Norton Gross Rents 1768-1793 [Parker notes]
> Trentham Rentals due and paid 1717-1839 (Wordie 1981)

Fig. 2 chronicles rents received for different estates. By using a log scale we can observe that while levels and periods differ, the trends in the rate of change are very similar. Because of the diversity of sources, as well as their partial overlap over time, we can only

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[16] J. R. Wordie, "Rent Movements and the English Tenant Farmer, 1700-1839", *Research in Economic History* Vol. 6 (1981) pp. 193-243, drawing on material from his thesis "A Great Landed Estate in the Eighteenth Century – Aspects of Management on the Leveson-Gower Estates 1691-1833", PhD diss. University of Reading 1967.

[17] Relating to his D.Phil. Thesis, "The Financial and Economic Affairs of the Cokes of Holkham, Norfolk, 1707-1842", University of Oxford 1956; revised and published as *Coke of Norfolk, A Financial and Agricultural Study 1707-1842*, Oxford University Press, London 1975.

[18] M. E. Turner, J. V. Beckett, B. Afton, *Agricultural Rent in England, 1690-1914*, Cambridge University Press, Cambridge 1997 Appendix 2 Table A2.1.

generally conclude that rental income was increasing relatively slowly over time (for Binham the average yearly relative change is about 4.5%, for Trentham about 3%, for the Norfolk Coke estate less than 1%). Towards the end of the period we could suggest that the "steady" increase in rent revenues comes to an end and gives way to significant volatility (this is the case with the data from Badmondisfield and Trentham). We come back to this in Fig. 4.

Fig. 2 Gross Rental Receipts over Time (log scale) (£s)[19]
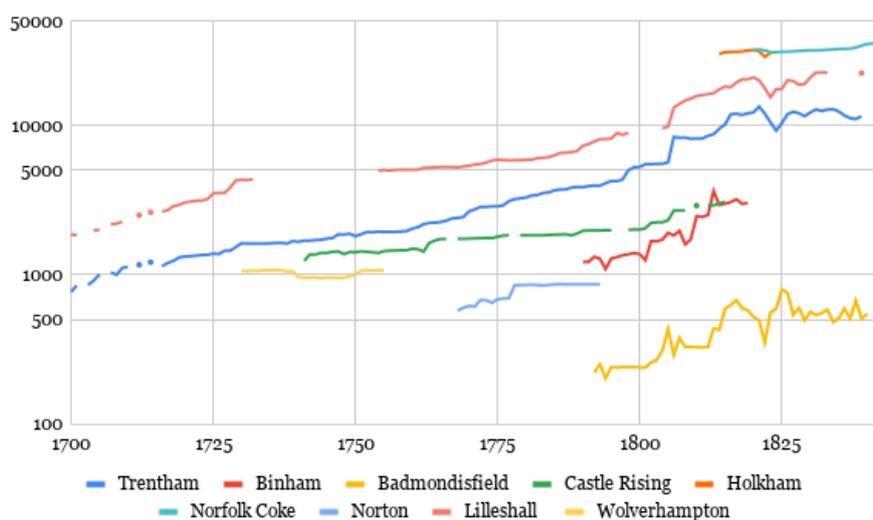
The long-run survey of rental trends conducted by Butler, Beckett and Afton has a national focus, and so is of limited interest for our purposes. They do however include in their study a table of annual rentals per acre calculated from a dataset that is added to over time. For 1700, for example, there is only one source, and for the first half of the eighteenth century it varies between 3 and 10 sources. By 1800 their aggregate of rentals and cultivated area draws on 21 sources, rising to 30 in 1821. While this expanding database naturally has a progressive rise in rental incomes and acreages, the calculation of rentals per acre provides a basis for comparison with the data in Fig. 3, using in this case an aggregate of all available contemporary data.

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[19] Since these estates were of varying size the nominal gross receipts vary a great deal from one estate to another. Despite this, and any change in landholding over time, there is an evident evolutionary similarity in the series.

Fig. 3 Aggregate Rentals (shillings per acre)[20]
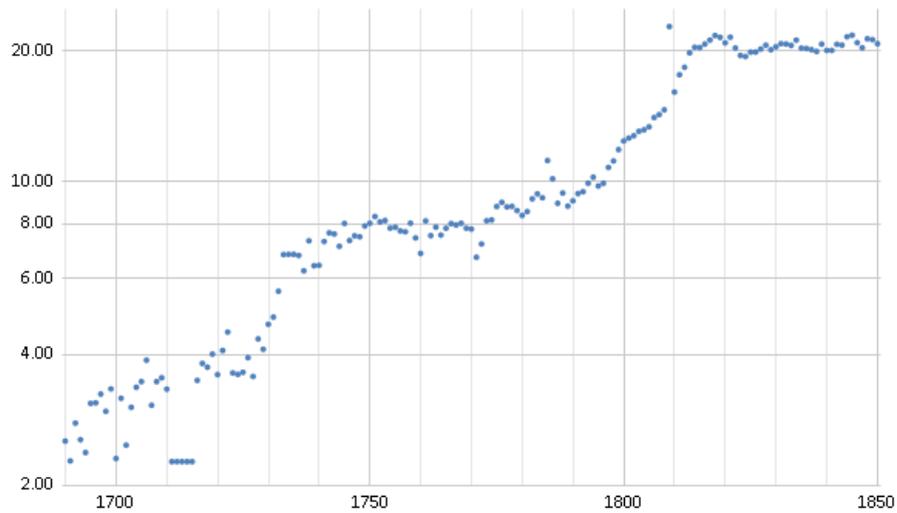
The plateauing that we can observe here in the mid-eighteenth century gives way to a period of steep increases from around 1790 to 1820, followed by another plateau. If we couple this with the data in Fig. 2 we can notice that this period is characterised by great volatility in that dataset, lasting into the 1820s. Figures 4 and 5 present the same information as in Fig. 2, the first overlaying the chronicle of changes of each estate, and Fig. 5 showing them separately.

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[20] Turner, Beckett and Afton, *Agricultural Rent in England*, op. cit. Table A2.1 pp. 309-313.

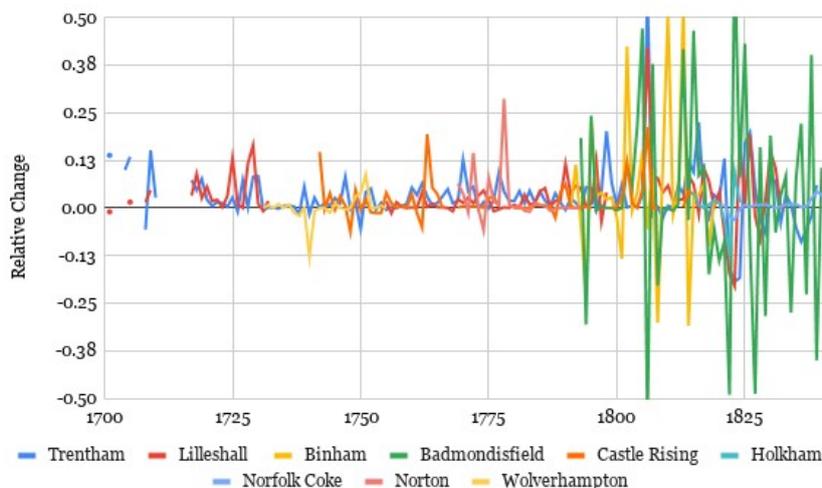Fig. 4 Relative Year-0n-Year Changes in Rentals


Fig. 5 Year-on-Year Changes by Estate

Representing the relative changes over time reinforces our judgement that, based on our data, rental payments from the 1790s onwards are more volatile. In the case of the Trentham series we know why this is: in 1788 the estate was in the hands of a new manager who systematically went about improvement and raising rents accordingly.[21] The rental series we are using here record rents received, excluding arrears owed, but including arrears paid. This no doubt accounts for some of the more extreme fluctuations, but in itself is an important indicator. That farmers fell into arrears during this period suggests that they were under

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[21] Wordie, *Estate Management*, op. cit. pp. 53ff.

increased pressure from landowners and agents: and that the evident change during the 1790s suggests more active management, as recorded in the case of Trentham and Lilleshall. This was not directly linked to the European wars since it persists after 1815, which further supports this hypothesis.

Next we turn to the relationship of wheat prices to rents received, using a logarithmic scale for annual rents and annual what prices. The general association between rents and wheat prices is difficult to characterise. In the graph below we attempted to illustrate the association between the evolution of the (log) price of wheat as measured in pence per imperial quarter and rentals measured in shillings. The information on price and rentals infrequently overlaps in time, but when it does there is no universal pattern: the two series neither move together or in opposite directions. Prices can be observed to increase and rentals to fall (Badmondisfield in the second half of the 1700s); or they both increase (Binham); or the price fluctuates while rentals are more or less constant (Castle Rising early on); while in some instance rentals increase despite the price falling (Lilleshall).

Fig. 6 Rental and Price Movements, various sources
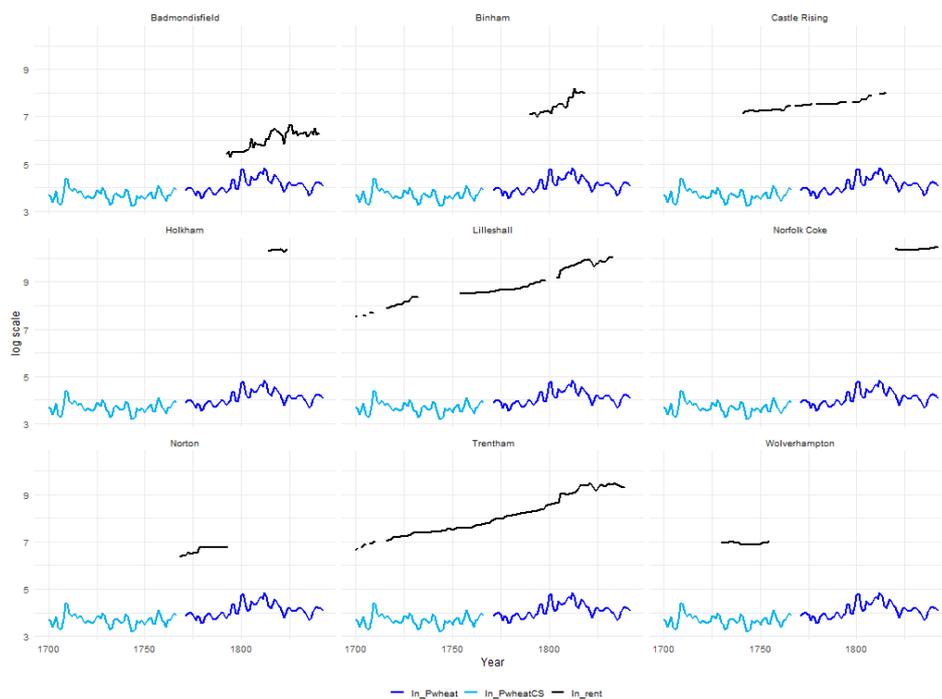
If we now plot that association as log rent vs log price we find the following:

Fig. 7 Rental and Price Movements, log scale
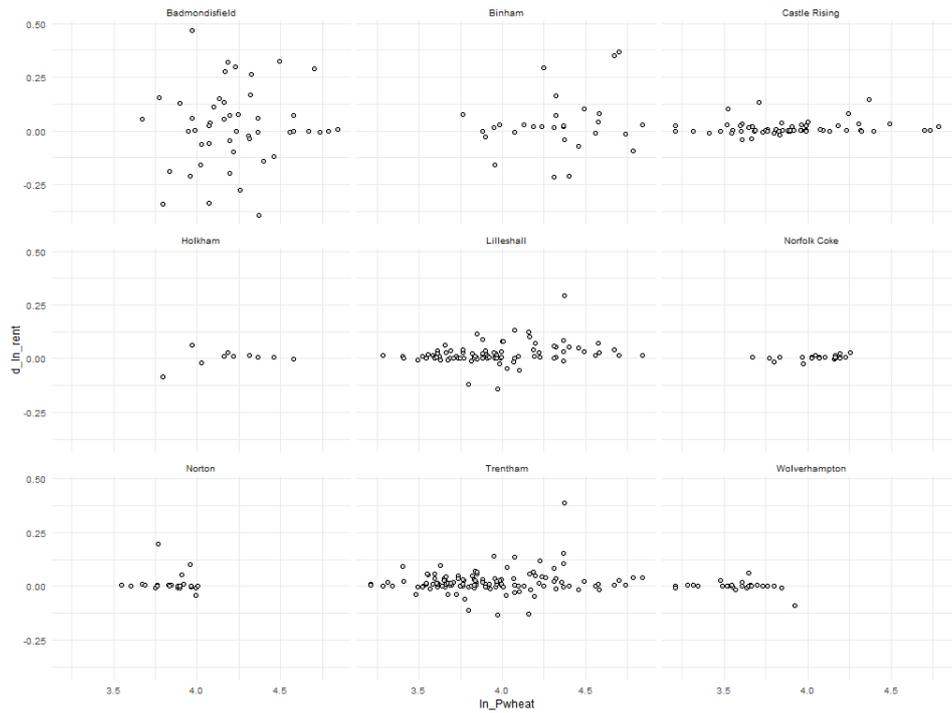
While there are here cases where the relationship is close (Castle Rising, Holkham), there are also cases where there is little relationship (Badmondisfield, Binham), with a further two in between.

The rent and price relative changes do not appear to be associated either. There is obviously substantial volatility throughout, but we cannot uncover any clear pattern, and at first glance they are are uncorrelated. To the extent that our data is informative about changes, this is true for all estates.

Fig. 8 Changes in Rentals and Changes in Prices, log scale
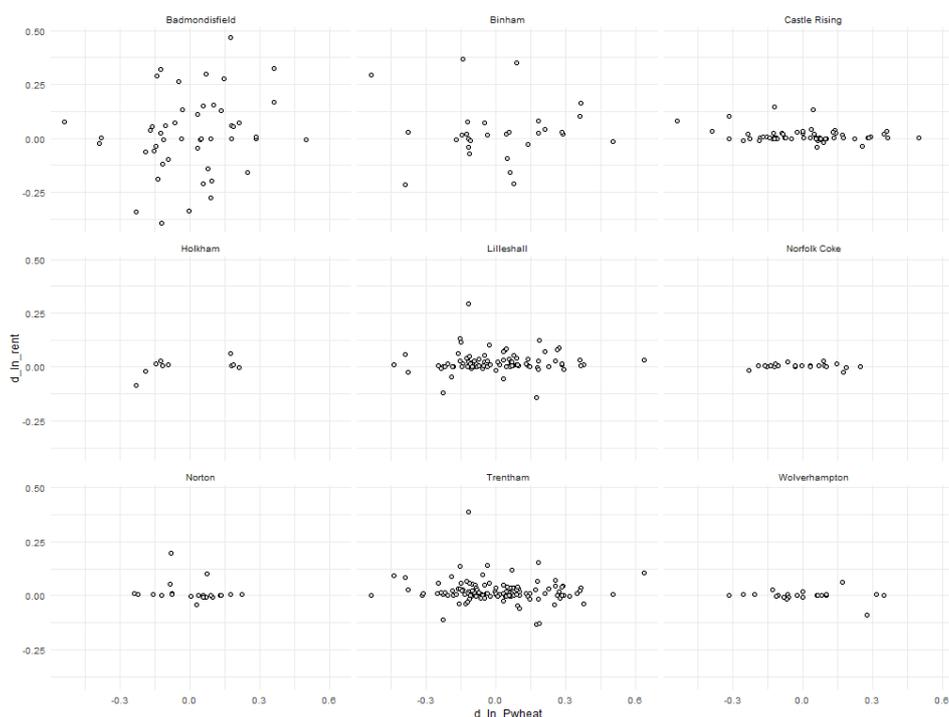
3. Grain Prices

When it comes to grain prices, the chief difficulty is that the literature has typically employed annual averages that provide no insight into intra-year seasonal fluctuations. Mitchell[22] includes published and unpublished data of this kind from Beveridge for Exeter (1316-1820), Eton (1594-1820) and Winchester (1630-1817), hence records of annual average prices at which wheat was purchased for institutions. As printed in Beveridge, the Winchester series for wheat and oats from 1657 to 1816 inclusive does include quarterly figures, which we have not yet examined in relation to the *London Gazette* data.[23] We have used the annual prices for wheat, oats and malted barley as printed in Beveridge as our basic long-run national price series. In the early 1930s Elizabeth Gilboy had access to the raw data collected by Beveridge's research team and she includes a table of annual average wheat prices 1700-1799 for Gloucester, Exeter, London, Maidstone, Oxford and York (the London run is complete for 1700-1790, others being more patchy). As already noted, she observed on the basis of this data that while there was regional variation in wages, there was no marked variation in wheat prices. However, since she reduced the Beveridge wheat prices from shillings per quarter to pence per peck in order to standardise wheat, oat and barley prices, small changes in price have been rounded, so that restoring the original

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[22] B. R. Mitchell, *British Historical Statistics*, Cambridge University Press, Cambridge 1988 Table XIV.16 pp. 752-5.

[23] William Beveridge, *Prices and Wages in England from the Twelfth to the Nineteenth Centuries*, Longmans, Green & Co., London 1939 pp. 81-84.

shillings/quarter metric both exaggerates and diminishes fluctuations.[24] Finally, Wordie's thesis also contains a run of Staffordshire Wheat Prices for the years 1804-1820.[25]

From 1770 the *London Gazette* published county average market prices on a developing base, switching in 1820 to the publication of prices and quantities sold for individual markets. This data was used extensively by Galpin, who also commented usefully on its composition and compilation; Fay also makes reference to it. As already noted, analytical interest in grain price series and market regulation waned, and it was only in 1977 that Adrian once again drew attention to the importance of this source. As also mentioned above, Wray Vamplew responded to Adrian's article, implying in a brief comment that the data was generally unreliable; but then in 1981 publishing a detailed account of the manner in which the data was collected and processed. There are a number of genuine issues here, but our conclusion from analysing the raw data is that, taking several Norfolk markets during the 1820s as an example, weekly price movements across markets are very similar. Since we are primarily interested here in price movements in the same market, the possible inconsistencies across markets in the Gazette data are not of immediate relevance.[26] The assumption that later nineteenth century data are more reliable than that from the eighteenth and early nineteenth centuries is also placed in question once the real variations in measurement that existed in the UK until the 1920s are taken into account.[27] Finally, Edmund Cannon generously gave us the dataset for 1770-1820 that had been digitised as part of the project with Liam Brunt.

Next we need to establish the relationship between the regulation of grain exports and imports (the "Corn Laws") and prevailing prices. Fig. 9 shows the relationship between the regulations in force and weekly wheat prices in Middlesex from November 1770 to September 1820 (from the *London Gazette* data supplied by Edmund Cannon). Hitherto commentary on this relationship between price and the thresholds for imports and exports has generally been related to annual average prices; using weekly prices provides a far clearer picture of the actual situation. However, whether a port was open or shut for imports or exports did not depend on the weekly or the annual average price, but instead on a retrospective quarterly average; for example, a decision to open or close being made in February on the average price between 1 November and 31 January.[28]

The Middlesex series is plotted in black, while the average of the forty counties continuously observed in this data is plotted in blue. We further represent the moving

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[24] She received data in shillings and pence per half-peck for wheat, three-quarters of a peck for barley; and one and a half pecks for oats. Gilboy, *Wages*, op. cit., Appendix II p. 252.

[25] Wordie, "A Great Landed Estate" (1967) op. cit., p. 118.

[26] The data issues include inconsistencies in those responsible for recording the data, local variations in what counted as "a bushel", the definition of the space within which recorded transactions occurred ("The marketplace"), and selling by sample or of standing crops. Nonetheless, it is a reasonable assumption that variations from any norm would persist in any one market for some months at least; and as our graphics show, individual markets did follow very similar price paths.

[27] See Stanley Dumbell, "The Sale of Corn in the Nineteenth Century", *Economic Journal* Vol. 35 (1925) pp. 141-45.

[28] See Fay, *Corn Laws*, op. cit. p. 79 for comment on this arrangement. See also pp. 29-30, 58ff.

average (over 52 weeks) of the average price over the forty counties, and the yearly average for an annual period starting in March (with the new growing period, in purple) or an annual period which begins in September (after the harvest, in yellow). These averages clearly track each other closely. There are obvious differences; however these differences do not suggest that a particular item provides widely different information about the market price of wheat: the average over counties is close to the price reported for Middlesex.

Fig. 9 Corn Law Thresholds and Weekly Wheat Prices, 1770-1820
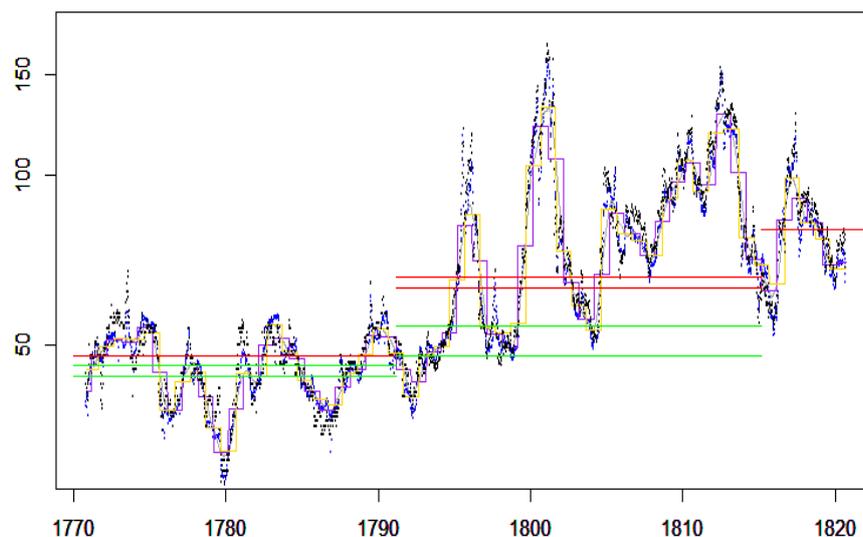
The horizontal lines (in red) correspond to the thresholds for the import duty (so that the duty does not apply when the price is between the horizontal lines). The horizontal lines (in green) correspond to the thresholds on the price values which determine the level of export duty. We assume for the time being that the different tariffs apply from 1st March. An export duty is due when prices are above the upper threshold, and in some periods a subsidy is paid to export when the price is below the lower threshold. In many instances exports were forbidden whenever the price was above the upper threshold. The reverse logic operates for the import duties. Over the period of interest imports are always subject to a duty. The duty is smallest (a few pence) when the price is above the upper threshold, and at its largest when the price is below the lower threshold (above 22 shillings per quarter). The duties disappear after 1814.

4. Wages

It is notoriously difficult to obtain a reliable measurement of the evolution of wages in the 18th and 19th century. Joyce Burnette[29] provides a carefully constructed seasonal wage series

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[29] Joyce Burnette, "The Wages and Employment of Female Day-Labourers in English Agriculture, 1740-1850", *Economic History Review* Vol. 57 (2004) pp. 664-90.

which distinguishes between the gender of the worker and the time of year of employment. Her analysis is remarkable, since her data sources cover the whole of England over the period 1740 to 1840. Her data is aggregated within 5 years intervals, hence it does not reveal any year-to-year change. However, the obvious reading of her work is that wages did vary within the year. Furthermore, labourers' wages appear to increase in nominal terms (male real wages appear almost constant over time, while they appear to decrease for women see Burnette) over time. We reproduce her finding in Figure 10 below.

Fig. 10 Male and Female seasonal nominal wages over time[30]
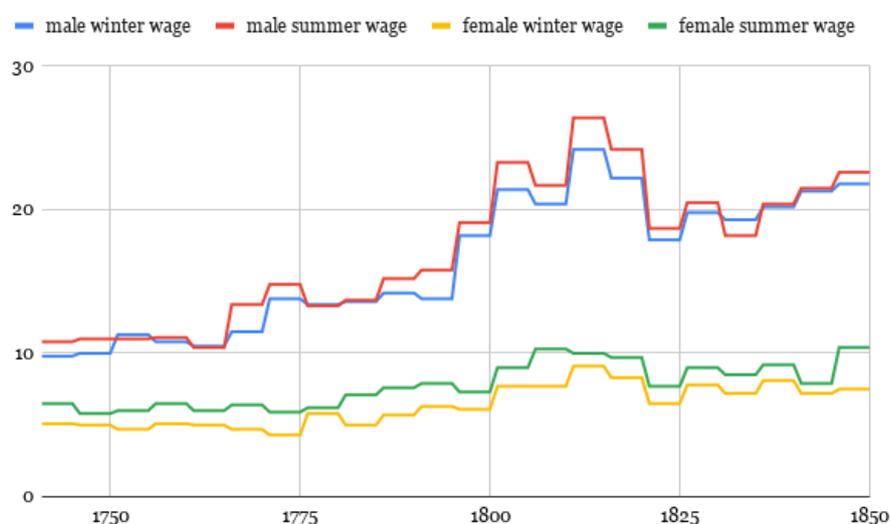
We will come back to this significance of this data in conclusion.

5. National and Local Grain Prices

Coming back to grain prices, we can first note that over the later part of our period of interest the structure of relative prices for 'corn' is stable (prices in the figure below, Fig. 11, are represented on a log-scale). This is especially marked during periods of rapid increases or decreases in price: the prices of the three different grains mostly respond at the same time and to the same extent (observe the evolution around 1800 or 1815).

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[30] Ibid., Appendix II, p. 688.

Fig. 11 Annual Average Corn Prices, England and Wales 1771-1880 (s. per quarter)[31]
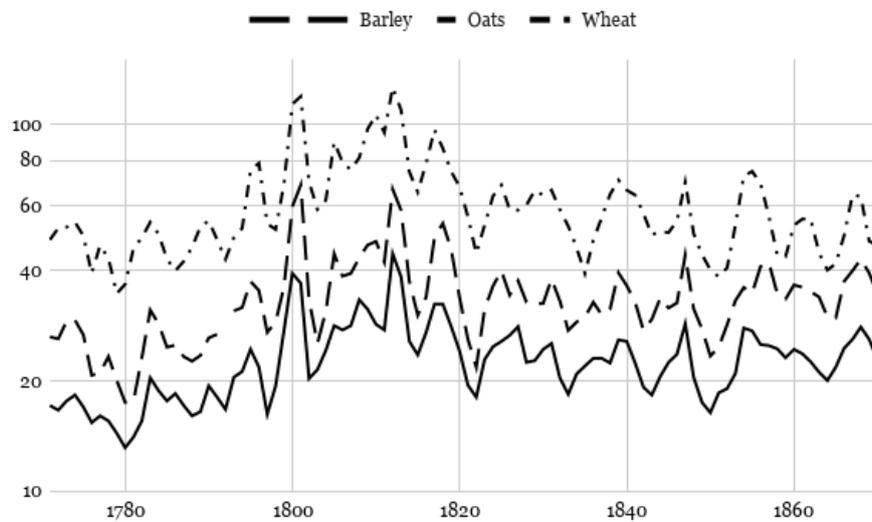
As noted above, Gilboy provides earlier information on the annual price of wheat for a number of locations in England. She was of the view that there was little regional variation in the annual price of wheat, and Fig. 12 bears this out, the fluctuations in any one location being reflected in others at a similar time and to a similar extent. This indicates the existence of a relatively uniform national market price for wheat. The price of wheat per quarter in Fig. 12 mostly varies between 25 and 50 shillings per quarter. Putting together the information collected from the two figures (excluding the turbulent period between 1800 and 1820), the average prevailing price per quarter for wheat changed from around 25s, per quarter in 1700 to 50s. Per quarter in 1870, corresponding to an average inflation of about half a percent per year .

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[31] Mitchell, *British Historical Statistics*, op. cit. Table XIV.17 p. 756.

Fig. 12 Local Annual Averages of Wheat Prices in s. per qr., 1700-1799[32]
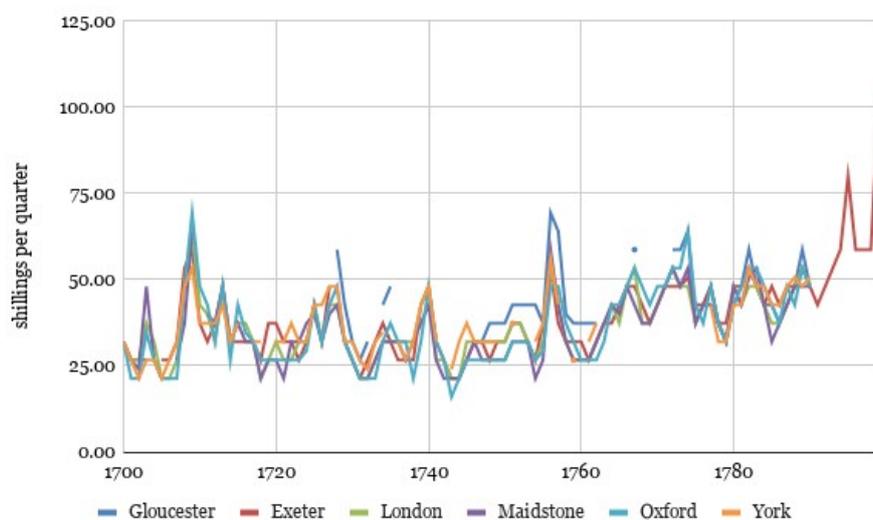
Turning to weekly regional prices, we have examined the behaviour of weekly prices for wheat in eleven Norfolk markets as published in the *London Gazette*. Although the prices are not identical in each market at any point in time, it is clear that the market clearing process, even at a local level, provided wheat producers with a good idea of the "market price" for wheat at the county level and at the national level.

The fact that prices are not identical, if we believe the price reports to be accurate, suggest that local market conditions matter in determining local prices (even within a county like Norfolk), and therefore that transportation costs from one local market to another have some importance (i.e. the supply of wheat is not infinitely mobile) and/or that the local demand does not arbitrage perfectly between local markets (i.e. the local demand for wheat is not expressed in all markets for wheat even within a 'small' distance).

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[32] Gilboy, *Wages*, op. cit. Appendix II pp. 288-90.

Fig. 13 Local Norfolk Weekly Wheat Prices (in 11 Markets, 14 October 1820 to 11 July 1828[33]
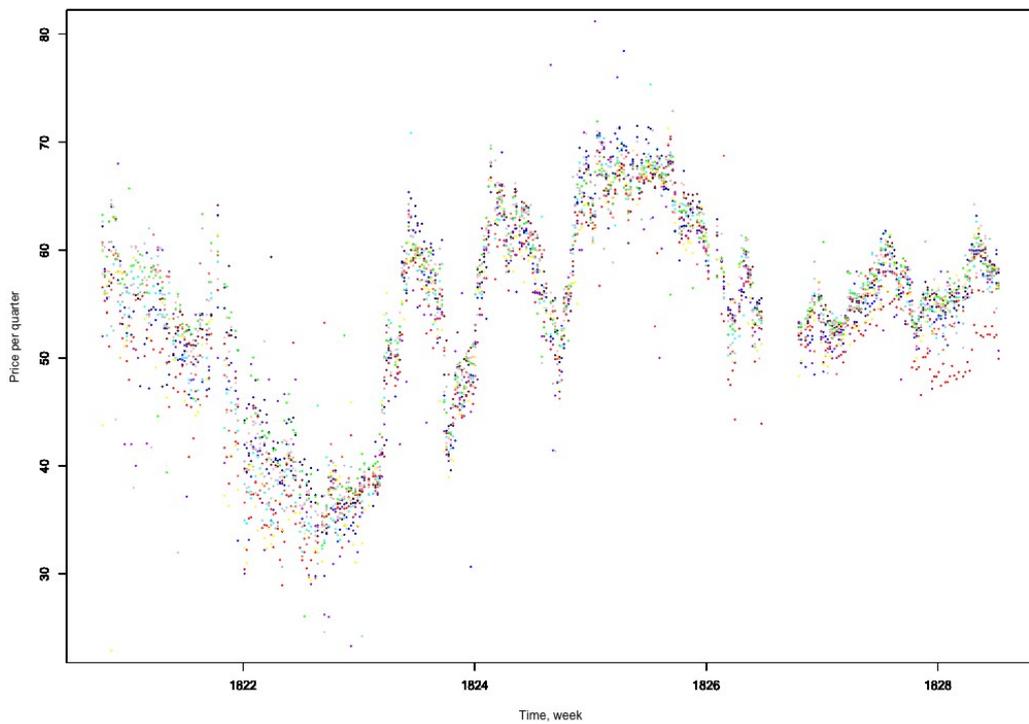
This broad correspondence in price movements between local Norfolk markets suggests that the pre-1820 prices, which were published as aggregate county averages, give a reasonable approximation of local prices (see Fig. 14).

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[33] *London Gazette* data from 1820 available at https://www.cornreturnsonline.org/.

Fig. 14 Norfolk County Average Weekly Wheat Prices, 1770-1820[34]

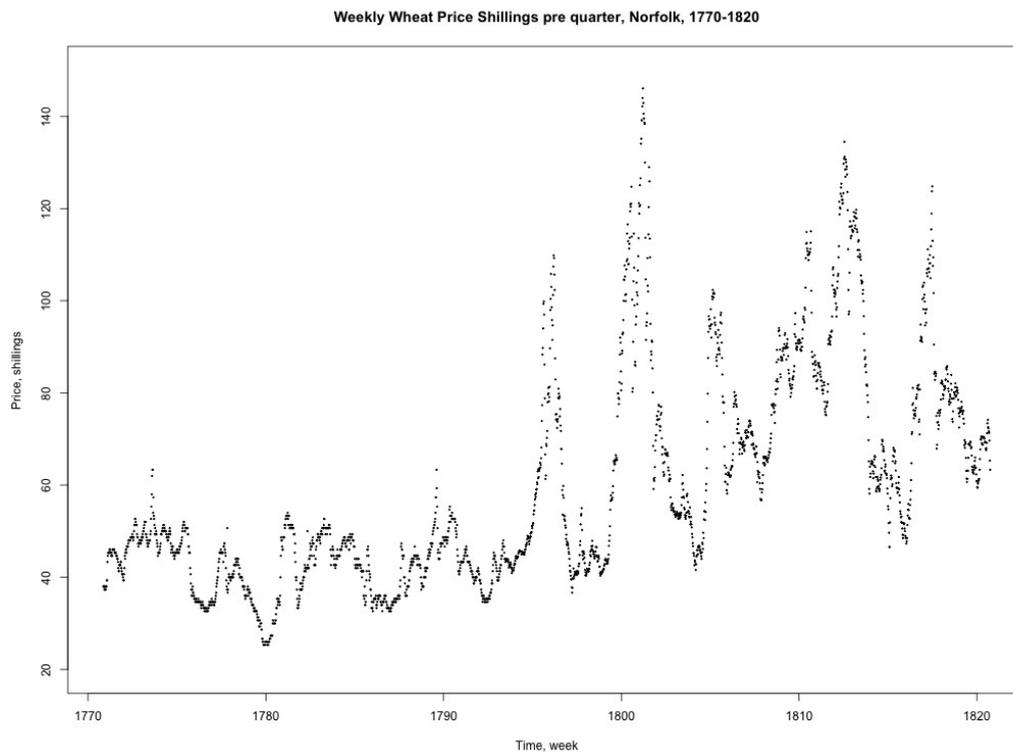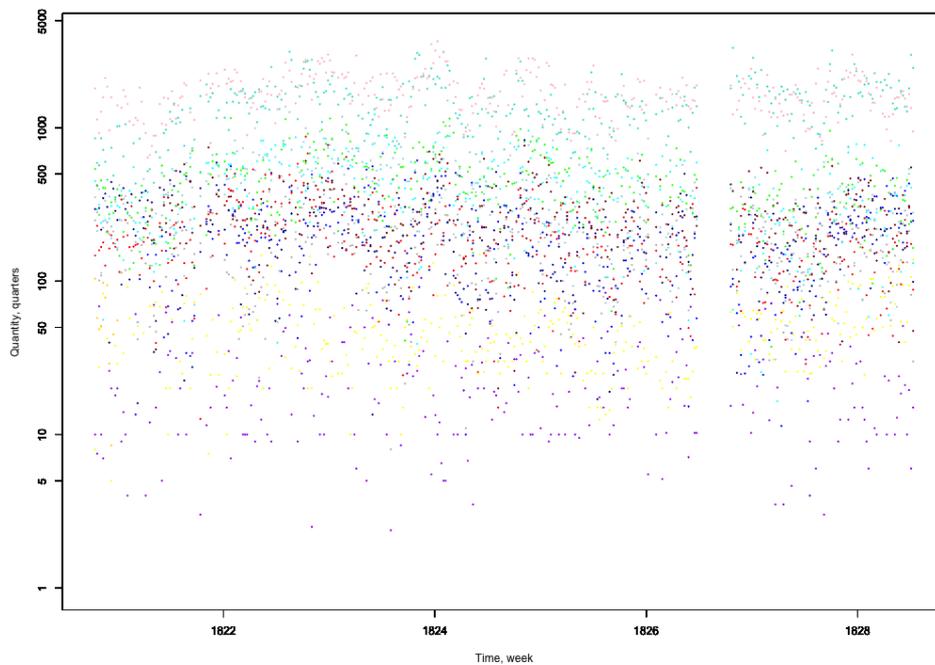**Weekly Wheat Price Shillings pre quarter, Norfolk, 1770-1820**

Fig. 15 Quantities of Wheat sold (quarters), Local Norfolk Markets 14 October 1820 to 11 July 1828[35]

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[34] The digitised *London Gazette* data obtained from Edmund Cannon.

[35] From https://www.cornreturnsonline.org/.

Fig. 16 Local Norfolk Quantities of Wheat against Price (Eleven Markets, 14 October 1820 to 11 July 1828[36]
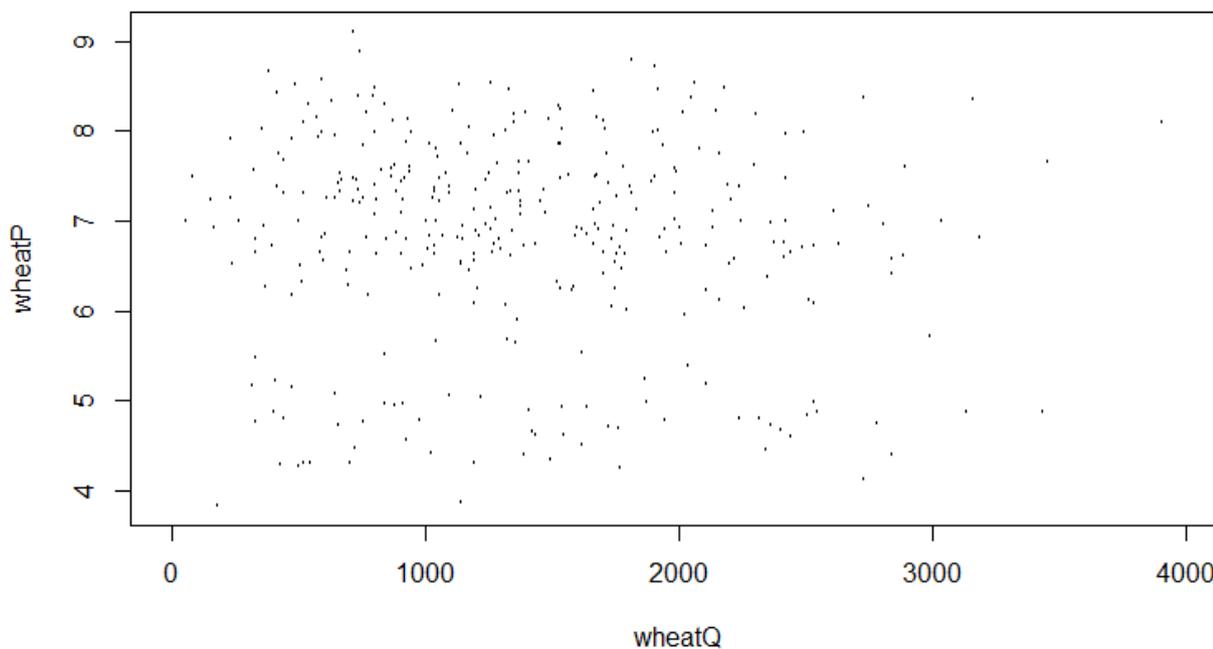
The clear relationship in the Norfolk data disappears in Fig. 16, which remains to be explained. In Fig. 17 we present the evolution of prices relative to the average price for March in any current year. The vertical blue lines indicate the start of the growing season. Relative to the price in March in each growing season, we observe that prices vary within year (by construction, the relative price is scaled again to one at the start of every year). For the few years we observe, the evolution of the relative prices is very diverse.

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[36] From https://www.cornreturnsonline.org/.

Fig. 17 Time Series Evidence, Weekly Prices in all Norfolk Markets, October 1820 to July 1828 (blue vertical line marking 1st March of each year)
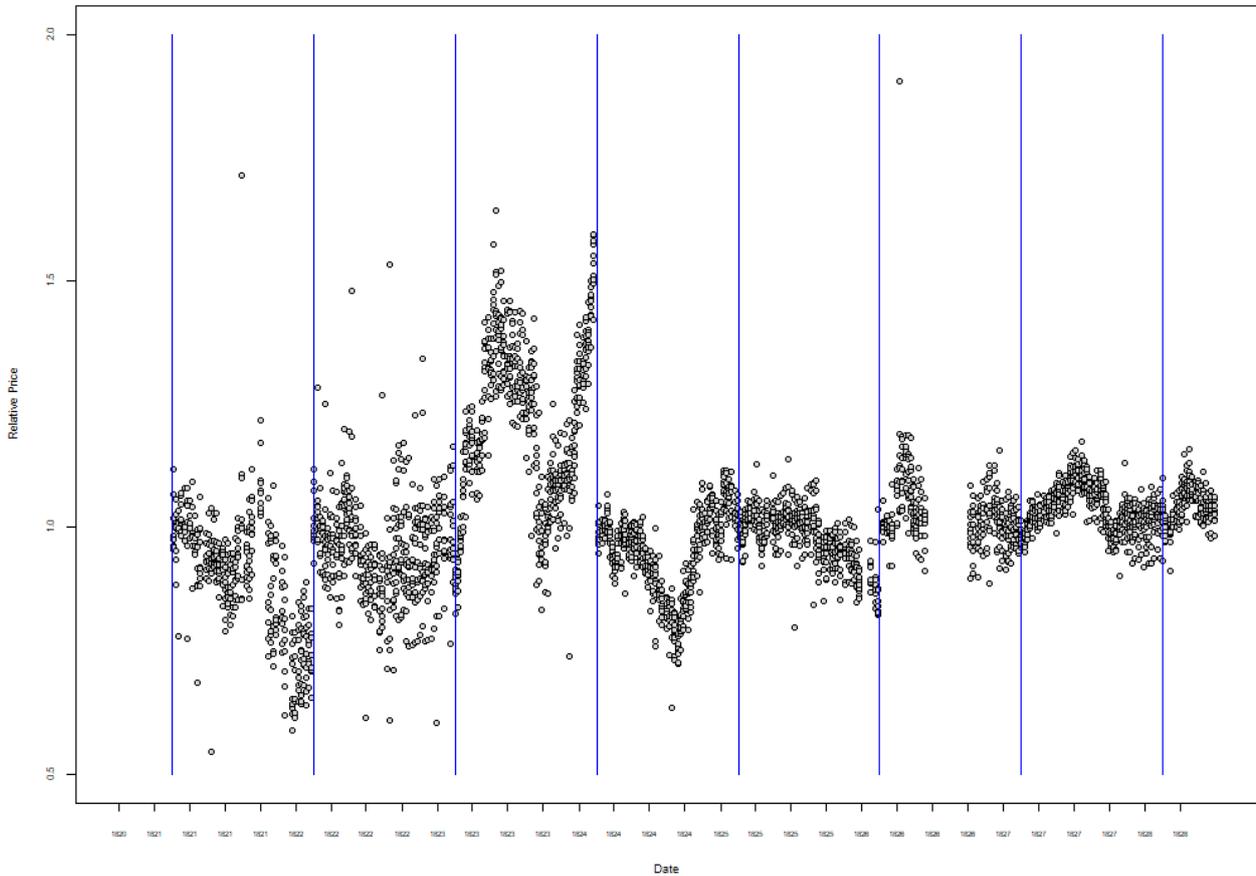
To get a better sense of the kind of uncertainty over relative prices that an individual consumer or merchant might experience during an agricultural season (given the sample period), we overlay the evidence for several years on the weeks of one calendar year. Hence the graph below, Fig. 18, shows the potential range of local weekly prices (88 datapoints per week) from March to February in the ensuing calendar year, relative to the price in March. This highlights that, over the year, there could either be an increase of 50% or a decrease of 50% in the price of wheat relative to what it was in March. While the further extremes of this range were unlikely, they were not improbable. We can also observe that the relative price was more volatile during the last few months of the year, from December to February.

Fig. 18 Range of Annual Weekly Prices relative to March of each Year, Eleven Local Norfolk Markets, October 1820 to July 1828[37]
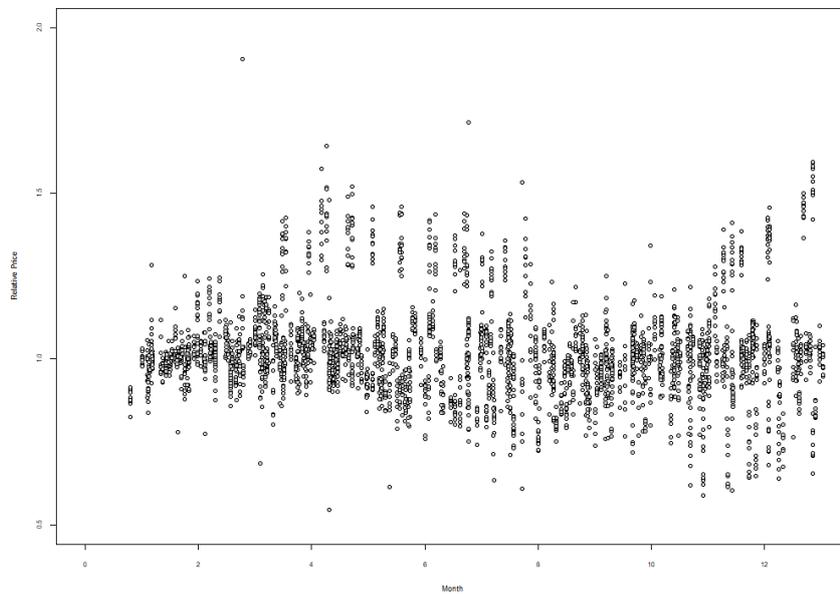
We next produce the same analysis of relative prices, this time relative to the average price in September, from just after the harvest for the next twelve months, from September to August. The penultimate year is not presented since the data for September 1826 is missing. The behaviour of relative prices appears dramatic; in some cases prices are observed to double, while in some other year they almost halve.

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[37] From https://www.cornreturnsonline.org/.

We can represent this information over a single year, i.e. ignoring the specific identity of year and presenting the relative price in each week of the year. This figure suggest that from the point of view of the price information available when the harvest is collected the uncertainty over the prices for the coming year is large, prices can halve or double, and increasing over time. Careful planning under such conditions will be costly. Storing grain in the hope of a price doubling over a year would expose a merchant to a loss of half of the value of his stock. Similarly selling all the stock at the current price leaves the producer exposed to substantial possible losses. Those reliant on the grain for food would not be able to insure themselves in any way against such price volatility.
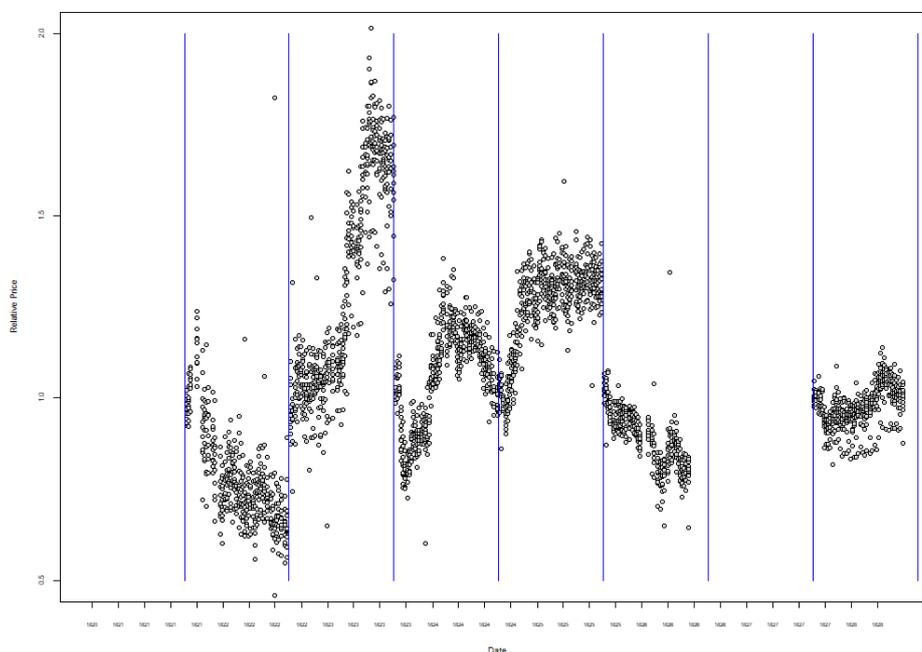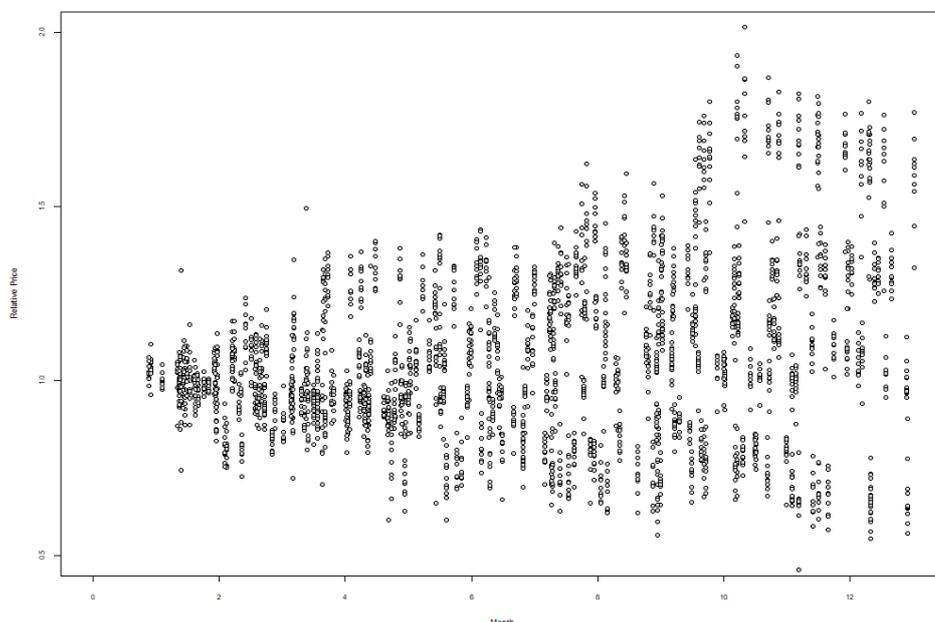
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[38] From https://www.cornreturnsonline.org/.

Fig. 20 Range of Annual Weekly Prices relative to September of each Year, Eleven Local
　　　Norfolk Markets, October 1820 to July 1828

The graphics here emphasise the existence of real uncertainty in grain markets and, as a corollary of this, that price formation subsequent to a harvest involves expectations that are subject to significant uncertainty. While we cannot explore this here, the implication is that the use by historians of annualised prices suppresses this feature of grain markets – the role of short-term expectations in price formation – in favour of arguments about imports and exports – that shortfalls/surpluses in the market will be covered by imports or exports that stabilise the price. As noted earlier, decisions about duties, bounties and prohibitions in external trade were made retrospectively and locally every quarter, and so had no direct impact on local weekly prices.

5. Some Descriptive Regression Analysis

The pattern of relative price changes is difficult to explain, but we can attempt to illustrate a similar point using a more "analytical" statistical method to characterize the evolution of prices over time. To that effect we specify a model for the relative change in wheat price for two counties (Norfolk and Staffordshire). Following our earlier analysis, any year starts with or right after the harvest in September (Month 1) and finishes the month before the harvest in August (Month 12). Hence 1800 starts in September 1800 and finishes in August 1801. We explain the weekly variability in wheat prices by indicator variables which identify each year in the sample, and with indicator variables which identify each month within a harvest year. We can understand the year indicator as conditioning the information available at the time the harvest is gathered in, and as conditioning the mean evolution for this particular agricultural year onward. The monthly indicator partially captures the mean evolution of prices within any

given year in our sample. We merged in with our data on prices the data on the average monthly temperature (mean central temperature in England) and rain fall (in England and Wales) to provide some information on the evolution of the weather over a particular year. We therefore add two quadratic functions of temperature and rainfall to the list of our explanatory variables. This information allows us to distinguish between years and accounts, in an imperfect fashion, for the development of the weather in any particular year.

The evolution of relative price changes does not depend on any particular month before the summer following the harvest, for both counties prices appear to increase systematically by 1 to 2 percent in June, July and August. Temperature (as captured by our quadratic function of the temperature in England and Wales) does not appear to have substantial explanatory power once the particular time of the year is accounted for: i.e. the temperature does not associate with relative changes in prices. For the information on rainfall, the evidence is less clear: while there may be a significant contribution of rainfall to the weekly price change in Norfolk, this effect appears limited in size.

The identity of each year does not seem to contribute to the explanation of price changes in Norfolk or in Staffordshire. 1804 appears to be an exception for both counties.

To illustrate further, we calculate diagnostic statistics to characterise the features present in the relative price change data which our model does not capture. The Durbin-Watson statistic reveals that the unexplained component (which makes up more than 90% of the data) is detectably autocorrelated (i.e. past values are associated with current values). Our calculation show that these autocorrelations are positive and less than a third. This means that the effect of any unexplained shock on price changes is short-lived. Similarly we tested for the presence of systematic variability in the variance of the unexplained component by testing whether an ARCH(1) process would characterise or not the variability of the unobserved terms. For both counties we reject the null hypothesis of conditional homoscedasticity. Hence the variability of shocks varies in a systematic fashion which the test detects. A large unexplained shock causes the shock in the next period to be more variable. The time series literature suggests that this is characteristic of data where the volatility clusters, i.e. that infrequent periods of high volatility characterise our data. Together these two diagnostic test reveal that the model does not entirely capture all the features of the data. In fact the two features, heteroscedasticity and autocorrelation, interact in general, and a model which would encompass the two characteristics is beyond the scope of this paper. Nevertheless, our model of price change illustrates clearly that volatility in its many forms characterises the evolution of price change over the sample period. Agents active in the markets of Norfolk and Staffordshire would have been aware of this generic variability.

Regression Results: % Changes, 12 September 1795 - 30 September 1820

	Norfolk % Price Change	Stafford % Price Change
October	-0.00	0.01
	(-0.02, 0.01)	(-0.01, 0.02)
November	0.01	0.00
	(-0.01, 0.02)	(-0.01, 0.02)
December	0.00	-0.01
	(-0.02, 0.02)	(-0.03, 0.01)
January	0.00	-0.00
	(-0.01, 0.02)	(-0.02, 0.02)
February	0.01	0.00
	(-0.01, 0.03)	(-0.01, 0.02)
March	0.01	0.00
	(-0.01, 0.03)	(-0.01, 0.02)
April	0.01	0.01
	(-0.01, 0.02)	(-0.00, 0.02)
May	0.01	0.01**
	(-0.00, 0.02)	(0.00, 0.02)
June	0.02***	0.02***
	(0.01, 0.03)	(0.01, 0.03)
July	0.02***	0.02***
	(0.01, 0.03)	(0.01, 0.04)
August	0.01	0.02**
	(-0.01, 0.02)	(0.00, 0.03)
Temperature/10	0.00	-0.00
	(-0.02, 0.03)	(-0.03, 0.02)
Temperature/10 squared	-0.01	-0.01
	(-0.02, 0.01)	(-0.03, 0.00)
Rain Fall/10	0.00*	0.00
	(-0.00, 0.00)	(-0.00, 0.00)
Rain Fall/10 squared	-0.00	0.00
	(-0.00, 0.00)	(-0.00, 0.00)
1796	0.00	-0.00
	(-0.02, 0.02)	(-0.02, 0.01)
1797	0.01	0.01
	(-0.01, 0.02)	(-0.01, 0.02)
1798	0.01	0.01
	(-0.00, 0.03)	(-0.01, 0.03)
1799	0.01	0.01
	(-0.01, 0.03)	(-0.01, 0.03)

1800	0.00	0.00
	(-0.02, 0.02)	(-0.02, 0.03)
1801	-0.00	-0.00
	(-0.02, 0.02)	(-0.02, 0.02)
1802	0.01	0.00
	(-0.01, 0.02)	(-0.02, 0.02)
1803	0.00	0.01
	(-0.01, 0.02)	(-0.01, 0.03)
1804	0.02*	0.02*
	(-0.00, 0.03)	(-0.00, 0.03)
1805	0.00	0.00
	(-0.01, 0.02)	(-0.01, 0.02)
1806	0.01	0.00
	(-0.01, 0.02)	(-0.01, 0.02)
1807	0.01	0.01
	(-0.00, 0.03)	(-0.01, 0.03)
1808	0.00	0.01
	(-0.01, 0.02)	(-0.01, 0.02)
1809	0.01	0.01
	(-0.00, 0.03)	(-0.01, 0.02)
1810	0.00	0.00
	(-0.02, 0.02)	(-0.01, 0.02)
1811	0.01	0.02**
	(-0.00, 0.03)	(0.00, 0.03)
1812	-0.00	-0.00
	(-0.02, 0.02)	(-0.02, 0.01)
1813	0.00	-0.00
	(-0.02, 0.02)	(-0.02, 0.02)
1814	0.00	0.00
	(-0.01, 0.02)	(-0.01, 0.02)
1815	0.01	0.01
	(-0.01, 0.03)	(-0.01, 0.02)
1816	0.00	-0.00
	(-0.02, 0.02)	(-0.02, 0.02)
1817	0.01	0.01
	(-0.01, 0.02)	(-0.01, 0.03)
1818	0.00	0.00
	(-0.01, 0.02)	(-0.01, 0.02)
1819	0.01	0.01
	(-0.01, 0.02)	(-0.01, 0.02)
1820	-0.01	-0.01

	(-0.04, 0.01)	(-0.04, 0.01)
Constant	-0.02	-0.01
	(-0.05, 0.01)	(-0.04, 0.02)
Durbin/Watson	1.4***	1.7***
Auto-correlation of the residuals.	0.31	0.15
ARCH 1	89.55***	18.97***
F Statistic (df = 40; 1242)	2.253***	2.965***
R^2	0.07	0.07
Adjusted R^2	0.03	0.04
Observations	1,283	1,283

Notes: ***Significant at the 1 percent level. **Significant at the 5 percent level. *Significant at the 10 percent level.

The Durbin Watson statistics provides the basis for a test of the null hypothesis that the residuals are not autocorrelated.

The confidence intervals are at the 95% level and are based on the robust standard errors (heteroscedasticity consistent).

The F statistics is the robust version based on the heteroscedasticity consistent estimator of the variance covariance.

The ARCH 1 statistic is a chi squared statistics of the null hypothesis that the squared residuals are not autocorrelated.

6. Some Conclusions

The general drift of our analysis has been to shift attention from relations of production to markets, and from the medium and long-term perspective to the short-term. Our argument is that this framework provides an appropriate perspective for understanding contemporary argument, policy-formation, and decision-making. Aggregated, annualised data blurs the issues and conceals the significance of expectations in price formation. If we take as our theoretical reference the Ricardian analysis of distribution in a grain-based economy, as exposed in his 1815 "Essay on Profits", then our findings destroy both the assumptions and implications of that analysis. As Ryan Walter has shown,[39] Ricardo's arguments did not engage with the concerns of his contemporaries. This paper shows why his arguments failed to engage with contemporary economic conditions. We can now sketch some conclusions.

Figures 4 and 5 show that there was significant volatility in rental payments beginning in the 1790s and extending into the post-war period. We know from the Staffordshire estates that this was most likely associated there with the activities of estate managers, but the phenomenon is much more generalised in the data we present. One plank of the Malthus/Ricardo theory of differential rents was that the extension of cultivation – of cultivated area – would involve increases in capital expenditure to yield the same return in output. It has

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[39] Ryan Walter, *Before Methods and Models*, Oxford University Press, New York 2021.

usually been assumed that, during the Napoleonic Wars, the disruption to international trade and the impact of a rapidly increasing British population led to an increase in the cultivated area, as per Malthus and Ricardo, to meet increased domestic demand. But this is not supported by any evidence. Mark Overton estimates that during the Napoleonic blockade some 11.35 acres was under arable cultivation; this was 2.5 million less than in 1836, and actually 1.4m. acres less than is likely in the early fourteenth century.[40] There was no significant extension of the cultivated area after 1790.

How then might we account for any increased output of grain from the existing cultivated area? As our data shows, there was a marked change in rental movements following 1790, and this could be construed as the result of efforts to increase output. If we follow this line of thought, that increased output came not from the extension of the cultivated area, but from a more intensive use of the existing cultivated area, then this suggests that changes in courses of cultivation could be responsible. A more intensive use of the existing cultivated area would raise output with little need for additional capital investment – a managerial, not a structural, change.

However, changes in courses would be associated with increased inputs of labour, and a changed seasonal rhythm of labour requirements. This was demonstrated by Timmer a long time ago,[41] a paper based on his work as a graduate student before he built a distinguished career as a specialist in the economics of agricultural development. Timmer demonstrated that the introduction of new courses led to increased labour requirements, both absolutely and seasonally. Joyce Burnette's agricultural wages data, summarised above, supports this argument, showing that in this period nominal summer wages in the South-East for both men and women began to rise during the quinquennium 1786-1790, and that nominal male summer wages were in the period 1811-1815 twice what they had been in 1781-1785. Roughly speaking, this is what Malthus was responding to in his *Essay on Population*: in 1798 he referred to a labourer earning eighteen pence a day as in no position to support a family – Burnette's male summer wage for this period is 19.1 (old) pence.[42]

Increased output thus meant higher wages, and not only higher rents; but this undermines the neat symmetry of Ricardo's analysis. If the wage bill was growing in real terms, then this prevents the treatment of movements in rents and profits being treated as purely reciprocal. Increasing wage costs was a feature of the wartime economy, and not primarily increasing rental payments. If Malthus noticed this, we might assume that others did also. Rather than "marginal land" being less productive, it is reasonable to suppose that the process of conversion involved little direct capital investment, and in some cases brought into

[40] See Stephen Broadberry, Bruce M. S. Campbell, Alexander Klein, Mark Overton, Bas van Leeuwen (eds.) *British Economic Growth 1270-1870*, Cambridge University Press, Cambridge 2015, p. 73.

[41] C. P. Timmer, "The Turnip, the New Husbandry, and the English Agricultural Revolution", *Quarterly Journal of Economics* Vol. 83 (1969) pp. 375-95.

[42] T. R. Malthus, *An Essay on the Principle of Population and other Writings*, ed. Robert J. Mayhew, Penguin Books, London 2015 p. 37.

arable cultivation land whose short-term yield was not markedly inferior. Rather than the addition of new, uncultivated, land requiring increasing amounts of capital yielding successively lower returns, the reorganisation of existing farmland resulted in increased production at little cost besides the wages of the increased amount of labour required to farm it. Hence the chief cost of a subsequent postwar reduction in production was not the abandonment of land that had been brought into cultivation, with an impact upon rents and profits, but a reduction in seasonal rural employment, with an impact upon farm wages.

Our conclusions regarding rental payments and the implications we might draw about estate management are independent of price movements. As we have shown, when prices rose or fell, rents did not follow. There is a weak relationship between rental payments and grain prices, presumably because rentals were set in advance and would be increased only by reference to previous price movements. As we have shown, prices were volatile while, for the greater part of our period, rental payments were not.

Finally, the Ricardian distributional framework is organised around the structure of production – inputs of capital and labour, outputs of grain, and the division of rents and profits from the proceeds. By drawing attention to the course of grain prices using weekly data we have suggested that stabilisation of price and supply was effected in the short-run by market trading and stock-holding: that the actions of merchants and millers played a major role in price formation. However, their decisions would have been guided by expectations of how prices would evolve, and as we have shown, in March or September it was hard to say where the price would be in two, three or four months. This necessarily short-term perspective was one upon which external trade in grain could not so easily impinge, not least because the existing regulations worked on a backwards-looking quarterly basis. Adam Smith's argument against export subsidies rested not on any arguments about the merits of free trade in securing the food supply, but rather on the role of the merchant, and the fact that the corn trade was mostly in the hands of the wrong sort of people:

> It is abandoned to an inferior set of dealers; and millers, bakers, mealmen,
> and meal factors, together with a number of wretched hucksters, are almost
> the only middle people that, in the home market, come between the grower
> and the consumer. (WN IV.v.b.8)

This seems a more productive approach to the grain market, and food security, than that proposed by Ricardo.[43]

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[43] See Keith Tribe, "Moral Economy and Market Order", forthcoming in *Critical Historical Studies*.