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<th><strong>Title</strong></th>
<th>Snapshots of Irish agricultural history: output and production pre-famine and post-famine</th>
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<tr>
<td><strong>Authors(s)</strong></td>
<td>Ó Gráda, Cormac</td>
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Snapshots of Irish Agricultural History:
Output and Productivity Pre-Famine and Post-Famine

by

Cormac O Grada

Working Paper No. 9

April 1989

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The title reflects the somewhat static approach adopted in this paper. By focusing separately on the fortunes of Irish agriculture at different periods, it tends to evade the difficult question of long-run productivity change. Still, it is important to get the milestones right. Part 1 provides another look at the issue of agricultural output on the eve of and in the wake of the Famine. Part 2 has a brief, necessarily tentative, discussion of output trends in the pre-Famine decades. Part 3 is a comparison of output and productivity in the two Irelands, north and south, between the beginning of the century and the 1930s. Part 4 does likewise for the recent past. I hope there is enough meat here for a good discussion.

I

He had unstrapped
The heavy ledger, and my father
Was making tillage returns
In acres, roods, and perches.
"Any other root crops?"
Mangolds? Marrowstems? Anything like that?"
"No." But was there not a line
Of turnips where the seed ran out
In the potato field? I assumed
Small guilts and sat
Imagining the black hole in the barracks.
He stood up, shifted the baton-case
Further round his belt,
Closed the domesday book,
Pitted his cap back with two hands,
And looked at me as he said goodbye.

From Seamus Heaney, 'A Constable Calls'.

Guesses at Irish agricultural output on the eve of the Great Famine (1846-9) necessarily rely to a considerable

---

extent on the 1847 official estimate of crop acreages and yields and of livestock numbers. It has been assumed, reasonably enough, that the 1847 livestock enumeration is a better guide to the situation in 1840-45 than those collected as part of the 1841 population census (Bourke, 1965). Obviously, the recorded acreage under potatoes in 1847 is a poor reflection of the pre-famine figure, but the 1847 statistics have been considered a fair guide to pre-famine grain crops.

The 1847 statistics mark the beginning of a much-celebrated, nearly-unbroken series of Irish agricultural statistics. Their overall reliability has never been seriously questioned. However, on reflection, it would be surprising if the 1847 estimate, the first such, carried out at the height of the Great Famine, was complete. Surely it is more plausible to consider such data collection as a learning exercise that would take at least a few years to perfect. Consider for a moment the lack of accuracy that marked other such pioneering data-collection exercises in Ireland. The shortcomings of the 1813-5, 1821, and 1841 population censuses are well known, and these shortcomings extend to various aspects of the 1841 agricultural data (Froggatt, 1965; Bourke, 1965; Lee, 1981). Even post-famine population censuses continued to suffer for decades from the under-enumeration of infants and small children (Fitzpatrick, 1978). Irish civil registration data were also notoriously unreliable in the early years (Walsh, 1970), and nineteenth-century official emigration and seasonal migration series are also problematic (Ó Gráda, 1975). The defects in these data can perhaps be put down mainly to ignorance, laziness, or fear of taxation; the inaccuracies of some other data, such as certain pre-famine import series, reflect the illegality of much of the trade carried on.

The early history of official agricultural statistics in neighbouring, but economically more advanced, countries is relevant here too. The shortcomings of the French official Recoltes des cereales et des pommes de terre are well known; first collected in 1816, they are generally conceded to have
been defective for several years after that (Allen and Ó Gráda, 1988: 114). Turner (1982) and Coppock (1956) have pointed to serious shortcomings in English agricultural data-collection experiments in the 1790s and 1850s. Coppock also shows that the continuous English series beginning in 1866 remained incomplete for several years. The key here is the continuous rise in the acreage in agricultural use in lowland counties, where the scope for reclamation was already very limited in the 1860s: the annual rise in Oxfordshire, for instance, averaged three-quarters percent for over a decade.

These English agricultural statistics were initially the responsibility of the Boards of Guardians. Holdings of less than five acres were excluded and filling the returns was voluntary. In Ireland, responsibility for collecting the data lay with the constabulary, who in 1847 numbered about ten thousand men. The agricultural statistics were part of the official response to the Famine. The police were given a few weeks in the summer to perform this task, and the average policeman (excluding those who worked in urban areas) had about one hundred farms to investigate under many headings. Alternatively, there was about one policeman for every two thousand acres. These proportions varied across counties; for example, Mayo had a policeman for every four thousand acres while Carlow had one for less than each thousand acres, Tyrone had 218 farms per policeman while Tipperary had fifty. There seems hardly any need here to invoke popular fear of the police or the farmer's perennial fear of taxation: the sheer size of the task facing an unexperienced police force in famine-time is enough.

The early reports of the Registrar-General of Marriages, William Donnelly, on whom responsibility for the agricultural census fell from 1851 on, reflect confidence in the agricultural statistics:

I beg to observe that the success which has attended the collection of Agricultural Statistics in Ireland is most gratifying, and is in every way creditable to the good feeling and intelligence of the owners and occupiers of land in Ireland, who
almost without an exception have voluntarily afforded the required information to the Constabulary, who act as enumerators, to whose exertions, and those of the Metropolitan police, the country is much indebted for the valuable information in connexion with this subject published from year to year since 1847, when the plan of collecting the Returns was first organized by Colonel Larcom, R.E. under the auspices of the Earl of Clarendon - a plan by which it is scarcely possible that any portion of Ireland be overlooked in the general enumeration of Tillage and Live Stock - as the area of each townland is made known to the enumerator by the Sub-inspector of his district, who is supplied with copies of the Ordnance maps, on which are shown the exact area and position of every townland in the district; but should a casual error arise, and any portion of a townland be unaccounted for by an enumerator, the error must be discovered when compiling the Returns and classifying the Holdings in this Office - where reference is also made to the Ordnance maps - thus showing the value of a national survey in carrying on national inquiries.

Still, it seems unlikely, though no reference is made to this in the annual reports, that coverage was complete from the outset. That the police force was stretched is indicated by the break in the series in 1848: what Larcom later called the "tumults of Ballingarry" - William Smith O'Brien's ineffective and short-lived 'rising' - was enough to bring data collection in counties Tipperary, Dublin and Waterford to a halt.

The House of Lords set up a select committee to examine the feasibility of collecting agricultural statistics in England in 1855. The evidence of Irish Registrar-General Donnelly to the committee was cautious, though consistent with less-than complete statistical coverage in the early years. It is worth quoting at some length:

I should state to your Lordships that information given is altogether voluntary; but though it is so, I have reason to believe, from various sources, that of late years much of the objection which originally existed, owing to prejudice and jealousy, has been gradually removed.

There was more jealousy, was not there, at the outset? - Yes; an impression prevailed on the
part of the people that these enquiries were made for objects of taxation, and that if they made known their circumstances, it would lead to increased taxation. That prejudice I know existed to a considerable extent in some parts of the country. From several members of your Lordships' House, I beg to say, I received very great assistance in removing unfavourable prejudices.

There is no such jealousy now? - I believe the jealousy is very much diminished with regard to the agricultural statistics.

At present, do you find any indisposition on the part of the occupiers to give you the required information? - I have not been brought into much personal communication with the occupiers, except those in the immediate locality near Dublin; but as far as I can learn from the landed proprietors of the country, their agents, and the constabulary themselves, I believe those prejudices are gradually dying away, and that each year they will diminish, unless some unforeseen difficulties arise.

A few years later Larcom, by then Undersecretary at Dublin Castle, told George Cornewall Lewis that the opposition of "a few jealous and crotchety people" had never been a great obstacle. But others expressed their doubts about the accuracy of the returns in the early years. Even Larcom, their proud architect, confided in 1848 that "the rates of produce must for a long time to come be a mere matter of opinion in Ireland, where so few take the trouble to record the produce of their farms." The Irish Farmers' Gazette ridiculed certain aspects of the 1850 crop returns, and as late as 1855, Sir Richard Griffith wrote of complaints reaching him of "the carelessness and inaccuracy of the police in giving their statements relating to the crops". Some improvement in the numbers over time is thus plausible. Even if close attention

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2"The number who are recusant", he continued, "are now reduced to two individuals in all Ireland! one a noble lord in a northern county who is not so admired as to make his example contagious, but the reverse". The 'noble lord' was Lord Leitrim. This and the other evidence in this paragraph are taken from N.L.I. Mss. 7743-4 (Thomas Larcom Papers).

3The point about crops is also hinted at by Sir R. Ferguson before the Lords' Select Committee (House of Lords, Q. 395). See too Donnelly to Larcom, 25 June 1855 (N.L.I. Ms. 7744).
to the ordnance survey maps meant that coverage of holdings was total or nearly so from the outset, that is not the same thing as accurate reporting of all acreage, yield, and livestock numbers. Nor is the evidence for improvement qualitative and indirect only; there are some hints of better coverage of acreages and livestock in the early agricultural statistics themselves.

(i) The increases in livestock numbers recorded between 1847 and 1853 were very substantial. Table 1 reports the numbers of cattle, sheep, and pigs enumerated in Connacht in this period; later data are not comparable because the data were collected earlier in the year (June versus September).

<table>
<thead>
<tr>
<th>Year</th>
<th>Cattle</th>
<th>Sheep</th>
<th>Pigs</th>
</tr>
</thead>
<tbody>
<tr>
<td>1847</td>
<td>357402</td>
<td>595737</td>
<td>44473</td>
</tr>
<tr>
<td>1848</td>
<td>361613</td>
<td>471205</td>
<td>56625</td>
</tr>
<tr>
<td>1849</td>
<td>391778</td>
<td>421874</td>
<td>72301</td>
</tr>
<tr>
<td>1850</td>
<td>437985</td>
<td>492612</td>
<td>83450</td>
</tr>
<tr>
<td>1851</td>
<td>472613</td>
<td>578038</td>
<td>114649</td>
</tr>
<tr>
<td>1852</td>
<td>507472</td>
<td>715049</td>
<td>123252</td>
</tr>
<tr>
<td>1853</td>
<td>555691</td>
<td>878937</td>
<td>143589</td>
</tr>
</tbody>
</table>

Percentage Rise 1847-53

Some increase in livestock numbers is to be expected, but these increases look suspiciously large, larger than any occurring over any later seven-year period. In aggregate, the rise in the value of livestock in constant prices between 1847 and 1853 was about thirty percent (here using 'official' 1841 prices), and would have required an investment in livestock alone of ten percent of farm output annually.

Overall, the reported acreage under crops also rose between 1847 and 1853, but this is accounted for by a big increase in the potato acreage from its trough in 1847. Individual county data suggest some anomalies, however. In Mayo, for instance, the acreage under crops leaped by almost
half in 1847-1853, and the cultivated acreage per farmer on farms exceeding an acre rose - this in a period when the agricultural labour force was drastically cut - from 2.4 to 5.4 acres.

(ii) The livestock data also provide some further circumstantial evidence for an improvement in coverage. Typically the number of animals aged less than one year in year $t$ was considerably less than the number aged between one and two years in year $t+1$. The problem is highlighted in the west, where the data in the early years are most likely to have been deficient. For example, in Connacht the ratio of one-year old pigs counted in 1848 to pigs less than one-year in 1847 was 1.25. The ratio dropped steadily thereafter to 0.78 in 1852-3, a pattern consistent with improving coverage over time. The following summarizes the relevant data in the case of County Mayo cattle:

<table>
<thead>
<tr>
<th>Year $t$</th>
<th>Cattle One Year and Under Two in Year $t$</th>
<th>Cattle Under One Year in Year $t-1$</th>
</tr>
</thead>
<tbody>
<tr>
<td>1848</td>
<td>12878</td>
<td>14503</td>
</tr>
<tr>
<td>1849</td>
<td>16173</td>
<td>9869</td>
</tr>
<tr>
<td>1850</td>
<td>23953</td>
<td>14478</td>
</tr>
<tr>
<td>1851</td>
<td>27519</td>
<td>17218</td>
</tr>
<tr>
<td>1852</td>
<td>35237</td>
<td>19775</td>
</tr>
<tr>
<td>1853</td>
<td>34231</td>
<td>22441</td>
</tr>
</tbody>
</table>

Here again, except in 1847-48, large numbers of one-year old animals appear out of nowhere each year, though in this case the ratio of older to younger cattle shows no pattern over time. The conjecture that the 'missing' calves were imported from elsewhere in Ireland cannot be sustained. Besides betokening an unsuspected (and surely implausible) degree of regional specialization in the cattle trade at this stage, it would imply 'missing' older animals elsewhere. In any case, for all-Ireland the ratios are:
### Year Cattle Pigs Sheep
---
1848  (0.94) (0.93)  (3.15)
1849  (1.15) (1.06)  (3.07)
1850  1.24  0.73  3.72
1851  1.17  0.66  3.20
1852  1.17  0.62  3.34
1853  1.16  0.61  3.20

Note: figures in brackets are based on 29 of 32 counties only.

(iii) There is little support in the trade data calculated by Peter Solar for the reported rises in livestock stocks. Table 2 juxtaposes Solar's estimates of aggregate beef exports (in thousand live animal equivalents) and the annual enumerations. Clearly the rise in stocks was not matched by a rise in exports.

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### Table 2: CATTLE NUMBERS AND CATTLE EXPORTS 1845-1853

<table>
<thead>
<tr>
<th>Year</th>
<th>Cattle Exports</th>
<th>Cattle Enumerated</th>
<th>Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>1845</td>
<td>125.7</td>
<td>n.a.</td>
<td>n.a.</td>
</tr>
<tr>
<td>1846</td>
<td>200.7</td>
<td>n.a.</td>
<td>n.a.</td>
</tr>
<tr>
<td>1847</td>
<td>205.7</td>
<td>2591</td>
<td>0.079</td>
</tr>
<tr>
<td>1848</td>
<td>209.7</td>
<td>(2680)</td>
<td>(0.078)</td>
</tr>
<tr>
<td>1849</td>
<td>219.9</td>
<td>2771</td>
<td>0.079</td>
</tr>
<tr>
<td>1850</td>
<td>193.8</td>
<td>2918</td>
<td>0.066</td>
</tr>
<tr>
<td>1851</td>
<td>190.5</td>
<td>2967</td>
<td>0.064</td>
</tr>
<tr>
<td>1852</td>
<td>211.5</td>
<td>3095</td>
<td>0.068</td>
</tr>
<tr>
<td>1853</td>
<td>195.4</td>
<td>3383</td>
<td>0.058</td>
</tr>
</tbody>
</table>

Increase 1847-53 - 5 31 (percent)

(iv) THE TURF QUESTION:

"Dá mbeadh trí fátaí is móin againn, bheadh an saol ar a thóin againn". An Irish proverb

There is a further reason for adjusting recent estimates of pre-famine output upward. The abject material poverty of a majority of the population before the Famine has been well documented. However, it was mitigated by two factors: the abundance (usually) of cheap food and cheap fuel. Nineteenth-century discussions about Irish bogs usually concentrated on their potential for reclamation or industrial fuel (e.g. Kane, 1845: ch. 2), making it easy to forget that probably about a million families relied on them for fuel on the eve of the Famine. Turf production was an important part of the work-year: between cutting, drying, harvesting and drawing a labourer's annual supply required up to one month's work. Like the potato, the bulk of the turf harvest was not marketed.

Turf varied considerably in quality and access, but the information needed for a rough estimate of the value of output is available in the Poor Inquiry Report (B.P.P. 1836). The report's appendix on 'cottages and cabins' contains a great deal of the following from throughout the island:

(Sligo): It would be a very poor cabin that would not burn 100 barrels in the year, and those, if bought, would cost 15s or £1, and would take a man at least a fortnight to cut for himself, and together with the help of his wife and children in drying it.

(Clonlisk, Offaly): To an ordinary farmer the saving of his year's fuel would cost about £2 10s., and the expense of drawing it home depends on the distance.

(Dundalk, Louth): The cost of fuel depends entirely on the distance from Dundalk for coal, and from the bogs for turf; if near to either, it may cost the ordinary farmer from £4 to £5 a-year.

(Portnehinch, Laois): The expenses, in an average case, will be, perhaps, about £1 10s.

(Talbotstown, Wicklow): To an ordinary farmer the cost of fuel may be about £5 annually, besides
drawing, which at the average distance from the
bogs, may be estimated at about as much more.

(Middlethird, Waterford): A farmer of twenty
acres burns about fifty kishes of turf in the year,
together with furze. The expense of drawing it home,
labour etc. is about 1s. 6d. a kish, which makes the
expense of fuel about £4 5s.

(Aughrim, Galway): the bogs are plentiful enough,
but I may say that they are closed against the poor,
for turf is set at from 6s. to 8s. a perch, and
three perches are little enough for any cabin.

The price and quantity consumed of turf varied widely
across regions and by farm size. My own assessment of the
evidence is that a rather conservative estimate of the average
cost per household would be about two pounds per family.4
Assuming a turf-using population of about five million, or one
million households, yields an estimate of £2 million in
aggregate, or about five percent of total agricultural output.
There is good reason for adding this sum to previous farm
output estimates, since the input into turf production was
farm labour and the output constituted net value added in the
conventional sense.

If the early official data are indeed under-enumerations,
this has a few straightforward implications for our
understanding of pre-famine Irish agriculture. First,
aggregate output in 1845 was somewhat higher - Table 3 implies
by about ten percent - than indicated by estimates that follow
1847 too faithfully (Ó Gráda, 1988, ch. 2; Solar, 1987, ch.
9). Not that this makes Irish agriculture seem markedly less
backward relative to English than existing estimates. However,
the narrow lead awarded by Solar and Goossens (1989) to
Belgian agriculture over Irish at this juncture may be
vulnerable. Solar and Goossens put the ratio of Irish to
Belgian output per worker at between 81 percent (using Irish

4The Halls (1845: vol. 2, 261-8) and Anon. (1855) are good
contemporary sources on the turf harvest. My thanks to Peter
Solar for the second reference.
prices and 102 percent (using Belgian prices); their estimate of the ratio of total factor productivity is between 74-79 percent (at Irish prices) and 93-98 percent (at Belgian prices).

Second, Austin Bourke's pioneering estimates of Irish crop acreages on the eve of the Famine (1965: Appendix 4) have been deemed too high by Solar (1987: ch. 9). But if the official 1847 data are indeed underestimates, then on Solar's own logic Bourke's figures must be nearer the truth than Solar concedes. Third, measurements of output and productivity change during the period straddling the Great Famine (Ó Gráda, 1988: ch. 3; Solar, 1987: ch. 9) need to be reassessed.

Table 3 : Irish Agricultural Output c. 1845

<table>
<thead>
<tr>
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<th>£ million</th>
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<tr>
<td>Irish Output (Ó Gráda, 1988)</td>
<td>40-43</td>
</tr>
<tr>
<td>Irish Output (Solar, 1987)</td>
<td>39.3</td>
</tr>
<tr>
<td>British Output</td>
<td>120-130</td>
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</tbody>
</table>

Suggested Adjustments:

<p>| | |</p>
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<tr>
<td>Turf</td>
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<tr>
<td>Under-estimate</td>
<td>2-4</td>
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</table>

Source: see text

II

2. PRE-FAMINE AGRICULTURAL TRENDS:

In Part 1, I suggested that fallible official data mean that recent assessments of agricultural output on the eve of the Great Famine, and of the output change caused by the Famine, require some re-examination. What of preceding decades, with no such data to rely on? Elsewhere, I have argued from the rise in population (from 5 to 8.5 million) and in agricultural exports that a significant rise in output is
likely between the Union and the Great Famine. Solar's index of agricultural exports at constant southern prices rises from 27.1 in 1796-1800 to 102.5 in 1841-5 (Solar, 1987: 243-4). If Ireland provided food for 1.5 million people in Britain on the eve of the Famine (Thomas, 1985), then this means that its exports c. 1800 fed perhaps at most 0.5 million. But the link drawn between Irish population growth and food consumption must be very tentative, since so little is known about the trend in aggregate living standards in Ireland before the Famine. Though a drop in the living standards of the poor before the Famine is hardly in doubt, others were probably improving their lot (Mokyr and Ó Gráda, 1988). The net effect on food consumption is unclear. Assuming a ten percent reduction in the value of food consumption per head between Union and Famine would imply roughly a doubling of output; a twenty percent reduction, an eighty percent increase (Ó Gráda, 1988: ch. 2).

Perhaps such increases are too high. In his recent dissertation, Peter Solar (1987) presents a powerful case for believing that agricultural output grew slowly between the Union and the Famine. Decelerating growth on the eve of the Famine is an important part of the story. Solar bases the case for deceleration mainly on his own newly-created trade data (Solar, 1987: Appendix Table 6.7). The volume index of exports based on southern prices using 1840-5 weights, converted to logarithms, is graphed in Figure 1. 'Eyeballing' graphs can be misleading. Still, though exports more than quadrupled between Union and Famine and Solar's series reaches its maximum in 1845, the impression given is of decelerating growth, particularly after 1830 or so. However, the data are subject to considerable year-to-year and short-run variation. How does this affect their forecasting power? Table 4 reports the results of a simple test of the data's predictive power and parameter stability, based on a time-series regression equation. The equation estimated is:

\[
\text{EXPORTS} = a_0 + a_1T^2 + a_2T^3 + a_3\text{EXPORTS}(-1)
\]
Regressions were run first for two periods, 1805-1845 and 1815-1845, and then for sub-periods ending at 1843 and 1839 in order to test for the predictive power of the estimated equations. Initially a simple time trend was also included, but since this added nothing to the explanatory power of the regression, it was dropped.

The data hardly permit the statistical inference that growth was coming to a halt. The standard tests statistics, the LM and Chow-test chi-square values, are generally high enough to reject the hypotheses of parameter stability or predictive worth.\(^5\)

Obviously, the estimated equations do not deny deceleration. Indeed, some deceleration is to be expected, if only because the growth in labour input was falling off in the 1830s, particularly in the richer though less intensely-cultivated east. But this is not quite the same thing as the beckoning of a stationary state. A further complicating factor, merely noted here, is bad weather. At least part of the apparent falling-off in output growth from the mid-1830s and in particular the dip in output after 1836 may have been due to a series of particularly bad harvests. The point would repay further study; the effect of weather on the different crops is complex, and direct evidence on crop size impressionistic. Still, Sir William Wilde painted a very bleak picture of the weather and harvests in the late 1830s in his account in the 1851 census, and he was supported in this by the Poor Law Commissioners who, reporting on the poor state of the harvest in 1841, added that "it had been nearly the same for the two or three previous years". Solar's distillation of harvest reports in the Waterford Mirror and the Northern Whig (Solar, 1988) is not inconsistent with this either; simple unweighted averages of his results across all crops are

\(^5\)Estimating a regression without the lagged endogenous variable but correcting for serial autocorrelation produces a comparable result. The parameters estimated for 1801-1840 significantly underpredict the outcome in 1843-45.
consistently lower in 1835-9 than in 1830-4. I suspect that exports, being the surplus available after seed and home consumption (animal and human) requirements had been catered for, were more sensitive to the state of the harvest than overall output. In sum, had the weather in these years not been particularly bad, there might have been no apparent deceleration in the series in the 1830s.
<table>
<thead>
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<th></th>
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<th>(iii)</th>
<th>(iv)</th>
<th>(v)</th>
<th>(vi)</th>
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<tr>
<td>$a_0$</td>
<td>237.35</td>
<td>225.89</td>
<td>206.54</td>
<td>245.76</td>
<td>224.43</td>
<td>179.39</td>
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<td></td>
<td>(3.58)</td>
<td>(3.58)</td>
<td>(2.93)</td>
<td>(3.13)</td>
<td>(3.12)</td>
<td>(2.11)</td>
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<tr>
<td>$a_1$</td>
<td>0.565</td>
<td>0.631</td>
<td>0.667</td>
<td>0.921</td>
<td>1.151</td>
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<td></td>
<td>(2.42)</td>
<td>(2.62)</td>
<td>(2.77)</td>
<td>(2.91)</td>
<td>(3.47)</td>
<td>(3.84)</td>
</tr>
<tr>
<td>$a_2$</td>
<td>-0.009</td>
<td>-0.011</td>
<td>-0.013</td>
<td>-0.162</td>
<td>-0.222</td>
<td>-0.261</td>
</tr>
<tr>
<td></td>
<td>(-1.96)</td>
<td>(-2.23)</td>
<td>(-2.42)</td>
<td>(-2.54)</td>
<td>(-3.16)</td>
<td>(-3.52)</td>
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<tr>
<td>$a_3$</td>
<td>0.487</td>
<td>0.498</td>
<td>0.532</td>
<td>0.347</td>
<td>0.326</td>
<td>0.381</td>
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<tr>
<td></td>
<td>(3.16)</td>
<td>(3.36)</td>
<td>(3.31)</td>
<td>(1.92)</td>
<td>(1.92)</td>
<td>(2.09)</td>
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<td>763.9</td>
<td>747.2</td>
<td>727.4</td>
<td>829.8</td>
<td>813.0</td>
<td>794.7</td>
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<td>SER</td>
<td>67.4</td>
<td>63.6</td>
<td>62.9</td>
<td>59.3</td>
<td>63.3</td>
<td>61.2</td>
</tr>
<tr>
<td>$F$</td>
<td>132.94</td>
<td>132.7</td>
<td>121.0</td>
<td>73.8</td>
<td>79.4</td>
<td>77.5</td>
</tr>
<tr>
<td></td>
<td>(3.36)</td>
<td>(3.34)</td>
<td>(3.31)</td>
<td>(3.28)</td>
<td>(3.26)</td>
<td>(3.23)</td>
</tr>
<tr>
<td>LM-test</td>
<td>1.06</td>
<td>0.12</td>
<td>0.00</td>
<td>0.29</td>
<td>1.17</td>
<td>2.37</td>
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<td></td>
<td>[5.99]</td>
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<tr>
<td>PP-test</td>
<td>6.44</td>
<td>10.28</td>
<td>-</td>
<td>7.88</td>
<td>13.33</td>
<td></td>
</tr>
<tr>
<td></td>
<td>[5.99]</td>
<td>[11.07]</td>
<td>[5.99]</td>
<td>[5.99]</td>
<td>[11.01]</td>
<td></td>
</tr>
<tr>
<td>n(PS)</td>
<td>2</td>
<td>5</td>
<td>-</td>
<td>2</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Chow-test</td>
<td>--</td>
<td>10.08</td>
<td>-</td>
<td>--</td>
<td>13.25</td>
<td></td>
</tr>
<tr>
<td></td>
<td>[9.49]</td>
<td></td>
<td></td>
<td></td>
<td>[9.49]</td>
<td></td>
</tr>
<tr>
<td>obs</td>
<td>1806-45</td>
<td>1806-44</td>
<td>1806-41</td>
<td>1814-45</td>
<td>1814-43</td>
<td>1814-41</td>
</tr>
</tbody>
</table>

Note: LM, PP, and Chow-test are the tests for second-order serial autocorrelation, predictive performance, and parameter stability given in Pesaran and Pesaran, *Data-fit* (Oxford, 1987). The five percent significance levels for the appropriate degrees of freedom - n(PS) in the case of the PS test - are given in squared brackets. YBAR is the mean value of the dependant variable, SER the standard error of the regression.
There is the Ireland of the North, where the land is, comparatively speaking, poor land and the climate cold, where the farmers are shrewd, intelligent men, who have made the most of their circumstances. The farms are trim and well kept. The land is well tilled. There is an air of prosperity about the country. There is the Ireland of the South, where the land is better and the climate milder, and the people, possibly to some extent because nature has done so much for them, less energetic; where the steadings are ill-kept and the land badly tilled, and waste and neglect are much in evidence.

[John Sinclair], 1906.

Sinclair's statement, on behalf of a group of Scottish farmers who toured Ireland in 1906, reflects a common and enduring perception. In the past, this presumed Northern edge was linked to the alleged advantages of its tenurial system. By allowing farmers considerable discretion in disposing of their investment in the land, the Ulster variant of landlordism was supposed to have provided the economic advantages of peasant proprietorship, which southern farmers lacked before the end of the nineteenth century. Ulster farmers were accordingly considered more progressive and more mobile.

This traditional interpretation of Ulster superiority is no longer widely accepted. The association between tenant right and improvement across Ulster turns out to be by no means clearcut; the case of County Donegal, much of it agriculturally backward though faithfully observing Ulster Custom, has been stressed by Solow (1971: ch. 1), and E.H. Steele (1970: 19-21) has shown that 'Ulster custom' was somewhat of a misnomer, at least in the nineteenth century, since tenant right was a good deal more widespread by then than the name implies. Nor can the existence of the considerable capitalised sum obtained by farmers on ceding their tenancies really be put down to investment: rather, it

---

This section is based on the early parts of Ó Gráda (1989).
suggests that landlords could not (or, less likely, would not) exact their full Ricardian rents (Vaughan, 1984: 20).

A further problem is definitional. The 'Ulster' implied by some accounts is the Northern Ireland component of the United Kingdom, which excludes Counties Cavan, Donegal and Monaghan. Here we allow the six-county political unit to determine the discussion.

The trends in potato and oat yields in the two Irelands from the mid-nineteenth century on, derived from the official statistics discussed earlier, address this question but fail to provide a clearcut answer. Potatoes and oats were chosen because both were widely cultivated in both Irelands throughout the period. The trend in cattle and sheep densities per acre since 1850 permit no strong inferences, either: but tillage would seem to have done better in the South after 1921 relative to earlier, pasture in the North. Unfortunately for the South, tillage accounted for a small and generally declining share of output in the two Irelands (O Grada, 1989).

The earliest official estimates of Irish agricultural output date from 1908 and 1912. A recent study by O'Connor and Guimard (1985) uses the second set of estimates to calculate Southern output, allowing us to evaluate output and labour productivity growth North and South between 1912 and the mid-1920s. The result - Table 5 - also includes data for 1938. The comparison required certain adjustments to the raw data. We return to the problem of bog peat or turf, a major item in Irish farmers' output. Although as long ago as 1636 coal was supposed to be "almost the only material used for firing along

7It should be noted that the 1908 and 1912 estimates are not entirely consistent. In particular, the gap in the output of dairy products is far greater than could be explained by the (small) difference between the size of the dairy herds in the two years. The valuation put on potatoes was twice as high in 1912 as in 1908. Though I have used the earlier estimate in other work (see also Solow, 1971: 171-4), here I follow O'Connor and Guimard (1985) is using the 1912 estimate.

8I am grateful to Robert O'Connor for providing me with his worksheets and related material.
this coast all the winter from Knockfergus to Youghal", a 1918 survey found that on nearly two-thirds of farmsteads turf was the sole fuel (Purcell, 1920: 12).

It might be argued that turf should be excluded because it is non-reproducible, except in the very long run. Yet national accounts everywhere include marine, forest and mineral products, regardless of resource depletion considerations. Semantics aside, excluding turf would badly distort North-South labour-productivity comparisons. Yet neither the 1908 nor the 1912 estimate allowed for it. The first to do so was the official estimate for the South in 1926, which put turf output at 5.9 million tons, worth over £6 million, or almost ten percent of total gross value added (Statistical Abstract, 1931: 48). That estimate relied in part on a 1918 inquiry (Commission of Inquiry, 1921; see also Purcell, 1918). However, subsequent estimates of Southern turf production were more conservative: output was put at 3.6 million tons in 1929 and at 3.3 million in 1939 (Statistical Abstract, 1942: 70). The estimates in Table 5 assume, first, that the South produced nine-tenths of all turf throughout; Northern output has been adjusted accordingly. Second, O'Connor and Guilomard's 1926 estimate is used instead of the higher official figure. Third, the turf price implicit in O'Connor and Guilomard's 1912 estimate - £0.85 per ton at a time when the wholesale price of coal, with more than twice

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11 A 1920 study (D.A.T.I., 1920) estimated turf output per worker at 130 tons per man-year, implying that output in the mid-1920s employed nearly thirty thousand men.
the calorific power, was less than that\textsuperscript{12} - seems implausibly high. Fourth, however, O'Connor and Guimard's volume estimate (3.9 million tons) is probably conservative. The value of turf output used here, £3 million, is a compromise. A separate problem concerns the agricultural labour force in Northern Ireland in the late 1930s. The figure used in Table 5 relates the index in Isles and Cuthbert (1957: 61) to official post-war data.

The comparison produces an unexpected result: evaluating output in both areas at domestic prices, agricultural output per worker was slightly higher in the South in both 1912 and 1926.) The result is perhaps less surprising when the smaller average farm size in the North is remembered. In 1911 seventy-six percent of Ulster farms were less than thirty acres, compared to sixty-four percent in the other three provinces (see Kennedy, 1985: 20-1).

Though no formal calculation is attempted here, the South's advantage hardly stemmed from a greater endowment of physical capital. The difference in buildings and outhouses may have been trivial - their rateable value per worker seems to have been about £10 per male worker both North and South\textsuperscript{13} - but the agricultural census of 1908 implies that Northern farmers had considerably more machinery at their disposal. The North's share of the all-Ireland male labour force then was about 22 percent, but the North contained 30.2 percent of all steam- or gas-engines, 71.6 percent of horse-sprayers, 70.7 percent of threshing-mills, 38.5 percent of cultivators and grubbers, 26.2 percent of ploughs, 40.8 percent of drill-ploughs, and 25.1 percent of reapers and mowers (D.A.T.I.

\textsuperscript{12}The average price listed for imported coal in Department of Agriculture and Technical Instruction, Report on the Trade in Imports and Exports at Irish Ports (Dublin, 1911-13) was £0.65 per ton.

\textsuperscript{13}The 1911 census of population (Table 164) provides the basis for an estimate of the value of farm buildings and outhouses by county, using Griffith's valuation. The outcome is an aggregate figure of £2.1 million for the North and £7.3 million for the South.
The gap widened between North and South seems to have widened between 1912 and 1926, but during the subsequent decade or so the South lost most or all of its advantage. But since (see below) Southern food prices had been driven about ten percent below Northern during the 1930s, it is likely that the South maintained its advantage in volume terms even then. Excluding turf revises the story somewhat: the South maintains its edge up to the 1920s, but may well have lost it by the 1930s.

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14In the 1920s about one-third of the gap is explained by the very low price put on potato output in Northern Ireland. Adjusting for this (on which more later), output per worker in the North would have been £81.
Table 5: AGRICULTURAL OUTPUT NORTH AND SOUTH, 1912, 1925-6 AND 1938-9

<table>
<thead>
<tr>
<th></th>
<th>All-Ireland</th>
<th>26 Cos.</th>
<th>6 Cos.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(in £ million)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>A. 1912:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Livestock</td>
<td>45.2</td>
<td>37.2</td>
<td>8.0</td>
</tr>
<tr>
<td>Crops</td>
<td>14.9</td>
<td>10.1</td>
<td>4.8</td>
</tr>
<tr>
<td>Total</td>
<td>59.1</td>
<td>47.3</td>
<td>12.8</td>
</tr>
<tr>
<td>Labour Force (m.)</td>
<td>0.977</td>
<td>0.765</td>
<td>0.212</td>
</tr>
<tr>
<td>Output per Worker (£)</td>
<td>60</td>
<td>62</td>
<td>60</td>
</tr>
<tr>
<td>B. 1925/6</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Livestock</td>
<td>60.2</td>
<td>48.4</td>
<td>11.8</td>
</tr>
<tr>
<td>Crops</td>
<td>14.3</td>
<td>11.1</td>
<td>3.2</td>
</tr>
<tr>
<td>Total</td>
<td>74.5</td>
<td>59.6</td>
<td>15.0</td>
</tr>
<tr>
<td>Labour Force (m.)</td>
<td>0.847</td>
<td>0.648</td>
<td>0.199</td>
</tr>
<tr>
<td>Output per Worker (£)</td>
<td>88</td>
<td>92</td>
<td>75</td>
</tr>
<tr>
<td>C. 1938/9</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Livestock</td>
<td>52.0</td>
<td>38.9</td>
<td>13.0</td>
</tr>
<tr>
<td>Crops</td>
<td>15.1</td>
<td>13.0</td>
<td>2.2</td>
</tr>
<tr>
<td>Total</td>
<td>67.1</td>
<td>51.9</td>
<td>15.2</td>
</tr>
<tr>
<td>Labour (m.)</td>
<td>0.761</td>
<td>0.586</td>
<td>0.175</td>
</tr>
<tr>
<td>Output per Worker (£)</td>
<td>88</td>
<td>89</td>
<td>87</td>
</tr>
</tbody>
</table>

THE ECONOMIC WAR:

The mid-1930s marked the nadir of Southern Irish farmer welfare in the present century. The plunge in conacre or eleven-month rents, a sensitive indicator of farmer expectations, tells the story. Conacre rents in the Limerick area fell from nearly two pounds per acre in 1930-2 to just
over a pound in 1934-5 (Nunan, 1987: 69). The worldwide downturn in agricultural prices after 1929 was blow enough, but far more serious from the farmers' standpoint was the Anglo-Irish 'Economic War' which lasted from 1932 to 1938. This dispute was sparked off by the refusal of the newly-elected Fianna Fail administration to transfer to London certain payments worth £5 million annually, payments made without demur by its predecessor. Westminster countered by recouping the money through special duties on Irish exports. The effect of this policy is captured in agricultural output data:

<table>
<thead>
<tr>
<th>Year</th>
<th>(1) 26-County Prices</th>
<th>(2) 6-County Prices</th>
<th>Price Ratio i.e. (2)/(1)</th>
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<tbody>
<tr>
<td>1926/7 (A) :</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Tillage</td>
<td>11.2</td>
<td>9.8</td>
<td>.875</td>
</tr>
<tr>
<td>Livestock</td>
<td>46.7</td>
<td>50.4</td>
<td>1.079</td>
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<tr>
<td>Total</td>
<td>57.9</td>
<td>60.2</td>
<td>1.039</td>
</tr>
<tr>
<td>1926/7 (B) :</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tillage</td>
<td>11.2</td>
<td>11.4</td>
<td>1.018</td>
</tr>
<tr>
<td>Total</td>
<td>57.9</td>
<td>61.8</td>
<td>1.067</td>
</tr>
<tr>
<td>1935/6 :</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Crops</td>
<td>11.6</td>
<td>11.2</td>
<td>.966</td>
</tr>
<tr>
<td>Livestock</td>
<td>30.9</td>
<td>37.2</td>
<td>1.204</td>
</tr>
<tr>
<td>Total</td>
<td>42.6</td>
<td>48.4</td>
<td>1.137</td>
</tr>
<tr>
<td>1948/9 :</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Crops</td>
<td>33.7</td>
<td>31.6</td>
<td>.938</td>
</tr>
<tr>
<td>Livestock</td>
<td>85.9</td>
<td>83.1</td>
<td>.967</td>
</tr>
<tr>
<td>Total</td>
<td>119.6</td>
<td>114.7</td>
<td>.959</td>
</tr>
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</table>

Source: calculated from official output data, using the implicit prices where possible. Otherwise (e.g. turf, 'other vegetables'), (2) was evaluated at Southern prices.
The above calculations are informal in the sense in that no attempt is made to correct for output quality differences. It implies that the South 'lost' about £6 million or ten percent of output value through lower prices in 1935/6, on the assumption that Northern prices would still have been available had there been no Economic War. The sum is close to the £5 million raised by the U.K. Treasury in special duties.

Another feature of Southern agriculture in the 1930s - the greater impact of the crisis on the livestock sector - is not fully reflected in the official output data. This is mainly due to the very low valuation put on potatoes in Northern Ireland in 1925/6: £2.7 per ton compared to £5.1 in the South. (The values used in 1935/6 were £3.8 and £3.4 per ton.) Valuing potatoes similarly North and South produces the outcome reported under 1925/6 (B). Note now the substantial rise in the tillage-to-livestock price ratio between the mid-1920s and mid-1930s.

While the £6 million represented a direct loss to Irish farmers, the loss to Ireland was not commensurate. Holding the annuities meant that the Dublin government could enjoy both higher revenue and lower taxation. Still, the British duties entailed a deadweight efficiency loss in farming (Neary and O Grada, 1986).

But did the anti-livestock distortion result in a further loss? In this period the agricultural labour force was declining both North and South; could the price shift towards (labour-intensive) tillage have placed the South at a relative disadvantage? This argument founders on an index number problem. But Joseph Johnston provided another reason in 1937 why a shift in the price of crops relative to livestock might reduce productivity. This argument has its origin in a statement in the Wealth of Nations about the consequences for Scottish agriculture of union with England:15

The price of butcher's meat ... and consequently cattle must gradually rise till it gets so high, that it becomes as profitable to employ the most fertile and best cultivated lands in raising food for them as for raising corn ... Till (the price of cattle) has got to this height, it seems scarce possible that the greater part, even of those lands which are capable of the highest cultivation, can be completely cultivated. In all farms too distant from any town to carry manure from it, that is, in the far greater part of those of every extensive country, the quantity of well-cultivated land must be in proportion to the quantity of manure which the farm itself produces; and this again must be in proportion to the quantity of cattle raised on it ... The increase of stock and the improvement of land are two events which must go hand in hand ... Of all the commercial advantages ... which Scotland has derived from the union with England, this rise in the price of cattle is perhaps the greatest.

If the Union benefitted Scotland by increasing the viability of livestock, according to Johnston Ireland suffered after 1932 for the opposite reason. The sharp rise in the ratio of tillage to livestock prices after 1932 brought structural dislocation. Hence "Adam Smith's contention is abundantly illustrated" (Johnston, 1937: 685). Now there is nothing automatic about this outcome, since world prices need not reflect the ratio of pasture to tillage prices required by resources and technology. However, perhaps the point is saved by noting that Ireland has long been "by nature counted a great soil of pasture",16 so that any price-shift towards tillage would have been injurious. In other words, until 1932/3 a free market in agricultural produce generated something closer to the near-constant ratio of grain to livestock prices required by technology. However, politics thereafter drove the ratio out of kilter, making Johnston conclude with the rather apocalyptic prediction of "a gradual but increasingly rapid decline of our national agriculture" (1937: 685; see also Johnston, 1934, 1951).

Hoffman and Mokyr (1984: 120, 124-5) have also applied this argument to Irish agriculture. In an era of relatively few tractors and less reliance on artificial fertilizers such as the 1930s, this characterization carries greater conviction than it would today. In the short-run the trade-off between livestock and grain outputs might be generous as with DD in Figure 2, but not so in the long run. Suppose the long-run trade-off is EE. In that case the shift from G induced by a shift in relative prices might be to H in the short-run, but to J (inside the original production possibility frontier) in the long run. Now while a plausible representation of what Adam Smith and Johnston seem to mean, the move implies a high degree of myopia on the part of government, if not of farmers.

No attempt to formally test the model will be made here. Note, however, that while the model may help explain the problems of the mid-1930s, it does not account for the subsequent poor performance of Southern agriculture.

![Figure 2](image)

**Figure 2**: Long- and short-run trade-off between Tillage and Pasture Sectors

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4. **THE RECORD SINCE 1960**:

Research on this period, particularly on the years since accession to the EEC, has been plentiful, but the verdict on relative North-South performance keeps changing.
In theory since both Irelands were subject to the Common Agricultural Policy, farmers should have faced a common price regime. In practice, the Southern government was much more willing (at least before EMS membership in 1979) than the Northern to avail of Green Pound devaluations, while Northern farmers benefitted from the Meat Industry Employment Scheme (1975-80) and Milk Aid (Norton, 1983; Stainer, 1987: 19).

Certainly a comparing labour productivity in 1969-71, on the eve of accession to the EC, and 1984-6 suggests a dramatic relative improvement in Southern performance: 17

<table>
<thead>
<tr>
<th>TABLE 7: Output per Worker, North and South 1969-71 and 1984-6</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
<tr>
<td>North</td>
</tr>
<tr>
<td>1. Net Output</td>
</tr>
<tr>
<td>2. Labour Force</td>
</tr>
<tr>
<td>3. 1/2 (Ir £)</td>
</tr>
</tbody>
</table>

Note: the subsidy element in 'net income arising from agriculture has been removed from the southern figures. In both cases, estimates of the male labour force only have been used. The 1984-6 estimate NI estimate has been converted to punts.

Several reasons have been given for the South's better performance since the 1960s: the less wasteful use of machinery in the South in the 1970s (Furness and Stainer, 1981), a delayed return in the 1980s on earlier machinery investment (Attwood and O'Sullivan, 1983/4), or the South's more favourable output mix (Spenser and Whittaker, 1986).

Output per worker is one of the most common measures of farm performance, but let us finally consider a more comprehensive measure of 'efficiency'. A comparison of total factor productivity growth is a preliminary to sorting out the various arguments. Boyle's productivity growth calculations for the South since the 1960s show healthy growth (over one percent) up to the late 1970s, and stagnation since then (Boyle, 1986, 1987). But so far there have been no measures of TFP performance in the North, though an official series is contemplated (Stainer, 1987). This paper eschews sophisticated measurements such as Boyle (1986), focusing instead on two indirect but simple ways of evaluating performance North and South in the last few decades or so. One standard means of comparing productivity is to estimate (2) for the areas being analyzed:

$$A^i = -p^i + a_i w^i.$$  

Here $A^i$ is productivity change in country $j$, $p$ is the proportionate change in an index of output prices, $w$ the proportionate change in input price $i$, and $a_i$ the factor share of $i$. Provided production technology is similar in the areas compared, some data requirements may be finessed. I offer tentative results using two approaches to measuring productivity change since the 1950s.

Let us first turn to trends in land prices North and South. The price of land is of particular interest, since unlike labour and fertilizers, land is immobile. Granted that Northern and Southern output were similar, and factor markets reasonably competitive, then most of any relative productivity gain in one area should accrue to the fixed factor, and that should be reflected in its price (compare McCloskey, 1972). In other words, if farmers remain in business, and yet can afford to pay progressively higher prices in one area relative to another, the most plausible reason must be their greater
efficiency.\textsuperscript{18}

The difference in productivity performance may be gauged by calculating $A^\text{North} - A^\text{South}$. Under a common price regime this would be approximated by $b(r^\text{North} - r^\text{South})$, where $r$ is the rate of change in the return on land, and $b$ rent's share of output. Unfortunately, the data here are not good. Rental data in time series are not available for the North. Land price data are available, though arguably they reflected anticipated more than past performance. Fortunately, the record in the South suggests that this is not such a problem. Nunan's analysis of the land market in the Limerick region since 1900 (1987: 55-7) shows that except for 1957-70, movements in the price of land mirrored closely those in rents. This is our justification for using land prices as a proxy for rent movements here. However, not even our land prices are beyond criticism. Northern Ireland boasts an official series stretching back to 1959, but the available Southern data are unofficial, and quite patchy before the late 1970s. (Nunan, 1987; Kelly, 1983).\textsuperscript{19} We must make do with what there is. Kelly (1983) provides a good series based on valuation office data from 1978. For earlier years I have relied on a simple average of Nunan's Limerick series, the Irish Land Commission series (reported by Nunan, 1987), and Kelly's pre-1978 data. All three series follow the same broad trends, but are subject to substantial year-to-year fluctuations. Since the I.L.C. generally paid a lower price for land, all were indexed at 100 in 1970. Official agricultural price indices are used, with one correction: in 1978-80 the Meat Industry Employment Scheme paid farmers about 21.5 percent of the Northern Ireland cattle reference price, effectively adding almost ten percent to Northern prices (Norton, 1984: 157).

Here we assume that $b$ is 0.2-0.3. The implied $A^\text{1}'s$ are given

\textsuperscript{18}In the short run, differences in expectations or credit availability could muddy the picture.

\textsuperscript{19}Kelly's 1983 series is brought forward to 1986 in the 'The Land Market in 1986', Information Update Series No. 26 (An Foras Taluntais, Dublin).
below. Note, however, that simply comparing land price movements amounts to assuming the same movement in output prices North and South. But policy toward Green Pound devaluations in the two Irelands differed. Moreover, output mix may have influenced output price movements differently North and South. In order to correct for the possibility that the movement in land prices was merely a reaction to different output price movements, and not different productivity movement, we must look at an index of land prices deflated by an index of output prices North and South, i.e. calculate:

\[ \lambda^N - \lambda^S = b(r_s - r_g) - (p_n - p_g) \] (3)

The result of doing so is given in Tables 8 and 9. Both over 1960-1985 and 1969/71-1983/5, productivity growth was greater in the North. However, the gap was quite narrow, and during the 1970s the South performed better by this measure.

Another, related approach would be to focus on the change over time in an index of real net output (i.e. after subtracting for transport, fertilizer, machinery and other intermediate inputs) relative to that in the farm labour force. More precisely,

\[ R = Q - g.L \] (4)

where Q is proportionate net output change, L the change in labour input, and g a factor weight. Netting out measurable inputs leaves something loosely comparable to the 'residual' in standard calculations.

The results are given in Table 10. The outcome confirms the earlier story of faster productivity gains in the South.
Table 8. Output and Land Prices in NI and RoI, c. 1960-1985 (percentage change per annum)

<table>
<thead>
<tr>
<th></th>
<th>South</th>
<th>North</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. 1959/61 - 1983/5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(a) Land Prices</td>
<td>15.8</td>
<td>12.4</td>
</tr>
<tr>
<td>(b) Output Prices</td>
<td>8.8</td>
<td>6.9</td>
</tr>
<tr>
<td>2. 1969/71-1983/5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(a) Land Prices</td>
<td>18.5</td>
<td>15.0</td>
</tr>
<tr>
<td>(b) Output Prices</td>
<td>12.7</td>
<td>11.3</td>
</tr>
<tr>
<td>(a) Land Prices</td>
<td>29.5</td>
<td>24.6</td>
</tr>
<tr>
<td>(b) Output Prices</td>
<td>16.4</td>
<td>16.5</td>
</tr>
</tbody>
</table>

Source: Southern land prices from Nunan (1987), Kelly (1983). Kelly’s valuation-derived data are used from 1978. The NI data sources for land values are given in Whitaker and Spencer (1986). The output prices are taken from Nunan (1987) and official NI sources. The 1978-80 Northern output price was adjusted upwards by the average MIES premium in those years (21.5 percent), weighted by the share of cattle and pigs in the agricultural price index (0.457).
Table 9: The Gap in Productivity Growth North and South, as Implied by Land Price Movements, 1960s-1980s

<table>
<thead>
<tr>
<th>Period</th>
<th>b = 0.2</th>
<th>b = 0.3</th>
</tr>
</thead>
<tbody>
<tr>
<td>1959/61-1983/5</td>
<td>1.2</td>
<td>0.9</td>
</tr>
<tr>
<td>1969/71-1983/85</td>
<td>0.7</td>
<td>0.4</td>
</tr>
<tr>
<td>1969/71-78/80</td>
<td>0.1</td>
<td>-0.4</td>
</tr>
</tbody>
</table>

Table 10: Annual growth rate of R (%)

<table>
<thead>
<tr>
<th>Period</th>
<th>South g = 0.4</th>
<th>South g = 0.6</th>
<th>North g = 0.3</th>
<th>North g = 0.6</th>
</tr>
</thead>
<tbody>
<tr>
<td>1956/8-1984/6</td>
<td>1.9</td>
<td>2.3</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>1956/8-1964/6</td>
<td>2.5</td>
<td>3.0</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>1964/6-1984/6</td>
<td>2.1</td>
<td>2.5</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>1970/2-1978/80</td>
<td>0.8</td>
<td>1.3</td>
<td>-0.3</td>
<td>0.3</td>
</tr>
<tr>
<td>1978/80-1984/6</td>
<td>4.4</td>
<td>5.1</td>
<td>0.3</td>
<td>0.5</td>
</tr>
</tbody>
</table>

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