Land under pressure: The value of Irish land in a period of rapid population growth, 1730–1844*

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Abstract

This paper uses information on almost 5000 leases to arrive at estimates for the trends in current land values in County Armagh from 1730 to 1844. The estimates control for the length of the lease, the holding size, and the quality of land in the townland where the property was located, the last relying on information from the General Valuation of Ireland. They show growth in nominal rents up to the early 1770s, a plateau in the 1770s, 1780s and 1790s, an increase to the early 1810s, followed by a fall to the early 1820s and another plateau thereafter, stretching until the famine of the late 1840s. Taken together with information on wage and price trends, the new estimates show little change in real rents and negative total factor productivity growth from the 1780s to the 1830s.

The Irish economy in the eighteenth and early nineteenth centuries was predominantly agricultural. In 1841, 53 per cent of the labour force worked on the land, and in the early eighteenth century the share was probably higher.[1] The timing and direction of change in the intervening years are a matter of dispute, which is unlikely ever to be resolved fully in the absence of sufficiently reliable statistical information.[2] Ireland was also experiencing one of the highest population growth rates in Europe: from the early 1750s until the 1820s upwards of 1.4 per cent per annum.[3] The natural rate of population growth remained relatively high into the 1830s and early 1840s, with the actual rate slowing only with the beginnings of mass emigration. Such rapid population growth should have put upward pressure on the relative price of land, unless there existed an abundant supply of unexploited land and/or there was productivity growth sufficient to counter the effects of increasing population density. There was indeed extensive reclamation of marginal lands as cultivation spread up hills and into bogs,

* We are very grateful to Richard Hoyle, Cormac Ó Gráda and two dedicated referees for extensive and valuable comments on early versions of this paper.

[1] F. Geary, 'Deindustrialization in Ireland to 1851: some evidence from the census', *EcHR* 51 (1998), p. 517.

[2] F. Geary, 'The Act of Union, British-Irish trade, and pre-Famine deindustrialization', *EcHR* 48 (1995), pp. 68–88; A. Bielenberg and F. Geary, 'Growth in manufacturing output in Ireland between the Union and the Famine: some evidence', *Explorations in Economic Hist.* 43 (2006), pp. 119–52.

[3] S. Daultrey, D. Dickson and C. Ó Gráda, 'Eighteenth-century Irish population: new perspectives from old sources', *JEcHist* 41 (1981), p. 625.

but the increasing share of tillage on existing agricultural land and especially the greater use of the potato certainly suggests the intensification of land use. Despite the spread of cultivation to poorer lands and more intensive land use, average crop yields seem to have been maintained from the 1780s to the early 1840s.[4] Whether this was the result of increased labour inputs or of improvements in productivity remains an open question.

In any agrarian society the value of land is a key indicator, though only when taken in conjunction with other indicators such as wage rates and the prices of agricultural produce. The price of land relative to that of labour signals relative factor scarcities that may influence the direction of innovation, the choice of technique, and the structure of agrarian social relations.[5] The price of land relative to the prices of agricultural produce, or real rent, can be an indicator of the productivity of the agricultural sector.[6] Changes in overall productivity can also be estimated by comparing changes in the prices of land, labour and other inputs to changes in output prices.[7] Reliable information on the trends in Irish land values would thus help address the question of how Ireland was able to sustain such high rates of population growth. Although new information on agricultural wages and prices has recently become available, it is good evidence on the trends in land values that is wanting.[8]

The Irish agrarian system was, like that in England, based on landlords and tenants. Most of the country was owned by several thousand proprietors who farmed little, if any, of their land. They let it to tenants, who either farmed it themselves or sublet to those who did. It is not possible to track land values on the basis of property sales because before the 1850s not much land was sold and those sales that did take place have left little in way of detailed and comparable documentation. However, surviving estate papers contain an abundance of information on the bargains struck between landlords and tenants. Whilst there have been some previous efforts to use leases to track rents, the results were disappointingly imprecise, with the consequence that little research on this subject has been done since the 1970s.

This paper argues that it is time to return to the estate archives. It shows that more precise estimates for the movements in rent can be achieved by using statistical methods that exploit the information available in leases. These methods allow researchers to move beyond the estate as the unit of study and to use readily available information to control for features of the property being let and the nature of the lease. One aspect of the paper is

[4] R. C. Allen and C. Ó Gráda, 'On the road again with Arthur Young: English, Irish and French agriculture during the industrial revolution', *JEcHist* 48 (1988), p. 107

[5] On technical choice and innovation, see P. A. David, *Technical choice, innovation and economic growth: essays on American and British experience in the nineteenth century* (1996). On agrarian social relations, see E. Domar, 'The causes of serfdom or slavery: A hypothesis', *JEcHist* 30 (1970), pp. 18–32 and J. Conning, 'On the causes of slavery or serfdom and the roads to agrarian capitalism: Domar's hypothesis revisited', Hunter College Department of Economics Working Paper no. 401 (2004)

[6] R. C. Allen, *Enclosure and the yeoman* (1992), ch. 11.

[7] P. T. Hoffman, 'Land rents and agricultural productivity: the Paris basin, 1450–1789', *JEcHist* 51 (1991), pp. 771–805; G. Clark, 'Land rental values and the agrarian economy: England and Wales, 1500–1914', *European Rev. of Economic Hist.* 6 (2002), pp. 281–308.

[8] L. Kennedy and M. W. Dowling, 'Prices and wages in Ireland, 1700–1850', *Irish Economic and Social Hist.* 24 (1987), pp. 62–104; L. Kennedy and P. M. Solar, *Irish agriculture: a price history* (2007).

thus methodological with relevance for research on England, which had a similar agrarian structure.[9]

The new method for tracking Irish rents is applied to County Armagh. Armagh is by no means a typical Irish county, if such a creature even exists. It is in the north of Ireland, off the fertile limestone-based soils that characterize much of the island. In the eighteenth and early nineteenth centuries most farmers combined tillage and dairying on holdings that were of modest size, generally less than 50 acres and often less than 20 acres. The main tillage crops were oats, potatoes and flax; relatively little wheat or barley being grown. There were few sheep, except in mountainous areas in the south of the county. Livestock was composed mainly of cows, used principally for producing butter, and pigs, which were increasingly exported to the British market either live or as bacon. Poultry, which, like pigs, could be fed on potatoes, was also common.[10]

In the eighteenth and early nineteenth centuries County Armagh was at the heart of Ireland's major industry, the domestic production of linen cloth. In 1800 Charles Coote noted that 'since the pursuits of husbandry, exclusively occupying the attention of the people, are scarcely to be found anywhere in this county, it is difficult to point out the farmer unconnected with manufacture'.[11] It had experienced very rapid population growth, even for Ireland, and was in the early nineteenth century one of the most densely populated counties. Although there was reclamation of marginal land in the county, the main way in which population grew was through subdivision of holdings and the proliferation of small plots of only a few acres. Armagh's experience may not be typical of Ireland, but it may be representative of other counties in the northeast and is at least a first step toward the bigger picture.

I

The standard source for the current value of land ought to be the lease rather than the rent roll, though both sources have their weaknesses. The rents due to landlords and those received by them depended on when and how the land was let. They look toward the past, and sometimes far into the past. In England until the mid- to late eighteenth century leases for lives or for periods of 21 and 31 years were common. The lives, if well chosen, could last for decades. In eighteenth-century Ireland the three-life lease was the most common form of tenure, and could often last for 30 to 50 years. Though there was some movement away from leases in Ireland, a sample of properties put up for sale in the 1850s showed that almost three-quarters of the land was under lease and that the average age of leases in force was around 25 years, with over a tenth of leases having been taken out more than 50 years earlier.[12] Perpetual and renewable leases, given in both England and Ireland, could essentially fix the rent for all time. The rents owed to landlords could thus deviate significantly from the current value of the land, particularly after periods of inflation or deflation. As can be seen in the series collected for

[9] It should be noted, as well, that Hoffman, 'Land rents', has used a similar approach in tracking the movements of rent in the Paris basin between the fifteenth and eighteenth centuries.

[10] C. Coote, *Statistical survey of the County of Armagh* (1804), pp. 161–244.

[11] Ibid., pp. 138–9.

[12] J. Mokyr, *Why Ireland starved* (1983), pp. 91–9.

England by Turner, Beckett and Afton, rents due, if no leases expired, could remain unchanged for years, even decades, and they could change markedly if many leases came due at the same time.[13]

The lease then is a better indicator of the current value of land, though it is important to be careful about the meaning of current value. The lease was a contract freely entered into. The extent to which there was competition for land may have been constrained by the claims of sitting tenants, but such claims certainly did not prevent landlords from increasing rents. Where long leases were common, the terms of the lease were necessarily influenced by expectations about future returns. Since agricultural productivity growth was relatively slow, expected output was probably based on an average of recent experience. More important was the future level of agricultural prices. Prices could fluctuate wildly from year to year, so expectations were likely to have been shaped by the experience of the previous five to ten years. These expectations could prove disastrously wrong, as is witnessed by the extensive renegotiation of rents in the late 1810s and early 1820s. Nonetheless, if landlord and tenant expectations were based on the levels, rather than the trends, in prices, the rent contracted for should reflect what they saw as the revenue potential of the land with a lag of a few years.

It should be clear from this discussion that, where long leases were common, an index of estate income (rents paid) or potential income (rents due) could differ markedly from an index of current values based on the leases being granted. This was quite clear to contemporary land owners who commissioned surveys of their property either during the wartime period to see how their income could be increased or during the post-war deflation to figure out how to deal with tenants who complained that their rents were too high.[14] It has been less clear to the participants in the recent debates about rent movements in England. There is no reason to expect that the shorter-term movements in estate income or potential income, as measured by Beckett, Turner and Afton, need correspond exactly to the movements in current value indices, as constructed by Allen and Clark.[15]

Eric Kerridge seems to have pioneered the construction of land value series based on lease-like evidence. In his 1953 study of several Wiltshire estates during the sixteenth and seventeenth centuries, Kerridge used periodic manorial surveys which recorded the terms of leases in force at a given date.[16] Kerridge remained a lonely pioneer until the 1970s when series were put together for a number of large Irish estates. Maguire tracked rents at new lettings

[13] M. E. Turner, J. V. Beckett and B. Afton, *Agricultural rent in England, 1690–1914* (1997). The data underlying Turner, Beckett and Afton's series are available from the UK Data Archive, SN 3691.

[14] As examples of the former, see the surveys of the Erne and Hamilton estates (PRONI, D/1939/18/9/34 and D/1939/14/2). For the latter, the outstanding example is Gregg's report on the Gosford estate in Co. Armagh (W. Gregg, *General Report on the Gosford Estates in County Armagh 1821* (introduction by F. M. L Thompson and David Tierney, 1976)).

[15] Clark, 'Land rental values' and id., 'The Charity Commission as a source in English economic history', *Research in Economic Hist.* 18 (1998), pp. 1–52; R. C. Allen, 'Community and market in England: open fields and enclosures revisited', in M. Aoki and Y. Hayami (eds), *Communities and markets in economic development* (2001), p. 49; Turner, Beckett and Afton, *Agricultural rent*, p. 57, n. 18.

[16] E. Kerridge, 'The movement of rent, 1540–1640', *EcHR* 6 (1953), pp. 16–34. Kerridge's data has recently been reworked by Richard Hoyle, 'Estate management, tenurial change and capitalist farming in sixteenth-century England', in S. Cavaciocchi (ed.), *Il mercatao della terra secc. XIII–XVIII* (2004), pp. 353–82.

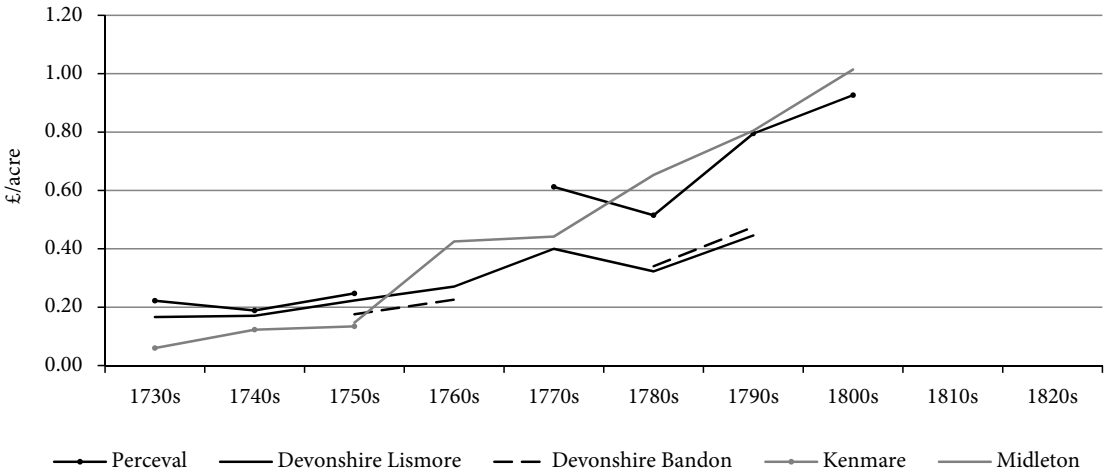

FIGURE 1. Current land values in Munster, 1680–1809

Source: Dickson, *Old world colony*, pp. 643–45.

on the Downshires' Kilwarlin estate in County Down from 1740 to 1845.[17] Crawford did so for the Brownlow estates in County Armagh from 1650 to 1799.[18] Dickson produced series for several estates in counties Cork and Waterford: the Devonshire estates from 1690 to 1797, the Perceval/Egmont estates from 1680 to 1810, the Browne/Kenmare estates from 1720 to 1759, and the Brodrick/Middleton estates from 1750 to 1814.[19] Roebuck extended coverage of Ulster estates to the Sandwich (co. Armagh, 1730–1806), Erne (co. Donegal, 1730–1810), Hamilton (co. Fermanagh, 1760–1810), Balfour (co. Armagh, 1760–1815) and Charlemont (co. Armagh, 1740–1820) estates.[20]

This work on Ireland, whilst pioneering, turned out to be disappointingly imprecise in the statistical sense. Figures 1 and 2 show the results for the Munster and Ulster estates. In Munster land values were clearly rising over the eighteenth century, but it is difficult to pick out the timing of any acceleration. In Ulster the variance across estates is so great that all one can really say is that rents were rising. The reasons for this imprecision are several. First, the sample sizes for some periods on some estates are very small and the sampling design is by convenience (i.e., taking whatever observations that happened to be available) rather than randomized. For the outlying Erne estate in Ulster there is just one letting in the 1750s, four in the 1760s and two in the 1810s. Note as well that for some estates in both Munster and Ulster there are decades in which no land was let. Second, the size of the holdings being let could vary from period to period. On the Hamilton estate the average size of holding let in the 1760s

[17] W. A. Maguire, *The Downshire estates in Ireland, 1801–1845* (1972), p. 39.

[18] W. H. Crawford, 'Landlord-tenant relations in Ulster, 1609–1820', *Irish Economic and Social Hist.* 2 (1975), p. 13.

[19] David Dickson, *Old world colony. Cork and south Munster, 1630–1830* (2005), pp. 643–45. These series were long only available in D. Dickson, 'An economic history of the Cork region in the eighteenth century' (Ph.D. thesis, Trinity College Dublin, 1977).

[20] P. Roebuck, 'Rent movement, proprietorial incomes and agricultural development, 1730–1830', in P. Roebuck (ed.), *Plantation to partition* (1981), p. 88.

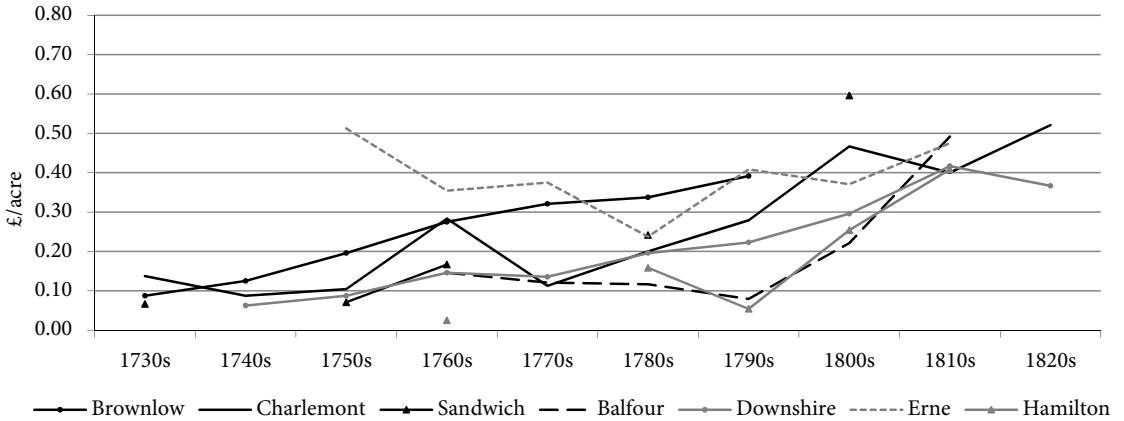

FIGURE 2. Current land values in Ulster, 1730–1829

Source: Roebuck, 'Rent movement', p. 88.

was 1617 acres and in the 1790s 567 acres, decades with particularly low average current values. Third, the quality of the land being let could also vary from decade to decade. More generally, the variance in land quality, as evidenced by the range of values observed at any one time, was large both within and across estates.

Mokyr, as a part of his work on land tenure in Ireland, departed from the usual practice of taking the estate as the unit of analysis. He drew data on land tenure from the sale notices issued by the Landed Estate Court Rentals in 1850.[21] Although his main interest was in the prevalence of leases, he also generated a retrospective series for rents per acre on a countrywide sample of 1288 holdings. Mokyr's series is subject to many of the same sources of imprecision as the estate studies. In addition, his series may not be very reliable for the first two decades of the century, when rents on new lettings were very high, since his sample will necessarily contain only leases that were not renegotiated in the aftermath of the wars.

In England Kerridge seems to have had no followers until very recently. Clark has, like Mokyr, moved outside the confines of the individual estate and constructed a large, countrywide sample of current land values drawn from information furnished to the Charity Commissioners.[22] Clark, following on Hoffman's work on France, has also innovated by using regression methods to control for various characteristics of the property or the location. He incorporates variables that indicate the presence of buildings and common rights, whether the size of the holding is greater or less than 20 acres, and the population density of the parish. His only control for land quality, though it might also refer to demand conditions, is a set of dummy variables for five broad regions of England and Wales.

The use of regression methods represents a fundamental change in the way in which the

[21] Mokyr, *Why Ireland starved*, pp. 88–99.

[22] Clark, 'Land rental values' and 'Charity Commission'. Clark's sample has been criticized as being biased toward atypically small and higher valued properties, but that is not to deny his methodological advances (Allen, 'Community and market', p. 49; Turner, Beckett and Afton, *Agricultural rent*, p. 57, n. 18).

information in leases is regarded. In most of the research cited above the average land value for a given period has been arrived at by dividing the total value of the land being let by the total acreage let. This implicitly weights the average values on larger properties more heavily, which might be appropriate if the sample of land being let were anywhere near the total area of estate. But given the long terms of many leases, the share of an estate being let in any given decade could be modest, the evidence on four Irish estates indicating somewhere between 10–20 per cent, at most.[23] Regression methods, by contrast, treat each lease as an equally weighted observation on the value of land.

The work reported in this paper, like Clark's, goes beyond the individual estate and uses regression methods.[24] It is more thorough-going in controlling for the characteristics of the property being let and the characteristics of the lease. It makes use of information that can be found in all leases: the location of the property, its owner, its area and the length of the lease. The regression equation to be estimated is:

$$\ln(\text{rent per acre})_i = \Sigma\alpha_j \text{Time}_{ij} + \Sigma\beta_k \text{Estate}_{ik} + \gamma \ln(\text{size plot})_i + \delta \text{ Length lease}_i + \eta \ln(\text{townland value})_i + \mu_i \quad (1)$$

where the rent per acre on a given parcel is a function of a series of time dummies indicating when the lease was signed; a series of estate dummies intended to capture any differences in leasing practices across estates; the size of parcel being let; an indicator of the length of the lease being granted; and the average value of land in the townland in which the parcel was situated. The specification is in logarithms because the price level varies a good deal over this period and the effects of the dependent variables are likely to be proportional to the level of prices. The time path of rents can be calculated from the coefficients on the time dummies. (For want of data in the leases it was not possible to control, as Clark does, for buildings.)

The distinctively Irish element in this estimating equation is the use as a control for land quality of the average townland value from the General Valuation of Ireland conducted in the 1850s and 1860s.[25] It is, in general, impossible to match properties being let over the previous century or more to the holdings in the General Valuation. But it is relatively easy to match townlands, the basic administrative unit in Ireland. Since the townland was relatively small, averaging only 300–400 acres, its average value should give a pointer to the quality of the land on a given holding. There was considerable variation across townlands, on the order of a tenfold difference in average values in the case of County Armagh. There could, of course, still be a good deal of variation in land quality and valuation per acre within townlands.

As a control for land quality, the average townland value is a cross-section at the end of a long period. Its usefulness assumes that the relative valuations of townlands did not change dramatically during the preceding century. This is probably a reasonable assumption. Even upland and bog areas that were brought into cultivation during the late eighteenth and early nineteenth centuries generally remained relatively low value land.

[23] Roebuck, 'Rent movement', pp. 85–6.

[24] Some unpublished work along these lines preceded Clark's by more than a decade (P. M. Solar, 'Growth and distribution in Irish agriculture before the famine', Ph.D. thesis, Stanford University, 1987, ch. 7).

[25] *General valuation of rateable property in Ireland: County of Armagh* (1864)

II

Land holding in Ireland had some particularities that may have implications for the measurement of land values from lease data. One is the subdivision of holdings, usually among family members. As population grew, parents with sufficient land under lease made room for their married children to establish households.[26] From generation to generation holdings became smaller and smaller. Whilst subdivision did occur, it should not be overestimated. As late as the early 1840s most of the good land in Ireland was still occupied in holdings of 20 acres or more, with Ulster, and especially County Armagh, being exceptional in having a prevalence of small holdings. Subdivision was also a phenomenon that took place over a long time horizon, and is really only conceivable under the very long leases that prevailed in Ireland. As such, it is not clear that it would have a great influence on the rents at which such leases were contracted. The value to the tenant of an option to subdivide at some distant time in the future could not have been very large. Moreover, if what matters is the trends in land values, then it is how this option value changed over time that matters. If during the eighteenth and early nineteenth centuries, this option value increased, then it would tend to bias the observed growth in land values upward.

A related, and perhaps more important, feature of the agrarian economy in Ireland was subletting. Some sorts of subletting can be set aside immediately as disguised wage payments. Labourers in Ireland were often paid in short-term access to land, being given parts of the farmer's potato field in return for their labour on his grain crops. A similar, though somewhat more permanent, arrangement involved farmers letting marginal land in small plots, with the rent often being paid in labour. Any farmer taking out a lease on a holding large enough to require extra-familial labour would have had to take this cost of labour into account.

The more relevant sort of subletting involved 'middlemen', individuals who farmed little of the land that they held under lease, instead letting it out in smaller parcels to subtenants.[27] In the seventeenth and early eighteenth century some Irish landowners, particularly those who had received recent grants of confiscated land, took the easy option of letting it out in blocks of hundreds and even thousands of acres. When they did so on leases in perpetuity or renewable forever, they effectively alienated the property to these large tenants. But many of the leases to middlemen were of shorter duration: in the eighteenth century leases for three lives were commonly given to Protestants, whilst the Penal Laws restricted the length of leases given to Catholics to 31 years. From the late eighteenth century landowners started eliminating the middlemen when they had the opportunity. If middlemen paid particularly low rents, either because they were favoured individuals or because they were taking over the effective management of the estate from the landowner, then their progressive elimination would tend to make any rise in rents appear larger.

In practical terms the phenomenon of subletting by middlemen is unlikely to affect the estimates made here. Since leases in perpetuity or renewal forever often involved fines, they

[26] K. H. Connell, *The Population of Ireland, 1750–1845* (1950), ch. 6.

[27] D. Dickson, 'Middlemen', in T. Bartlett and D. Heyton (eds), *Penal era and golden age* (1979), pp. 162–85.

have been excluded from the data set. (Indeed some of the observations used in this study come not from the records of the original landlords but from those of the effective landlords.) In the case of County Armagh the dataset contains very few leases for large holdings susceptible of being those of middlemen. Out of 4746 observations only 44, less than one per cent, refer to holdings of a hundred acres or more. Moreover, these holdings tended to be located in townlands that had low valuations in the mid-nineteenth century, hence they may have been contained large tracts of marginal land.

A third particularity of land tenure in Ireland was tenant right, which needs to be distinguished from the customary arrangements of the same name are found in parts of England.[28] The meaning of tenant right, or Ulster custom, has been an historiographical morass, so one needs to tread with care.[29] It does seem clear that from at least the early eighteenth century tenants in Ulster were able to sell their 'interest' in a holding. In the nineteenth century the payments for tenant right could be substantial. Two Armagh witnesses before the Devon Commission in the early 1840s put forward estimates of £10 per acre and £5–18 per acre, and similar figures were cited for the neighbouring counties of Down and Monaghan.[30] What is most relevant to this study, and by no means clear, are the trends in the value of tenant right. It is striking that tenant right was mentioned by neither Arthur Young in the 1780s nor Edward Wakefield *c.*1810, both of whom were very interested in land tenure and both of whom produced estimates for the rental of Ireland.[31] Nor does it get a single mention in Charles Coote's 1801 statistical survey of the county.[32] This might suggest that the large payments for tenant right were a creation of the early nineteenth century. They certainly became more prominent in estate management, as the rise in emigration made actual payments more frequent. However, the few estate studies available for Ulster suggest that payments for tenant right were already well established by the late eighteenth century.[33] Also, Dowling argues that tenant right simply became more prominent as landlords, in the interests of more rational estate management, tried to monitor and regulate such transactions.[34] It also became more visible as tenants increasingly used the sale of tenant right as a means of financing emigration.

III

The data on which the regression is estimated constitute what was once described by a colleague as an 'convenient sample'. It is essentially all the lease information that could be

[28] J. A. Perkins, 'Tenure, tenant right, and agricultural progress in Lindsey, 1780–1850', *AgHR* 23 (1975), 1–22.

[29] For extended discussions of tenant right, see W. H. Crawford, 'Landlord-tenant relations in Ulster', pp. 5–22; W. E. Vaughan, *Landlords and tenants in mid-Victorian Ireland* (1994), ch. 4; and Martin W. Dowling, *Tenant right and agrarian society in Ulster, 1600–1870* (1999).

[30] [Captain Kennedy], *Digest of Evidence taken before the Commissioners of Inquiry into the law and practice in respect of the occupation of land in Ireland* (2 vols, 1847), I, pp. 294–5, 299, 301, 305–6.

[31] Arthur Young, *A tour in Ireland: with general observations on the present state of that kingdom …* (1780); Edward Wakefield, *An account of Ireland, statistical and political* (1812).

[32] Coote, *Statistical Survey.*

[33] Maguire, *Downshire Estates,* pp. 140–7; William H. Crawford, *The management of a major Ulster estate in the late eighteenth century* (2001), ch. 2.

[34] Dowling, *Tenant right and agrarian society,* ch. 5.

found for estates in County Armagh. Most is held among estate papers and collections of solicitors' records in the Public Record Office of Northern Ireland. Some material was found in estate papers held by the National Library of Ireland. The Landed Estate Court rentals, held in the National Archives of Ireland, were also consulted. Altogether there are just shy of 4750 observations from 49 different estates (see Appendix for sources and numbers of observations by estate). Four estates predominate in the data set, which is essentially split into five parts: the Charlemont, Brownlow, Gosford and Manchester estates, and the rest. Some rough calculations suggest that on average the dataset covers 7–10 per cent of the land in the county that came up for letting in a given year.[35]

A worry with a sample of this sort is that the surviving records may not accurately reflect the general population of estates. As noted above, the sample certainly overrepresents very large estates: the big four were indeed the four largest estates in the county.[36] One defence is that, unlike in previous studies, the method at least allows for the inclusion of leases from some smaller properties. That leases have survived more frequently from large estates might also mean that they were better managed, though better management may mean more bureaucratic rather than more progressive or more able to extract the full rental value of the land. The same charge might not be so easily levelled at the smaller estates, since many of their records survive because they found their way, usually for unknown reasons, into solicitors' storerooms. These concerns about the representativeness of the sample need to be signalled, though in practice there is little that can be done about them.

In general, only a small share of the information comes from the sort of estate surveys used by Reobuck or the sale records used by Mokyr. Most of the data comes from leasebooks, in which the terms of leases granted were recorded, or from individual original or copy leases kept in estate archives. Not all leases were included. Perpetual and renewable leases were excluded, as were leases at will, though none of these was very important in the sources. The standard Irish lease in this period was quite simple: it involved the annual or semi-annual payment of a fixed money rent for the term of lease. The payment of fines at the onset or the renewal of a lease was rare. Small holdings were also excluded since the object of the exercise is to trace the value of land for agricultural purposes and small holdings may have been valued more for housing or domestic industry. The threshold for inclusion was five statute acres.

The big four estates accounted for about a fifth of the county's land area, so it is not surprising that they account for a large share of the data set. The representation of the estates in the data set does vary over time, as is shown in Figure 3. This results in part from the irregular survival of the documentation and in part from the peaks and troughs in letting activity on the estates. On the Charlemont estate, for example, it would seem that there were no leases given in the late 1770s and very few in the 1780s. In the late 1770s and early 1780s there are no new leases recorded for the Manchester estate, yet 150 were granted in the late 1780s.

[35] Excluding mountain, bog and water, the surface area of County Armagh is 267,317 acres. If the average lease ran for 30 years, then 8910 acres would have been let each year. If the average lease lasted 40 years, then it would have been 6683 acres. For the entire sample the average amount of land let per year is 639 acres.

[36] J. Bateman, *The great landowners of Great Britain and Ireland* (4th edn, 1883 repr. 1971)

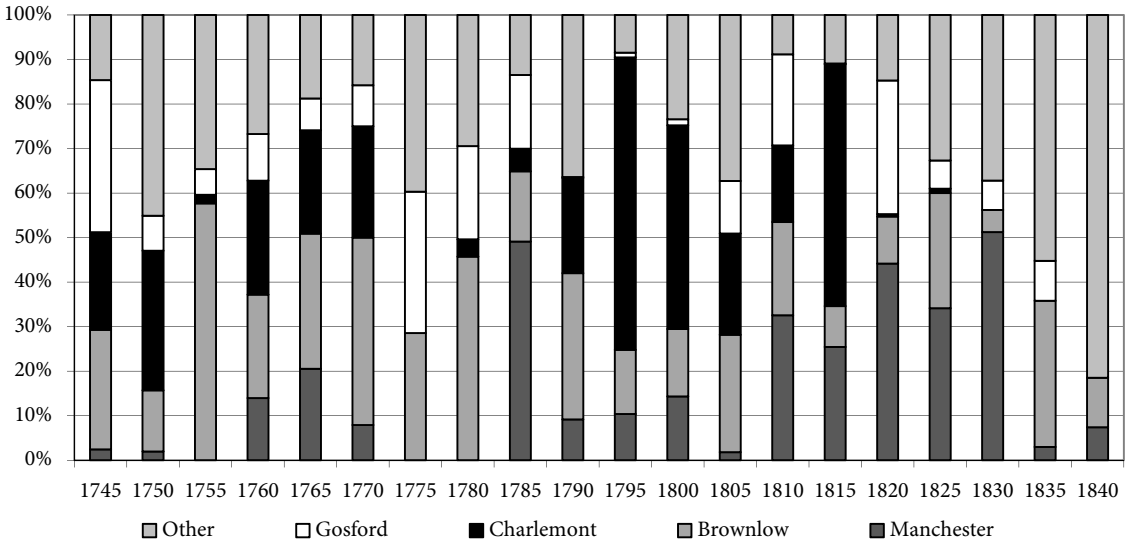

FIGURE 3. Composition of data set by estate

Source: Armagh rents data set (see Appendix).

Summary statistics are shown in Table 1 for the sample as a whole and by five-year period. The length of lease variable needs some explanation. The variety of terms to be found in leases were coded into a variable that takes integer values from 1 to 4 based on the following schema:

Length of lease variable	Lease terms
4	(3 lives AND >20 years) OR (>50 years)
3	(3 lives) OR (2 lives AND >20 years) OR (32–49 years)
2	(2 lives) OR (1 life AND >20 years) OR (23–31 years)
1	(1 life) OR (<23 years)

The number of observations in the sample is low for the earliest and latest years, so the estimates for the 1730s and early 1740s and for the early 1840s should be less precise. Most of the observations are concentrated between 1780 and 1839. The lower numbers in the early years, especially before 1750, are almost certainly due to lower survival rates of estate documentation. The falling off in numbers after 1830 may not be a quirk of the sources, but may reflect the movement away from leases for lives or long terms of years and toward tenancies at will. The surviving leases suggest that there were two periods of intensive letting, in the late 1780s and 1790s and in the late 1810s and 1820s. The smaller numbers of surviving leases in the intervening years from 1800 to 1814 might be explained in two ways. One is that landlords and tenants were reluctant to agree terms in these years of high and volatile prices. The other is that landlords and tenants did conclude leases, but these were torn up and renegotiated when prices fell sharply in the aftermath of the wars.

TABLE 1. Summary Statistics (averages)

	Observation (no.)	*Size of holding (acres)*	*Lease length (= 1, 2, 3 or 4)*	*Townland value (£ per acre)*
1730–4	12	54	3.2	1.06
1735–9	7	25	3.0	1.17
1740–4	13	29	2.4	1.14
1745–9	30	36	3.1	1.10
1750–4	92	33	2.9	1.06
1755–9	57	39	2.9	1.07
1760–4	90	30	3.1	1.07
1765–9	131	32	3.0	1.11
1770–4	77	33	3.0	1.14
1775–9	87	22	2.9	1.01
1780–4	188	20	3.0	1.11
1785–9	415	15	2.5	1.06
1790–9	534	18	2.6	0.96
1795–9	448	15	2.9	0.84
1800–4	321	14	3.0	0.92
1805–9	132	14	2.8	1.02
1810–4	267	13	2.0	0.99
1815–9	592	12	2.0	0.93
1820–4	348	13	2.0	1.03
1825–9	467	14	2.1	0.88
1830–4	183	16	1.9	1.00
1835–9	179	19	1.9	0.82
1840–4	76	20	1.8	0.70
Entire sample	4746	17	2.4	0.97
Standard deviations		32	0.76	0.28

Source: Armagh rents data set (see Appendix for estates and sources)

The average size of the holdings let fell steadily until the 1810s, then rose modestly. Figures 4 and 5, drawn for periods with relatively stable average land values, show that land values per acre show some tendency to fall with the size of the holding. Hence the changes in average holding size over time are likely to bias the trend in average land values upward during the late eighteenth century and downward in the 1830s and early 1840s.

Over the period as a whole the average length of leases fell, which largely reflects the transition from leases for three lives to leases for one life and 21 years. If higher rents were associated with longer leases, then this would have the opposite effect to the trend in holding

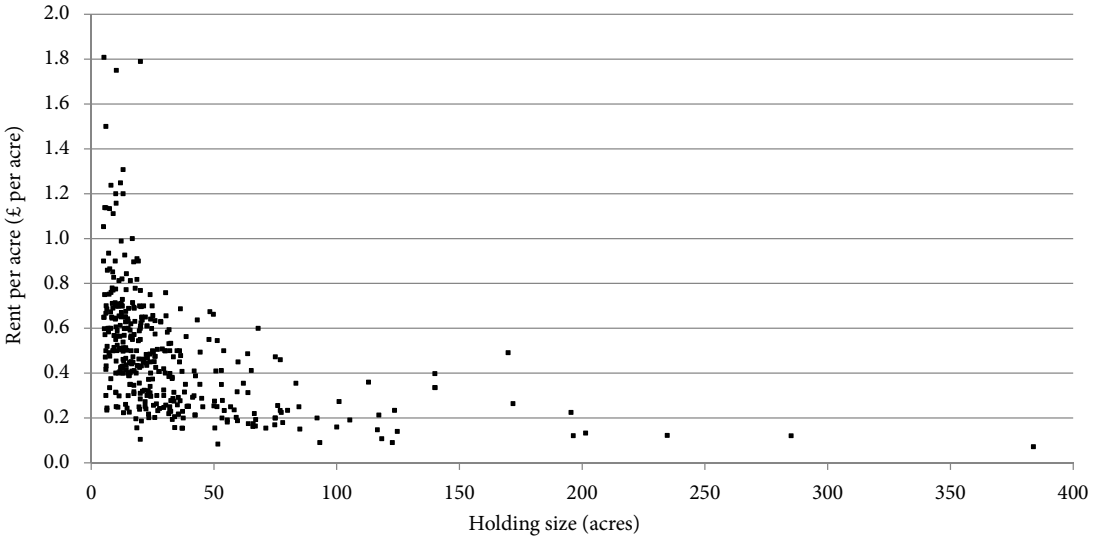

FIGURE 4. Average land values by holding size, 1730–1769

Source: Armagh rents data set (see Appendix for estates and sources).

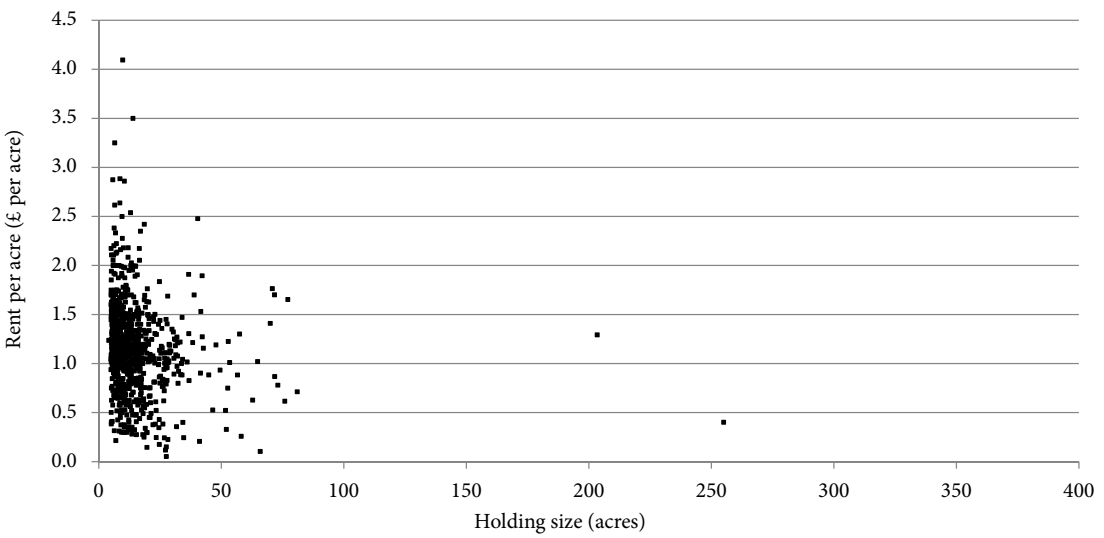

FIGURE 5. Average land values by holding size, 1820–1844

Source: Armagh rents data set (see Appendix for estates and sources).

size. It would tend to bias the trend in land values downward. The average townland value of the properties let fell somewhat over the entire period. If this represents a fall in average land quality up for letting, then it would also bias the trend in land values downward.

IV

The estimates based on equation (1) are shown in Table 2. Since for a number of estates there were very few observations (see Appendix), all estates with six or fewer observations were lumped together into an 'other estates' dummy. The share of the variance in rents per acre explained by the dependent variables is relatively high, at 75 per cent. An analysis of variance shows that the time dummies do about half of the work, the townland value a quarter and the holding size about a tenth. The estate dummies make only a small contribution, and the length of the lease very little at all.

The coefficient on the townland value shows that, other things being equal, the higher the townland value, the higher will be the rent per acre. That the coefficient is less than 1 suggests that actual rents varied somewhat less than did the valuations. The coefficient on holding size confirms that, controlling for other factors, the larger the holding, the lower the rent per acre. Given the logarithmic specification, the coefficient can be interpreted as an elasticity. The value of −0.13 means that doubling the holding size (a 100 per cent increase) would produce a 13 per cent lower rent per acre. This effect is fairly strong. A 40-acre farm would have a rent per acre about a quarter lower than a 10-acre farm. The coefficient on the length of the lease indicates that, other things being equal, the longer the lease, the lower the rent per acre. This is not the expected sign, but the estimated effect is very small in practice. The move from a lease for three lives to one for one life and 21 years, the typical change over the period, would produce only a two per cent fall in rent per acre.

The estate dummies show remarkable variation. They should be read as indicating the level of rent on a given estate relative to that on the Charlemont estate, the largest in the data set and the estate variable that has been deliberately omitted. Only two of 25 estates show lower levels of rent than that which prevailed on the Charlemont estate, and those differences are not statistically significant. Half of the other 24 estates had rent levels more than 20 per cent higher. Rents on the Charlemont estate seem to have been low for the county.

The variance in rent levels across estates may reflect differences in land quality not captured by the townland valuation variable, but it would be surprising if they were so large. Alternatively, there may have been large differences in the quality of estate management, though two aspects of management are already controlled for by the plot size and lease length variables. But landlords could have had different strategies toward their tenants, ranging from auctioning off tenancies to the highest bidder to charging artificially low rents in order to attract progressive or content tenants, as Allen has suggested some English landlords did.[37] The degree to which tenant right was established could also have varied across estates. Another old war horse of Irish history – absentee landlords – could also be a factor in explaining differences across estates, though there is not sufficient information to test this systematically. Moreover, as Malcomson has shown, absenteeism is not as simple a phenomenon as contemporary pamphleteers suggested.[38] Differences in rent levels across estates could be seen as an argument

[37] Allen, *Enclosure*, pp. 181–2.

[38] A. P. W. Malcomson, 'Absenteeism in eighteenth-century Ireland', *Irish Economic and Social Hist.* 1 (1974), pp. 15–34.

TABLE 2. Determinants of rent per acre

	Estimated Coefficient	*Standard Error*	*t-value*	
Townland value	0.786	0.018	43.45	**
Size of plot	−0.127	0.008	−16.41	**
Lease length	−0.026	0.009	−2.83	**
Time effects:				
1730–4	−0.996	0.097	−10.23	
1735–9	−1.112	0.120	−9.28	
1740–4	−1.036	0.091	−11.33	
1745–9	−0.901	0.067	−13.41	
1750–4	−0.745	0.048	−15.47	
1755–9	−0.541	0.055	−9.90	
1760–4	−0.567	0.050	−11.43	
1765–9	−0.266	0.045	−5.86	
1770–4	−0.074	0.049	−1.50	
1775–9	−0.070	0.048	−1.45	
1780–4	−0.183	0.042	−4.39	
1785–9	−0.242	0.036	−6.66	
1790–4	0.028	0.036	0.79	
1795–9	−0.032	0.036	−0.90	
1800–4	0.221	0.037	5.98	
1805–9	0.415	0.042	9.89	
1810–4	0.626	0.034	18.29	
1815–9	0.547	0.030	18.33	
1820–4	0.360	0.033	10.97	
1825–9	0.299	0.032	9.29	
1830–4	0.396	0.037	10.60	
1835–9	0.344	0.038	9.01	
1840–4	0.321	0.046	6.98	
Estate effects (with respect to Charlemont estate):				
Manchester	0.217	0.016	13.66	**
Brownlow	0.153	0.016	9.29	**
Gosford	0.050	0.015	3.26	**
Cremorne	0.115	0.034	3.39	**
Barton	0.123	0.036	3.44	**
Sandwich	−0.032	0.037	−0.88	
Maxwell Close	0.044	0.037	1.17	

	Estimated Coefficient	*Standard Error*	*t-value*	
Cope	0.635	0.035	18.04	**
Kilmorey	0.152	0.040	3.77	**
Verner	0.398	0.041	9.58	**
McKinstry	0.195	0.046	4.21	**
Graham	0.058	0.044	1.33	
Caledon	0.028	0.049	0.58	
McGeough	−0.059	0.055	−1.08	
Ker	0.029	0.060	0.48	
Wakefield	0.365	0.058	6.29	**
Valentine Wilson	0.199	0.066	3.01	**
Landed Estate Court VI	0.670	0.116	5.75	**
Burges	0.298	0.069	4.34	**
Smyth	0.329	0.074	4.46	**
Simpson	0.218	0.088	2.48	*
Blacker	0.070	0.073	0.96	
Fane	0.197	0.097	2.04	**
Landed Estate Court I	0.083	0.068	1.22	
Trevor	0.026	0.152	0.17	
Other estates	0.255	0.036	7.09	**

Residual standard error: 0.301 on 4694 degrees of freedom
Multiple R-squared: 0.75
Adjusted R-squared: 0.75
F-statistic: 275 on 52 and 4694 DF, p-value: <0.0000000000000002

** statistically significant at 1 per cent level
* statistically significant at 5 per cent level

Note: The levels of statistical significance have no real meaning for the time dummies.
Source: Armagh rents data set (see Appendix)

against pooling observations from many estates, but this need not be the case if policies on individual estates were consistent over time.

The trends in rents as indicated by the time dummies are shown in Table 3 and Figure 6, along with 95 per cent confidence intervals (dashed lines) for the estimates. (The level of this series was set by evaluating the estimating equation at the mean values for the other independent variables.) Rents at new lettings grew steadily from the early 1740s until the early 1770s, increasing by about 170 per cent. In the 1770s, 1780s and 1790s there was little upward movement. The wartime rise in rents, of about 80 per cent, took place from the late 1790s to the early 1810s. By the early 1820s rents had fallen to about 75 per cent of the wartime peak, and they remained at that level through the early 1840s. The postwar level of rents was still about 50 per cent higher than that which had prevailed in the late eighteenth century.

TABLE 3. Rent per acre in County Armagh, 1730–1844 (£ per acre)

Five year interval beginning	*Regression method*	*Mean of mean rent per acre*	*Total rent divided by total area*
1730	0.26	0.24	0.21
1735	0.23	0.30	0.24
1740	0.25	0.32	0.30
1745	0.29	0.32	0.27
1750	0.34	0.36	0.28
1755	0.42	0.44	0.33
1760	0.40	0.43	0.38
1765	0.55	0.62	0.41
1770	0.66	0.78	0.48
1775	0.67	0.66	0.63
1780	0.59	0.68	0.60
1785	0.56	0.66	0.62
1790	0.73	0.81	0.60
1795	0.69	0.64	0.59
1800	0.89	0.98	0.87
1805	1.08	1.24	1.15
1810	1.33	1.56	1.43
1815	1.23	1.36	1.28
1820	1.02	1.25	1.13
1825	0.96	1.00	0.95
1830	1.06	1.19	1.13
1835	1.01	0.95	0.95
1840	0.98	0.81	0.76

Source: Armagh rents data set (see Appendix for estates and sources).

Figure 6 also shows the rent movements as estimated from the same data set by two much simpler methods. One is that used in the earlier work cited above: the 'overall average' is the total rent observed in a given period divided by the total area let. The other is the 'simple average' of the rents per acre for all lettings in a given period. Since larger holdings tended to rent for less per acre and the 'overall average' gives larger holdings greater weight, this measure of rent change is always below the 'simple averages'. The estimated rent movements differ from these simpler measures in two main respects. First, they are generally less volatile. Second, the wartime inflation and the post-war deflation in rents are less prominent. These differences are due to additional variables in the regression which control for changes in the composition of the properties observed from period to period. For example, the simpler methods show a sharp fall in rents from the early 1830s to the early 1840s, which could, mistakenly, be taken as a sign

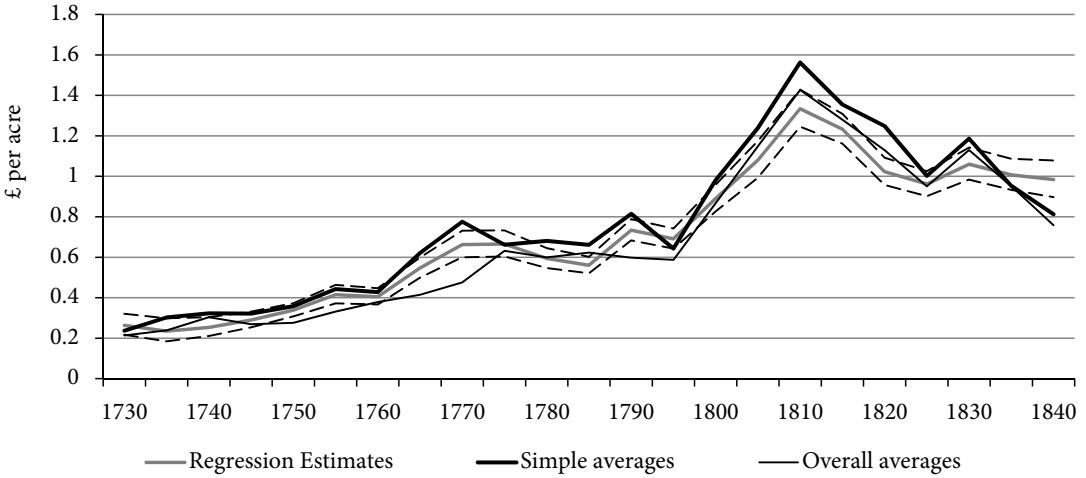

FIGURE 6. Rent movements, 1730–1844

Source: Table 3.

of the impending crisis. The regression estimates control for rising holding size, falling lease length and falling townland value during this period, all factors which would tend to depress the average rent. They show instead that rents were relatively stable in the two decades before the famine.

V

Real rents, which show the rent in terms of the prices of agricultural produce, are presented in Figure 6. The northern price indices (based on Belfast and Londonderry prices) suggest that real rents increased only modestly from the 1780s to the early 1840s. If southern prices (based on Cork and Waterford prices and well correlated with the northern prices) were used to extrapolate the northern series backward to the late 1760s, it would seem that real rents hardly changed between 1770s and the famine. In the late 1790s and early 1800s real rents appear to decline by about 20 per cent, but most of this fall can be attributed to the extraordinarily high prices in 1799 and 1800.

The series in Figure 7 begin in the late 1760s because good agricultural price indices are wanting for prior years. The oats price series assembled by Kennedy and Dowling shows an increase of about 65 per cent between the 1730s and the 1770s.[39] Given the increase in nominal rents of around 170 per cent, this implies an increase in real rent during the middle of the eighteenth century of roughly 64 per cent (270/165 = 1.64).

Allen shows how in theory changes in productivity translate into increases in Ricardian rent. These are magnified by the inverse of the land share in agricultural income.[40] In the Armagh case the lack of any significant growth in real rents suggests that total factor productivity growth in agriculture could only have been modest at best.

[39] Kennedy and Dowling, 'Prices', pp. 99–100.

[40] Allen, *Enclosure*, pp. 229–31.

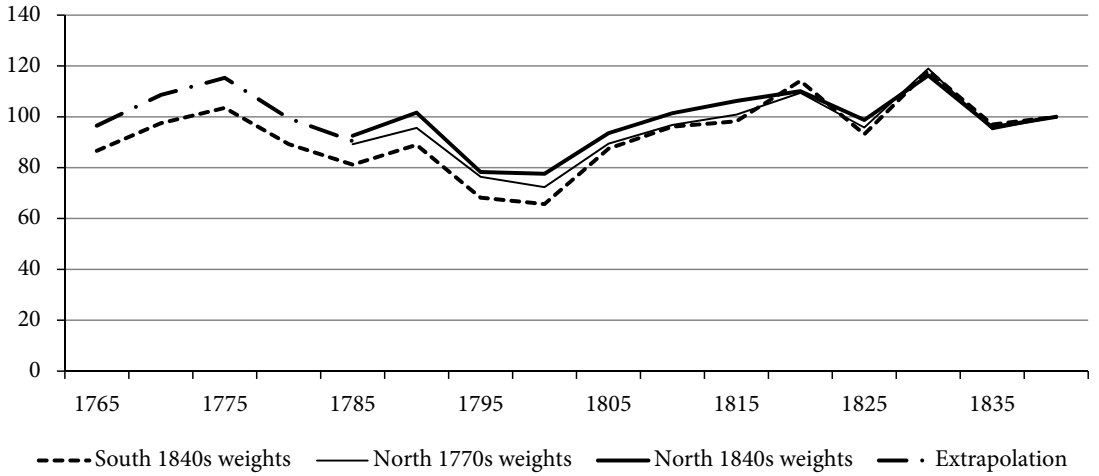

FIGURE 7. Real rents, 1765–1844 (1840–4 = 100)

Sources: rents: Armagh rents data set (see Appendix for estates and sources); prices: Kennedy and Solar, *Irish agriculture*, pp. 184–91.

It is feasible to attempt a direct, albeit rough and ready, calculation of total factor productivity growth between the late eighteenth century and the decades before the famine. For want of reliable information on output and input quantities, this can be done by comparing the changes in the price of output to the changes in the prices of the major inputs, land and labour. (We have no prices for capital inputs for Ireland, but these are unlikely to have been large for the small-scale, mixed farming characteristic of County Armagh.) If input prices rose faster than output prices, then this indicates increased efficiency at transforming inputs into output. If they grew more slowly, then it means reduced efficiency. The intuition behind these calculations is that the only way that the payments to those supplying the inputs to agriculture can grow faster than prices is if output is growing faster than the inputs being used.

The information on agricultural prices is relatively good. That on wages is more spotty, but the notorious stickiness of nominal wages is a help. Scattered observations on several Ulster estates, collected by Kennedy and Dowling, suggest that the levels of rural wages in the 1770s and 1780s and in the 1820s and 1830s were quite stable and that the increase from the late eighteenth century to the decades just before the famine was about 50 per cent.[41] Geary and Stark draw on Bowley's work to show an increase in Irish agricultural wages from the late 1780s to the 1820s and 1830s of about 30 per cent.[42] Comparing the average of 40 observations on wages in Arthur Young's tour in the late 1770s with Mokyr's estimate for the national average wage in the 1830s gives an increase of 50 per cent.[43] In the calculations below alternative values corresponding to wage increases of 30 and 50 per cent will be used.

Weights for the input prices are also needed. In the early 1840s rents accounted for 25–30 per

[41] Kennedy and Dowling, 'Prices', pp. 94–96, 98.

[42] F. Geary and T. Stark, 'Trends in real wages during the Industrial Revolution: a view from across the Irish Sea', *EcHR* 57 (2004), pp. 392–3.

[43] Solar, 'Growth and distribution', p. 256.

TABLE 4. Calculations of Total Factor Productivity Growth, 1765–1789 to 1820–44 (per cent per annum)

Land share	20		30		40	
Labour share	80		70		60	
Rents	0.90	0.90	0.90	0.90	0.90	0.90
Wages	0.48	0.74	0.48	0.74	0.48	0.74
Prices	0.90	0.90	0.90	0.90	0.90	0.90
Total factor productivity	−0.34	−0.13	−0.29	−0.11	−0.25	−0.10

Note: Total factor productivity is calculated as the difference between the weighted sum of the growth rates of the input prices minus the rate of growth of the output prices.
Sources: rents: Table 3; wages: see text; prices: Kennedy and Solar, *Irish agriculture*, pp. 184–191.

cent of agricultural output, but the calculations below are made for land shares ranging from 20 to 40 per cent.[44] It turns out that these alternative assumptions about the factor shares do not have a major influence on the results.

The calculations of total factor productivity are shown in Table 4. As an illustration of how the figures for productivity growth are arrived at, the figure at the bottom of the first column is calculated as:

Weighted sum of input price growth		Output price growth		Total factor productivity
((0.2 * 0.9%) + (0.8 * 0.48%))	−	0.9%	=	−0.34%

The results for all configurations of assumptions about wage growth and factor shares indicate that agriculture in County Armagh was becoming less efficient in its use of resources during the late eighteenth and early nineteenth centuries. Since crop yields remained relatively constant over the period, this means that more and more inputs, notably labour inputs, were needed to maintain yields at the same level. In so far as there were economies of scale, the fall in the average size of holdings may have contributed to the loss of efficiency.

The calculation of total factor productivity from input and output prices assumes that factor markets were competitive and that the input prices reflect the marginal productivity of labour and land. The existence of tenant right, by which tenants retained part of the economic value of the land, might seem to compromise the results, but this need not be the case. First, it is clear that tenant right existed throughout the period. If its share in the value of land remained relatively constant, then the trends in rents estimated here would still be valid. Second, even if there were changes in the share kept by the tenants, it might not make all that much difference to the conclusions. The estimates for tenant right in County Armagh cited above indicate that it might have been worth eight to ten years' rent. In the mid-nineteenth century land in Ireland

[44] Ibid., pp. 371–2

sold for about 25 years' purchase, which suggests that its value may have been understated by as much as 40 per cent. Suppose, to take an extreme case, that there were no tenant right in the late eighteenth century and that it grew to reach 40 per cent of what the landlord could capture before the famine. The effect would be to increase the rate of growth of rents as well as the growth of total factor productivity, but it would change total factor productivity growth from −0.11 per cent per annum to just 0.08 per cent per annum.

Negative total factor productivity growth is not such an unusual phenomenon. It has been the case for many sub-Saharan African countries during the last 40 years, a sign of the economic deterioration that has widened the gap between incomes in Africa and those elsewhere in the world.[45] Singapore, despite its remarkable growth, has had negative total factor productivity growth.[46] Its problem was that vast amounts of capital were used to little effective gain. But in western European agriculture during the eighteenth and early nineteenth centuries total factor productivity growth was generally positive and contributed to overall growth. In late eighteenth-century France total factor productivity growth in the Paris basin was on the order of around 0.3 per cent per annum.[47] For late eighteenth-century England Crafts puts it at 0.2 per cent per annum.[48] For the eighteenth century as a whole Allen gives a figure for England of about 0.1 per cent per annum.[49] Crafts' estimate for England during the first three decades of the nineteenth century is much higher, at 0.9 per cent annum.[50] Ireland, thus, was not keeping up with the improvements in agricultural efficiency being made elsewhere and may even have been regressing.

The rent and wage trends shown in Table 4 imply that the relative price of labour was falling over this period. This is consistent with the increased intensity of land use. Widespread potato cultivation required large inputs of labour for manuring, planting and harvesting. This was not only the case for subsistence farming. Land used by labourers for potatoes often formed part of crop rotations on larger holdings, with spade cultivation of potatoes serving as an important soil preparation for cereal crops.

The movements in land values also had important implications for the distribution of income, particularly during and after the French Wars. Since Irish leases were long, adjustments to new levels of land values were very slow. If the nominal value of land was rising, as measured by the new lettings, then tenants with old leases would capture more and more of the return to land. When prices fell, returns from the land shifted back to the landlords. The experience on two County Armagh estates is shown in Table 5. On both the Cremorne and Gosford estates the rent due to landlords fell seriously behind land values during the French Wars, though by the 1820s and 1830s both estates were able to reclaim their real losses as prices fell and as old, eighteenth-century leases fell in and property was re-let at higher rents. Note too that in terms of agricultural prices these landlords' real incomes rose very little between the 1780s and the 1830s.

[45] S. L. Baier, G. P. Dwyer and R. Tamura, 'How important are capital and total factor productivity for economic growth?', *Economic Inquiry* 44 (2006), pp. 33, 36.

[46] Alwyn Young, 'A tale of two cities: factor accumulation and technical change in Hong Kong and Singapore', *NBER Macroeconomics Annual 1992* (1992), p. 35.

[47] Hoffman, 'Land Rents', p. 795.

[48] N. F. R. Crafts, *British economic growth during the Industrial Revolution* (1985), p. 84.

[49] Allen, *Enclosure*, p. 228.

[50] Crafts, *British economic growth*, p. 84.

TABLE 5. Rents due and land values on Armagh estates, 1780s–1830s (1780s =100)

Cremorne				Gosford			
Year	*Rent due (£)*	*Index of rent due*	*Index of land values*	*Year*	*Rent due (£)*	*Index of rent due*	*Index of land values*
1787	1282	100	100	1789	3444	100	100
1812	2125	166	235	1814	6238	181	235
1838	2212	173	179	1828	6789	197	171

Sources: rents due: Cremorne: National Library of Ireland, MSS 3183, 3188–3189; Gosford: Public Record Office of Northern Ireland, D.1606/7A/73, 8, 38 (31 townlands); land values: Table 3.

VI

This paper has used new evidence and new (to Ireland) methods to trace the path of rents at new lettings in one part of Ireland during more than a century leading up to the famine of the late 1840s. The large sample, with information from nearly 5000 leases in County Armagh, and the use of controls for land quality, the size of holding, the length of the lease, and estate leasing policy have made it possible to make more precise estimates of rent movements. These estimates show growth in nominal rents up to the early 1770s, a plateau in the 1770s, 1780s and 1790s, an increase to the early 1810s, followed by a fall to the early 1820s and another plateau thereafter, stretching until the famine of the late 1840s.

For most of the period, certainly from the late 1760s, land values in County Armagh just kept pace with agricultural prices, which suggests that there were few gains in productivity and that the benefits to landlords of increases in output and trade were limited. When taken together with wage and price trends, the rent estimates imply negative total factor productivity growth, which meant that in order to maintain yields and output farmers and labourers had to put in more and more labour inputs to counter this loss of efficiency. Whether this rather dismal view of agricultural development in pre-famine Armagh is indicative of the situation in the rest of Ireland can only be determined by further research on rent movements in other parts of the country.

Appendix: Sources of Land Value Data

The following gives the estate name, the number of leases drawn from it and the archival reference using the following abbreviations; PRONI, Public Record Office of Northern Ireland; NLI, National Library of Ireland, Manuscripts Department; NAI, National Archives of Ireland; LEC, Landed Estate Court rentals

Charlemont, 1270, PRONI, T/1176/3, D/266/360A; D/1644/1–30; Manchester, 888, PRONI, D/1248/L; Brownlow, 776, PRONI, D/1928; Gosford, 774, PRONI, D/1606/3; Cremorne, 117, NLI Special List 86; Barton, 86, PRONI, D/294; Sandwich, 86, PRONI, D/763/2; Maxwell Close, 83, PRONI, T/3097; Cope, 82, PRONI, D/1252/21/1, D/1345/1, 2, 4, 5, 8, 9, 10; Kilmorey, 62, PRONI, D/2638/B; Verner, 61, PRONI, D/236; McKinstry, 58, PRONI, D/266/344; Graham, 57, PRONI, D/943/2; Caledon, 43, PRONI, D/2433/4/1, D/2433/AA/5/11B; McGeough I, 34, PRONI, D/288; Ker, 30, PRONI, D/1747/1–4; Wakefield, 28, PRONI, D/1252/7/6, D/959/5/1/1–58; Valentine Wilson, 22, PRONI, D/462/1–215; LEC Misc VI, 21, NAI, LEC 62/2; Burges, 20, PRONI, D/1594/60; Smyth, 19, NAI, LEC 30/37; Blacker, 18, PRONI, D/959; Simpson, 12, PRONI, D/1522/4/2/11, D/552/1–32; Fane, 10, PRONI, D/1393/1; LEC Misc I, 7, NAI, LEC 16/6; Fivey, 6, NAI, LEC 12/22; Bond, 5, NAI, LEC 10/43; Clarke, 5, PRONI, D/1253/4/1; Harden, 5, PRONI, D/1253/3/1–17; Hardy, 5, PRONI, D/1253/4; Misc I, 5, PRONI, D/476; Dungannon, 4, PRONI, D/1954/3/4, 11; LEC, Misc, IV, 4, NAI, LEC 41/6; LEC Misc V, 4, NAI, LEC 52/42; LEC Misc VII, 4, NAI, LEC 66/73; Peel, 4, PRONI, D/889/1; Trevor, 4, PRONI, D/778; Workman, 4, PRONI, D/1252/14/4; McGeough II, 3, PRONI, D/3012/2/2/11; Rotton and Lane, 3, NAI, LEC 136/48; Small, 3, PRONI, D/1607/5–6; Misc II, 3, PRONI, D/2394/1/1–3; Misc III, 2, PRONI, D2394/2/1–4; Read, 2, NAI, LEC 14/48; Turner, 2, NAI, LEC 14/60; Misc IV, 1, PRONI, D/2394/3/3; LEC Misc II, 1, NAI, LEC 33/29; LEC Misc III, 1, NAI, LEC 33/36; Leitrim, 1, NLI, 36025/1, 3.