# TENANCY AND AGRICULTURAL TECHNIQUES: EVIDENCE FROM THE 1882 COMMISSION

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Tenancy and Agricultural Techniques: Evidence from the 1882 Commission

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Introduction

In this paper I wish to examine the relationship between security of tenure and its effects on agricultural investment. I will be drawing on data from the 1882 Royal Commission in an attempt to provide quantitative evidence where there has previously been only speculation. I will begin by setting the scene and explaining how the controversy arises.

Chapter 1

Tenancy and farming methods in the late nineteenth century

In his paper "The Second Agricultural Revolution 1815-1880" F.M.L. Thompson advances the "proposition that there was not one single agricultural revolution but three, of which the second fell in the period 1815-1880."[1] He argues that the farm of the first revolution was basically a closed unit. The only regular input to the farm was seed and at the end of each season the farm would have produced some corn, meat and wool for sale at market. The farmer also operated an internal market for his goods. Each year he produced roots and clover that put the nitrogen back into the soil. He also grew food for his animals that powered the farm, provided meat and dairy products and valuable manure.

The farmer of the second agricultural revolution behaved more like a factory owner who purchased raw materials and used the farm to convert them into higher value goods. The farmer began buying manure and fertiliser and was less dependent on rotation crops for improving the quality of the soil. He also began buying feed for his livestock which freed some of his land for more

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[1]F.M.L. Thompson, 'The Second Agricultural Revolution, 1815-1880', *Economic History Review*, XXI, (1968), p63

profitable use and yet still gave him the valuable by-product - manure.

The third revolution involved the increased use of machinery and the heavy use of fertilisers.

This change towards the second agricultural revolution began with the increased use of bones as a fertiliser and oilseed cake as animal feed. Oilseed, such as linseed and rape seed was valued for its oil by both textiles and paint manufacturers. The oilseed cake was a by-product of this industry; it was what was left after the oil had been extracted from the seeds. The cake began the nineteenth century as a waste product used as cheap fuel and fertiliser until it became apparent that it made a very good animal feed. It had been claimed that there was no limit to the amount of cake that was profitable to feed cattle because oilseed manure was valued so highly.[2]

Demands on Capital

The change to a more intense system of farming gave higher yields but also required more capital from both the landlord and the tenant. The landlord needed to provide capital in the form of increased drainage and outbuildings to house both livestock and the stock of feed and fertiliser. However, an increasing proportion of the capital came from the tenant for the inputs to the farm amounting to a "substantial rise in the amount of tenant farmers' working capital."[3]

R. Perren, in his essay "The Landlord and Agricultural Transformation 1870-1900" said he saw increasing availability of oil cake from Europe and rising animal product prices as the key factors encouraging the production of

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[2]Thompson, 'Second Agricultural Revolution', p68

[3]Thompson, 'Second Agricultural Revolution', p65

livestock. Like Thompson, he believed that the more intensive farming required increased capital both from the tenant farmer and the landlord. The tenant needed more capital to buy in livestock and also for feedstuffs.[4] This was particularly true if the farmer practised stall or yard feeding where the proportion of feedstuffs in the diet was greatly increased.

For the farmer to make the transition to a 'commercialised' farm it was necessary to make some considerable investment. The more intensive farming was profitable because it gave higher output from the existing quantities of land. However, the investment in livestock, animal feed and fertiliser would last a number of years, for example, bones ploughed into the soil were said to last five years. Thompson estimates that between 1820-1880 tenants working capital rose by £50m or approximately £3 per acre. Even for a small farmer this investment is well over one year's income. Fortunately the transition from a closed circuit to a open circuit farm can be a smooth one where the total inputs purchased each year gradually rises as capital is accumulated.

Problem of Security

The problem was that the farmer had to be sure that he would reap the rewards of his investment. Even though the return on fertiliser and feed was a relatively short process, security of tenure was essential if the farmer was to invest in his land. According to Chambers and Mingay, this was a problem that was fully appreciated by agricultural writers as far back as 1774 when a long lease of 14 or 21 years was considered a good solution.[5] Chambers and Mingay also suggested that landlords may have helped farmers succeed "by the

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[4]R. Perren, 'The Landlord and Agricultural Transformation 1870-1900', in P.J. Perry, (ed), *'British Agriculture 1875-1914'*, p110

[5]J.D. Chambers and G.E. Mingay, *'The Agricultural Revolution 1750-1880'*, p46

provision of long leases"[6] Not all farmers had the security of a long lease but it seems obvious that farmers would be more likely to make improvements to their land if they felt certain of reaping advantage from them.[7] In a more recent debate between owner occupancy and tenant farming it was agreed that having longer leases would help remove the risk from tenants' investments: - "granting longer leases and ensuring compensation for unexhausted improvement would greatly mitigate the effects of uncertainty on tenants' investment decisions."[8]

Existence of Yearly Agreements

If leases were so good at removing risk from tenants' investments then we might expect all landlord tenant contracts to be long leases. This was not the case. The tripartite system had the tenant farmer as the main agent employing labourers and paying rent to the landlord. Prior to the second agricultural revolution it had worked well. When the tenant farmer fell on bad times, he would look to the landlord to reduce the rent and so many farmers were saved from financial ruin and the landlord was spared the inconvenience of finding a new tenant. In times of general depression rents fell across the country. This was done to maintain existing tenants and to attract new tenants to vacant farms. In hard times, it was not unheard-of for landlords to charge no rent at all because by keeping a farmer on the land the soil would be kept in good condition.[9] The landowner appreciated that his rents would need to fluctuate with the price of agricultural produce and the prosperity of his tenants. To

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[6]Ibid., p16

[7]Ibid., p165

[8]R. Gasson and B. Hill, '*Farm Tenure and Performance*',(1984), p17

[9]J.T. Coppock, 'Agricultural Changes in the Chilterns 1875-1900', in P.J. Perry (ed), '*British Agriculture 1875-1914*', p62

enable the regular review of rents, short contracts were favoured and these normally gave the tenant six months notice to quit. These short contracts were known as yearly agreements or tenancy from year to year. With only six months notice to quit the farmers did not have much security and we might expect these tenants to invest less than the lease holders. Investment in feed lasted at least one year, Thompson suggests that it would last at least two years. This is because the feed is consumed by livestock that might not be ready for market for another year or two. There are also secondary effects; the feed is converted into manure which would not be exhausted by the soil for some years. Some farmers valued oilseed manure more highly than the oilseed itself.[10] Fertilisers such as bones and superphosphate would last about five years so it is obvious that yearly agreements might lead to lower investment than lease holding.

Development of Tenant Right

The main argument against this hypothesis is the existence of something called the 'Lincolnshire tenant-right.' Having only light soil, Lincolnshire farmers were some of the first to use large quantities of fertiliser on a regular basis. The rapid growth of agricultural output between 1835-1850 was mainly due to an increased use of bones, which were ploughed into the soil, supplying nitrogen and phosphates which enabled light soils to yield heavy crops. The problem was that the effects of the bones lasted up to five years and so the people of Lincolnshire developed the tenant-right which was "a set of customary rules for compensating outgoing tenants for their unexhausted improvements."[11]

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[10]Thompson, 'Second Agricultural Revolution', p68

[11]Ibid., p68

The idea was that the tenant made an arrangement with his landlord to be compensated for any improvement he left behind. These agreements were supposed to remove the risk from investing in the land.

Chapter 2

Interpretations

A number of economic historians have put forward strong arguments to suggest that there were no problems with these tenancy arrangements. Firstly, they argue that tenant right covered any lack of security inherent in short contracts. Secondly, they observe that tenants with yearly agreements often resided on the same farm for many generations and thus expected to be resident for a number of years to come. Finally, it is argued that tenant farmers were free agents and if they felt that security of tenure was a problem they could negotiate a lease with their landlord.

Among those arguing in this direction are: Ó Gráda, Thompson and Chambers and Mingay. Ó Gráda says that lack of security did not stop farmers from improving their holdings because of the "widespread" systems of tenant right and the fact that farms often remained within a family for many years. He suggests that tenants who were concerned with the lack of security could have negotiated special terms in their contracts. He says that no evidence has ever been put forward to demonstrate a correlation between security and tenants outlay, and that replies to the Royal Commission of 1882 "imply" that those farmers without tenant right invested no less in lime and fertiliser than those with tenant right.[12]

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[12]C. Ó Gráda, 'Agricultural Decline, 1860-1914', in R. Floud and D. McCloskey,(eds.), *'Economic History in Britain since 1700'*, Vol. II, p187

Thompson felt that the informal institutional arrangements were sufficient and that the spread of compensation by tenant right meant that farmers were not discouraged from "enterprise".[13]

Chambers and Mingay seem to have an idyllic view of rural England. They write, that tenant farmers who held their land on yearly agreements trusted their landlord and seldom felt insecure. Their belief is based on a kind of gentleman's agreement that if you proved to be a good tenant then the landlord would leave you in possession of the land. As evidence for this they say that tenants often occupied the land for long periods and it was not uncommon for them to invest in improvements.[14]   However, later in the same book, Chambers and Mingay agree that greater security of tenure and compensation for unexhausted improvements would have encouraged better farming.[15]

Tenant Right

The first argument was that tenant right covered any lack of security. However, by their nature tenant right agreements were informal and depended on the farmer's trust in their landlord. Only a quantitative study can tell us how much security they really offered. Ó Gráda says himself that farmers without tenant right did not spend less on lime and fertiliser than those who had tenant right - therefore, conversely, having tenant right did not increase investment. Perhaps we might find that tenant right increased security but not by as much as a long lease.

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[13]Thompson, 'Second Agricultural Revolution', p72

[14]J.D. Chambers and G.E. Mingay, '*The Agricultural Revolution 1750-1880*', p46

[15]Ibid., p164

Secondly, those who have said that tenant right mitigated the problem of insecurity by becoming popular and widespread are forgetting that not all tenants were covered. Even if tenant right was removing the risks from investment, the benefits did not accrue to all farmers and as such these arrangements were not satisfactory. Security of tenure was one of the issues studied in the Royal Commission 1882, the background to which I will discuss later in the text. This is what the Assistant Commissioner found in his study of Southern County farms. He found that tenants security was heavily dependant on the honesty of the landlord.[16] In some regions the custom of tenant right was relatively rare and he felt that few landlord-tenant agreements recognised the tenant's investment in manure and feedstuffs.[17] Security of tenure was even a problem for the lease holder. Little believed that towards the end of his lease the farmer would have "little inducement" to manage the farm properly or to spend much time on the hay crop which would almost certainly be left behind if the lease was not renewed and the farmer left.[18] He felt that this was a common problem and that there were a "great number of farms" without the security that would encourage good farming towards the end of their leases.[19]

"A farmer occupying 600 acre under 14 years' lease, writes thus: 'Tenant-right? I have none, it's all on the landlord's side. My lease gives me no allowance for permanent improvement. ... I don't get a single penny, but I am bound by my lease to manure and crop and sow

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[16]Parliamentary Papers (here after called B.P.P.) 1882, XVI, p7

[17]Ibid., p8

[18]Ibid., p8

[19]Ibid., p8

seeds for the incomer free of cost to him' ... [Little writes] of this I am well convinced, that a lease such as he holds under cannot encourage him to farm well at the latter part of his term."[20]

Much of Commissioner Little's evidence is of this nature but it illustrates that not every farmer was happy with the situation as it was.

Length of Occupancy

The second argument was that long occupancy fostered trust in the landlord. This assumes that because a tenant has had the same landlord for years, he trusts him and feels certain about the future. However, this ignores the changes in the bargaining position brought about by an investment in the land. The farmer realises that when it comes to bargaining over next year's contract he will be in a worse position if the landlord knows that he has just invested a lot of money in fertiliser and feed. The farmer is open to exploitation by his landlord who can raise the rent by the amount equal to the farmer's expected loss if he is forced to leave. In such a situation the farmer would be indifferent to whether he should leave or stay and he would lose his investment in rent to the landlord. This scenario does not actually have to take place, all that is necessary is that the farmer realises that he is open to exploitation by the landlord and therefore does not make what would otherwise be a profitable investment.

A more subtle approach by the landlord would be to appropriate some of the gains from the investment and not frighten the farmer by stealing his stake. For example; in year one the tenant farmer invests £100 in fertiliser and feed which pays for itself in year two by increasing output by £110 after which we

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[20]Ibid., p19

assume the benefits are exhausted. This would amount to a ten percent return on working capital. The landlord could raise the rent in year two by £110 and appropriate the tenant's investment and return. The farmer would then be indifferent between staying or leaving, but he certainly won't invest in feed and fertiliser again. The alternative for the landlord would be to increase the rent in year two by perhaps £5. The farmer's return on investment then falls to five percent and as long as his return remains positive (above his cost of capital) he will continue to invest in subsequent years. The problem is that the landlord reduces the return on investment at all levels and this will result in investment below the social optimum.

The actual outcome was probably some combination of strategies with some landlords discouraging all investment, some appropriating some of the benefits of higher investment and others not even charging realistic rents. The problem would not be so acute for those farmers who had tenant right. If the landlord tried to appropriate their investment they could leave and have their compensation for unexhausted improvements. However, this does not stop the landlord from appropriating some of the benefits of the investment. If, however, Ó Gráda's theory is true, we would expect to find a correlation between length of occupancy and investment; the hypothesis being that long occupancy leads to security about the future and trust in the landlord and hence a more optimal rate of investment.

Product Prices
Finally, the third argument was that if tenants were free agents they could negotiate their own contracts. If security of tenure was such a problem then why were leases not the dominant form of contract? The reason for taking out a long contract was to fix the rent and remove any possibility for opportunism

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by the landlord. This had to be weighed against the advantages of a variable rent that could fall when times were hard and rise when times were good. This was valuable to both parties and removed many of the problems caused by changing product prices. The farmer who took a long lease was taking a risk on changing product prices which he did for the expected enhanced profits from his increased investment security. Whether or not the farmer chooses to take a lease will depend on his assessment of the two risks, investment and product price, and whether he wants to trade one for the other. We can see evidence for this if we compare the popularity of leases with farmers expectations of future prices. In his book "English Landed Society" F.M.L. Thompson notes how the popularity of leases declined after the Napoleonic wars and he says that tenants would not commit themselves all the while prices were falling. Apparently, it was almost impossible to find a tenant ready to take a lease and yet twenty years earlier most farmers had been trying to do so.[21] Thompson believes that the popularity of leases declined after the war and failed to recover for the rest of the century.[22] Mingay agrees and suggests that leases lost their popularity during the nineteenth century due to the "severe price fluctuations and periods of depression."[23]

Political Pressure

Finally, there were some contemporary commentators who believed that landlords were not granting leases for political reasons. Among these was Cobden, a campaigner against the Corn Laws. He believed that landlords

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[21]F.M.L. Thompson, *'English Landed Society in the Nineteenth Century'*, p230

[22]Ibid., p231

[23]G. Mingay, 'The Agricultural Revolution in English History: A Reconsideration', in W.E. Minchinton, (ed), *'Essays in Agrarian History'*, Vol. II, p16

refused to grant leases because the subsequent lack of security would force the farmers to vote with the landlords and thus retain the Corn Laws. According to Chambers and Mingay, this was an argument that was heard frequently during the nineteenth century.[24] Although this might be true it seems unlikely that it was of much importance in the latter half of the century when tenants were probably more reluctant to take on a lease than their landlords.

Current Economic Literature

There is a substantial body of literature on a subject known as transactions cost theory and contract design. In general the literature looks at the development of different contractual arrangements as a response to potential opportunistic behaviour by one party in a relationship. These contractual problems arise when a rational and opportunistic firm has an incentive to take advantage of a supplier who makes a transaction specific investment.

The example commonly used to illustrate the situation is that of a publisher and a printer. The publisher approaches the printer and arranges to print a regular newspaper in Greek. The printer makes a 'relationship specific investment' in a Greek printing press and then begins working for the publisher. However, a gap now exists between the value of the press in its first best use and its value to the next highest valuing leasee. That is to say that if the publisher decided to change to a different supplier the printer is left with an asset that is worth substantially less. He will have to pay to have it removed and perhaps shipped to a second hand buyer in Greece. Alternatively, he could try and find a new buyer for his services. This gap between first best use (i.e. selling his services to the publisher) and second best use (finding a new buyer or scrapping the

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[24]J.D. Chambers and G.E. Mingay, '*The Agricultural Revolution 1750-1880*', p160

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press) is called the quasi-rent. Knowing the printer's dilemma, the publisher can now offer a lower price for the services of the printing press and appropriate this quasi-rent.[25] If this problem is appreciated in advance then the specific nature of the asset could cause the printer not to invest in the press.

These kinds of problems are common when relationship specific investments are concerned and where contractual solutions can not be found they tend to lead to less than optimal investment.[26] For evidence of this Klien, Crawford and Alchian look to the motor industry.[27] Where competitive contracting still leaves appropriable rents they find that the supplier and the motor manufacturer tend to vertically integrate which internalises the quasi-rent. I believe that relationship between the nineteenth-century landlord and tenant is analogous; the tenant being open to opportunistic behaviour by the landlord and the quasi-rent is the investment in the land. This investment is relationship specific and its scrap value is zero if the landlord chooses to evict the tenant. The solution used in the motor industry was vertical integration of the supplier and the manufacturer. In this case, the analogous solution would be to integrate the landlord and tenant and create an owner occupier where the quasi-rent is internalised.

[25]K. Monteverde and D. Teece, 'Appropriable Rents and Quasi-Vertical Integration', *Journal of Law and Economics*, Vol. XXV, (Oct. 1982), p323

[26]J. Tirole, '*The Theory of Industrial Organisation*', (1990), p25

[27]B. Klein, R. Crawford, and A. Alchian, 'Vertical Integration, Appropriable Rents, and the Competitive Contracting Process', *Journal of Law and Economics*, (Oct. 1978)

However, Monteverde and Teece find another solution to the problem of asset specificity, by looking at the motor industry.[28] The solution here is something they call quasi-vertical integration. Motor manufacturers make sure that they own all the specialised equipment their suppliers use to make their components. Thus, if the suppliers tried to hold the manufacturers to ransom they could move the specialised equipment to new suppliers and avoid long delays. The objective is to minimise supplier switching costs. A similar solution could be applied to the tenant farmer problem although it is unclear which party is the supplier or manufacturer. The landlord would be required to pay for all feed and fertiliser at the beginning of the year and then the two parties would negotiate the rent. The farmer would have minimised the costs of switching to other suppliers of land. This would remove the possibility for opportunism and the two parties would negotiate a fair rent. This would result in optimal investment but might be a little inflexible.

Finally, Paul Joskow studied the relationship between contract duration and transaction specific investments in coal markets.[29] He found that long contracts are used in coal markets as a response to problems created by asset specificity. In particular, where power stations and coal mines are next to one another and interdependent they have long contracts, whereas, power stations that depend on a number of different mines tend to have shorter contracts. Obviously, in this situation, holders of long leases have greater security over their investments. Was this the case with tenant farmers?

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[28]Monteverde and Teece, 'Appropriable Rents and Quasi-Vertical Integration'

[29]P. Joskow, 'Contract Duration and Durable Transaction Specific Investments: The Case of Coal', *American Economic Review*, 77 (March 1987), p168-185

Summary

Thompson and Ó Gráda have other arguments that I will discuss later. However, their basic premise is that tenancy arrangements did not affect agricultural techniques and it is this hypothesis that I wish to examine. Of particular interest is whether having a lease led to greater annual consumption of feedstuff and fertiliser and hence investment. Also, were allowances for tenant right any substitute for a secure lease? One can also test the second line of argument that farmers who had occupied a farm for many years felt more secure about the future and hence invested more. We might expect to see a correlation between the length of occupancy and investment if the second argument were true.

Chapter 3

The Royal Commission 1882

Cormac Ó Gráda refers to "The replies to the questionnaire prepared by the Assistant Commissioner Little for the Royal Commission of 1880-1882." in his article Agricultural Decline 1860-1914[30]. He writes that by implication and suggestion the evidence supports his view that tenancy arrangements did not adversely affect agricultural techniques. I propose to use Commissioner Little's report, relying on more quantitative econometric techniques.

The title of the commission was the "Royal Commission on the Depressed State of the Agricultural Interest". The commission was called for in July 1879 by Mr H. Chaplin the owner of some 23,000 acres in Lincolnshire and agriculture's spokesman in the House of Commons. The assistant commissioners set about finding the causes of the depressed state by looking for falling profits, rising costs and reduced output.[31] In their search for the causes of the depression the assistants interviewed numerous farmers and effectively invited them to air their complaints.

> "much of their interrogation consisted in the kind of amicable discussion, with hearsay evidence prominent, of the weather, markets, taxes, yields, diseases and so on that is indulged in at all times among farmers, agents, merchants and others of the agricultural community when all participants share a common interest and expertise."[32]

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[30] Ó Gráda, 'Agricultural Decline, 1860-1914', p187

[31] T.W. Fletcher, 'Lancashire Livestock Farming During the Depression', in P.J. Perry, (ed), *'British Agriculture 1875-1914'*, p44

[32] Ibid

Having discussed almost every type of agricultural complaint the commission concluded that the immediate problem was the recent bad weather and that the new competition from abroad meant that prices no longer rose when output fell in a bad harvest. Among the complaints discussed was tenant right and the effects of security on investment. Assistant Commissioner William Little investigated the problem by asking a number of farmers to complete his questionnaire.

The replies to Mr Little's questionnaire are an invaluable source of economic data. One hundred and thirty-five farms responded to the questionnaire giving it a good sample size. The respondents are all from the southern counties of England stretching from Cornwall to Kent. Each farm was asked six questions that related to tenancy and agricultural investment. The farmers responded whether : Tenure was by lease or from year to year, Length of occupation, Covenants as to cropping and sale of produce, Allowances for tenant right, Artificial manures used, Feeding stuffs purchased. The farm size was recorded along with its county and district. Listed below is a transcript of the questions.

2. Upon what tenure do you own your farm-
   a) Upon lease?
   b) Under yearly agreement?
       Yearly or otherwise?
       With what length of notice to quit?
3. For how long has the farm been in the occupation of yourself or any member of your family?
4. What are the conditions and covenants upon which the farm is held in reference to-
   a) Cropping.

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b) The sale of produce (including hay, straw and roots).

23. What are your allowances for tenant right on quitting?

14. What quantity of artificial manures do you consume per annum on your farm?

15. What quantity of feeding stuffs?

The data was all contained within the report. The answers needed to be quantified if the data was to be used in an econometric model. The existence of a lease was represented by a 1 or 0 for a dummy variable. The duration of the lease was recorded in years. The total length of notice was used in the case of year to year agreements. The length of family occupation on the farm was recorded in years. A dummy variable called OFFLAND showed whether the tenant was entitled to sell hay and roots off the farm. Ones and noughts were used to indicate whether the tenant felt he had allowances for tenant right on quitting. The quantities of manures and feedstuffs were quantified. It was thought best to use the cost of these goods instead of tons of nitrogen or calorific value of feed. Some farmers gave the value and others gave the quantity of guano, superphosphate, oilseed cake et cetera. The variety of responses were all encoded onto a spreadsheet using the numerous price and conversion factors fully described in the appendix. A number of farms had to be excluded because they had a mixed lease or had not correctly completed the questionnaire. These farms are listed in the appendix along with the reason for exclusion. Having dropped 24 observations this left a clean data set of 111 farms.

Chapter 4

The Royal Commission - Analysis

I developed a model which I could test using Ordinary Least Squares estimation to test the different theories about agricultural investment. The intention was to find what factors, if any, affected investment.

Different size farms would obviously require different amounts of feed and fertiliser. For this reason the model used investment per acre as the dependant variable. I was interested in whether different factors affected the consumption of feed and fertiliser. One might expect the length of lease to be more important when purchasing fertiliser because its effects last longer than the feed and subsequent manure. For this reason three models were set up which I have numbered 1, 2 and 3. Model 1 uses the sum of expenditure on feed and fertiliser as a proxy for tenant's investment. This is divided by the number of acres on the farm to give the variable UNITINV, (investment per acre). Model 2 has UNITFEED, (feed per acre) as the dependant variable and Model 3 uses UNITFERT, (fertiliser per acre).

Each of the three models uses the same explanatory variables. Firstly, there is a constant term, CONST. Then there is the variable ACRES which is the farm size. This is to determine whether bigger farms invested more or less per acre than smaller farms. Next is a dummy variable called ALLOW. This is either a 1 or 0 depending on whether the farmer thought that he had allowances for tenant-right on quitting. A value of one indicates that he did have allowances. The next variable, LEASE, has a value of 1 for a lease holding farmer or 0 if the farmer has an agreement from year to year. Having a lease does not preclude a farmer from having an allowance for tenant-right. The

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next variable DURAT is the duration of the farmer's contract. Either this is the length of the lease or, in the case of yearly agreements, this is the length of notice to quit (typically six months or a year). OCCUP is the variable for the length of family occupation on the farm. If Ó Gráda's second argument is right we would expect to see a positive coefficient for this variable, implying a long occupation leads to security about the future.

The variable OFFLAND is a dummy variable that indicates whether the farmer was entitled to sell off the land. Traditionally, the landlord required the tenant to plough root crops back into the soil or feed them with the hay to the farm animals. The hay would be converted into manure and used, along with the roots and straw, to enrich the soil. Selling root crops, hay and straw was selling "off the land" and if this was done persistently it would exhaust the soil of all its nutrients. Persistent selling off land would be sustainable if the lost nutrients were replaced with extra feed or fertiliser. This was the view of the historian J.T. Coppock. He believed that the purpose of covenants was to protect the land, farmers were normally entitled to sell crops, hay and straw when sufficient dung was brought back to replace the lost manurial value.[33]

If the coefficient on the variable OFFLAND turned out to be positive and significant this would indicate that these farmers were selling off land and replacing the lost nutrients with purchased inputs. Some of the farmers in Mr Little's report said that they were not entitled to sell off land but did so without the knowledge of their landlord. They were given a 1 in the OFFLAND variable as if they were entitled to do so.

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[33]Coppock, 'Agricultural Changes in the Chilterns 1875-1900', p60

Finally, there is the problem of regional variation. The incidence of lease holding was fairly evenly distributed across the sample, which was fortunate. However, it was found that, when running regressions with dummy variables for each county, there were regional variations that were statistically significant. The counties with higher investment per acre tended to be Kent and Surrey; counties one would associate with market gardening. By using data from the Agricultural returns[34] I was able to assemble data on the regional distribution of: orchards, market gardens, nurseries, woods and cattle. This data was expressed as a percentage of total acreage under cultivation, (and cattle per acre), and used in place of county dummies. I found that the variable GARDEN was highly significant but the other variables were not and were subsequently dropped from the model. This completes the model:

$$Investment\ per\ acre\ =\ \alpha(CONST)+\beta_1(ACRES)+\beta_2(ALLOW)+\beta_3(LEASE)+\beta_4(DURAT)$$
$$+\beta_5(OCCUP)+\beta_6(OFFLAND\ )+\beta_7(GARDEN)$$

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[34]Agricultural Returns, P.P. (1882), LXXIV, p50 and p20-32

Results

Table 1 - MODEL 1

Dependent variable is   **UNITINV**
111 observations used for estimation from 1 to 111

Regressor	Coefficient	Standard Error	T-Ratio	
CONST	0.9704	0.2236	4.34	*****
ACRES	-0.0003	0.0002	-1.67	**
ALLOW	0.3692	0.1514	2.44	****
LEASE	0.7135	0.2962	2.41	****
DURAT	-0.0372	0.0196	-1.90	**
OCCUP	-0.0014	0.0020	-0.71	
OFFLAND	-0.3134	0.1531	-2.05	***
GARDEN	0.9109	0.2965	3.07	*****
R-Squared	0.2175			
S.E. of Regression	0.7530			

Note: * significant at 0.1 level, ** at 0.05 level, *** at 0.025, **** at 0.01 and ***** at 0.005

All the coefficients are significantly different from zero at atleast the 5% level apart from OCCUP which is not significant at even the 10% level. The results imply that there is a constant investment of 97 pence per acre which falls by 0.03 pence for every extra acre of land, i.e. bigger farms spend fractionally less per acre; returns to scale were not important in determining investment. Having an allowance for tenant-right increases investment by approximately 37 pence per acre, while having a lease increases investment by 71 pence per acre.

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However, longer leases resulted in lower investment; 3.7 pence per acre per year of the lease.

The coefficient on OFFLAND was significantly less than zero at the 2.5% level which implies that farmers who were entitled to sell off land spent less per acre on feed and fertiliser than other farmers. Either, they farmed their land less intensively or they were exhausting the soil of its nutrients. This second scenario is not sustainable, either the farmer will have to leave and move to another farm or he will end up farming poor soil with low annual yields. It is possible that these farmers began exhausting the soil for a quick return and ended up farming poor quality land which gave low income and hence insufficient retained earnings to break out into higher intensity farming. Further research would be necessary to determine whether this was the case.

Finally, the coefficient on GARDEN was positive and highly significant. Whilst it appears that a high concentration of market gardening raises investment it will become apparent from the results for models 2 and 3 that this relationship was slightly more complicated. Most importantly, the results give very strong evidence for the hypothesis that tenancy arrangements affected agricultural investment. Ó Gráda said that having an allowance was sufficient to encourage tenant farmers to invest. The results show that having an allowance did increase investment by approximately 40 pence per acre. However, having a lease could increase investment by a further 70 pence. Furthermore, the results seem to suggest that short lease holders without an allowance invested more than non-lease holders with an allowance; a difference of 30 pence per acre.

To test whether the coefficient on ALLOW is significantly different to the coefficient on LEASE we must compare Model 1 against a restricted version -

Investment per acre $= \alpha(\text{CONST}) + \beta_1(\text{ACRES}) + \beta_8(\text{ALLOW}+\text{LEASE}) + \beta_4(\text{DURAT}) + \beta_5(\text{OCCUP}) + \beta_6(\text{OFFLAND}) + \beta_7(\text{GARDEN})$

The restriction on Model 1 is that the coefficients on LEASE and ALLOW are the same and equal to β_8. The regression gave the following results.

Table 2 - MODEL 1 Restricted

Dependent variable is   **UNITINV**
111 observations used for estimation from 1 to 111

Regressor	Coefficient	Standard Error	T-Ratio	
CONST	0.9203	0.2196	4.19	*****
ACRES	-0.0003	0.0002	-1.51	*
ALLOW+LEASE	0.4178	0.1455	2.87	*****
DURAT	-0.0193	0.0119	-1.62	*
OCCUP	-0.0010	0.0020	-0.52	
OFFLAND	-0.3052	0.1532	-1.99	***
GARDEN	0.9237	0.2967	3.11	*****
R-Squared	0.2075			
S.E. of Regression	0.7541			

Note: * significant at 0.1 level, ** at 0.05 level, *** at 0.025, **** at 0.01 and ***** at 0.005

The test is to see whether the unrestricted model is significantly better than the restricted model. This is done by comparing the residual sum of squares.

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H_0: $\beta_2 = \beta_3$

H_1: $\beta_2 \beta_3$

$$\frac{RSSr\text{-}RSSu \ / \ q}{RSSu \ / \ (n\text{-}k)} \sim F(q, \ n\text{-}k) \quad \frac{59.1388\text{-}58.3946 \ / \ 1}{58.3946 \ / \ (111\text{-}8)} \quad = 1.312$$

$F1,60,0.05 \quad = 4.00$

$F1,120,0.05 \quad = 3.92$

Therefore the null hypothesis is not rejected. This means that the improvement in the residual sum of squares is no more than might be expected by chance and the coefficients on LEASE and ALLOW are not significantly different from one another. To determine which has the greatest influence on investment one would need a larger data set that would yield lower standard errors.

95% Confidence Intervals

ALLOW $0.3692 +/- (0.1514*1.960)0.07 < \beta < 0.67$

LEASE $0.7135 +/- (0.2962*1.960)0.13 < \beta < 1.29$

Added to this is the complication that the coefficient on DURAT is negative and significant at the 5% level. This implies that holders of long leases invested less per acre and were therefore less intensive farmers. If the point estimates of the coefficients are completely accurate than the benefits of having a lease would be completely diminished if the contract duration was 20 years. This unexpected result is explained by the results from models 2 and 3.

Figure 1.

Contractual Arrangments and Effects on UNITINV

UNITINV (£'s)

Contract Duration

- .... no lease, no allow
- ─··─··─ no lease, but allow
- ─ ─ ─ lease, but no allow
- ──────── lease and allow
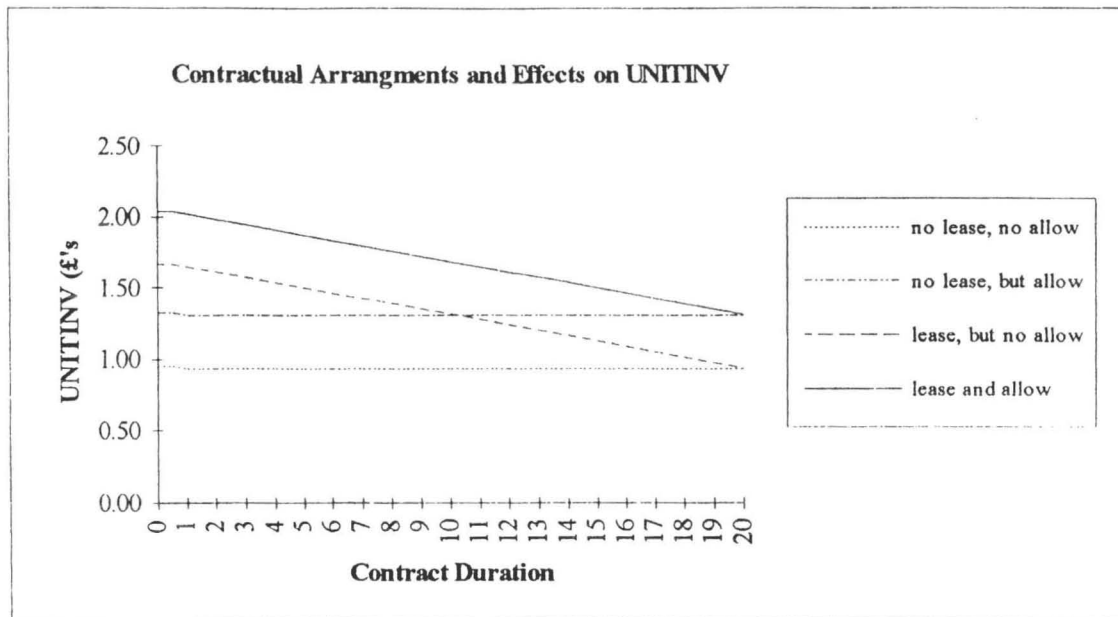
Table 3 - MODEL 2

Dependent variable is **UNITFEED**
111 observations used for estimation from 1 to 111

Regressor	Coefficient	Standard Error	T-Ratio	
CONST	0.5776	0.2094	2.76	*****
ACRES	-0.0001	0.0002	-0.69	
ALLOW	0.3453	0.1418	2.44	****
LEASE	0.8183	0.2774	2.95	*****
DURAT	-0.0510	0.0184	-2.77	*****
OCCUP	-0.0016	0.0019	-0.83	
OFFLAND	-0.2939	0.1435	-2.05	***
GARDEN	0.8064	0.2777	2.90	*****
R-Squared	0.1980			
S.E. of Regression	0.7053			

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Table 4 - MODEL 3

Dependent variable is   **UNITFERT**
111 observations used for estimation from 1 to 111

Regressor	Coefficient	Standard Error	T-Ratio	
CONST	0.3929	0.0918	4.28	*****
ACRES	-0.0002	0.0001	-2.49	****
ALLOW	0.0239	0.0622	0.38	
LEASE	-0.1048	0.1216	-0.86	
DURAT	0.0138	0.0081	1.71	**
OCCUP	0.0001	0.0008	0.16	
OFFLAND	-0.0195	0.0629	-0.31	
GARDEN	0.1045	0.1217	0.86	
R-Squared	0.1314			
S.E. of Regression	0.3092			

Note: * significant at 0.1 level, ** at 0.05 level, *** at 0.025, **** at 0.01 and ***** at 0.005

In Model 2 the lease increases expenditure on feed by 81 pence per acre and then reduces it by 5 pence for every year of duration. Both of these coefficients are highly significant. This implies that long lease holders spent less on feed than other lease holders. This is consistent with the results for Model 3. In Model 3 only three of the coefficients were significantly different from zero: CONST, ACRES and DURAT. In this case the holder of a 20 year lease invests 28 pence per acre more than the farmer with a yearly agreement. The results from models 2 and 3 show that holders of longer leases spend more

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on fertiliser and less on feed. This suggests that having a long lease gives the tenant the security required to invest in fertiliser for his land. Because the effects of the fertiliser last so long, just having a short lease was not sufficient to encourage investment, hence the coefficient on LEASE is not significant. In a recent study of tenure on modern farm performance the following theory was put forward.

"in circumstances where the tenants future occupancy is uncertain, he will be inclined to provide more factors to enterprises with short production periods and fewer to those requiring longer to mature, even though the latter might yield better returns in the long run."[35]

"tenant investment tends in the direction of resources which can be transformed into product in one season and for which the return is relatively certain. Instead of investing in lime, fertiliser or seed for legume crops, he turns his investment in the direction of tractor fuel for more cash grain crops. The production of hogs is favoured above dairying."[36]

The results from models 2 and 3 suggest a similar situation in the nineteenth century. With his ability to safely invest in fertiliser the farmer with a long lease was able to concentrate on growing crops and move away from a mixed farm. For this reason he spends less on feed than the holders of short leases. If it is true that livestock required more annual expenditure than crop growing then we should not be surprised that long lease holders spent less in total than short lease holders.[37] Also, if we assume that investment in fertiliser lasts five

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[35]R. Gasson and B. Hill, '*Farm Tenure and Performance*',(1984), p16

[36]Ibid.

[37]Feed accounts for some 80% of production costs in poultry farming - T.W. Fletcher, 'Lancashire Livestock Farming During the Depression', p82

years and that investment in feed lasts two years, by comparing annual expenditures, total investment in fertiliser is understated. To summarise, having a lease increased investment in feedstuffs, unless the lease was long, in which case, this increased investment in fertiliser.

In Model 2 the coefficient on the dummy variable ALLOW is significant at the 1% level. Allowance for tenant right did increase investment in feed. However, in Model 3 the coefficient is not significant, even at the 10% level. Tenant-right was not sufficient to encourage investment in fertiliser. From the results for UNITFEED it seems that having a lease was more effective than having an allowance for tenant-right; by 50 pence per acre. By running a regression on the restricted model that used the same coefficient for ALLOW and LEASE I was able to carry out another improvement in fit test. The F-statistic was 2.82, not high enough to reject the null hypothesis that the coefficients were the same.

95% Confidence Intervals

ALLOW $0.3453 +/- (0.1418*1.960) 0.07 < \beta < 0.62$
LEASE $0.7135 +/- (0.2774*1.960) 0.27 < \beta < 1.36$

Although we can not say that a lease was better than an allowance, it was still better to have a lease and allowance than only the allowance. Those farmers who had neither were in the worst situation. Therefore it is not true to say that the set of customary rules was sufficient to encourage investment. From Model 3, we can see that having allowance did not encourage any investment in fertiliser.

Ó Gráda suggested that farmers were resident for so long that they should feel secure about their future. The results do not support this point of view. In none of the models was the coefficient on OCCUP significant. The highest T-

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statistic was -0.83 and even this had the wrong sign. I believe we can say with some certainty that length of occupation did not affect investment.

Those farmers who sold off the land seem to have invested less in feed than all other farmers but not behaved any differently when it came to fertiliser. This might be because it was easier to strip the soil of its nutrients by growing crops and not keeping livestock. Alternatively, they might have been so impoverished by their earlier rape of the land that their retained profits were only sufficient to buy the minimum of fertiliser which had better returns than the same value of feed. Whatever the reason, more research would be needed to determine the true nature of the relationship and that is outside the scope of this paper.

Earlier I discussed the seemingly strong relationship between concentration of market gardening and investment. With the benefit of the results for Models 2 and 3 I believe we can shed more light on the matter. One might have thought that high concentrations of market gardening would require greater investment in fertiliser. We can see from the results in tables 3 and 4 that this was not the case. For example; when it came to feedstuffs Kent used approximately 60 pence per acre more than Wiltshire. However, the coefficient on GARDEN was not significant when it came to fertiliser. I believe that this is because GARDEN is acting as a proxy variable for 'proximity to major urban market' - namely London. Counties near major cities faced different demand for their produce and hence their investment behaviour was different. There are a number of reasons why investment was focused more on feed and not fertiliser. Farmers found that grazing land could be used more profitably if it was turned over to growing fruit, hops and market produce. Nevertheless, it may still have been worth keeping livestock, for

while urban incomes were rising so was their demand for fresh meat, eggs and milk. Instead of using land to grow hay and pasture for livestock it may have been more profitable to feed the animals with purchased feed.[38] Once eaten by the animal the feed would become fertiliser anyway; these farmers were already investing in fertiliser by buying it indirectly as feed. Like the off land farming, this is an area for more research but not an issue that concerns this paper.

Finally, the coefficient on ACRES is of passing interest. The coefficient is not significant for UNITFEED but is highly significant for UNITFERT. The results show that larger farms invested fractionally less per acre than their smaller competitors. The difference is negligible - 0.02 pence per acre - but it may have been that some owners of large farms found it harder to raise the necessary capital for investment. Being a larger farm, the total investment would also have been larger and it may have been harder to borrow or accumulate such a large sum. This was not the case with feed and perhaps this because of the shorter pay-back period and hence lower risk.

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[38]Grassland farmers wishing to produce winter milk were increasingly dependant on purchased feed - Ibid. p82

Criticisms

The low values of R-squared might seem to be a problem. This is not the case, in fact it would be surprising if we could explain much more than 20% of the variance in investment per acre. There are other factors that could affect a farmers choice of purchases. Most important would be what crops he was going to grow and in what quantity. Other factors could be: his expected sale price, the suitability of his land to different produce, his access to capital, his retained profits and his personal tastes. These omitted variables could lead to omitted variable bias. However, this bias would only be introduced if the omitted variables were correlated with any of the regressors. Some of the omitted variables would be endogenous such as, what crops to grow and his access to capital markets and so their omission is not important. The quality of his land is not likely to be correlated with any of the regressors and as discussed earlier GARDEN is probably only significant because of its correlation with access to urban markets. The lower R-squared statistic in no way invalidates the results and their standard errors. In fact a less suitable model may have a higher R-squared.

$$\text{Investment} = \alpha(\text{CONST}) + \beta_1(\text{ACRES}) + \beta_2(\text{ALLOW}) + \beta_3(\text{LEASE}) + \beta_4(\text{DU} \quad \text{RAT}) + \beta_5(\text{OCCUP}) + \beta_6(\text{OFFLAND}) + \beta_7(\text{GARDEN})$$

This model, which uses investment as the dependant variable, yields an R-squared of 0.4. This is because a large degree of the variance in investment is explained by the different farm size which is not the case in Models 1,2 and 3 where the dependant variable is investment divided by farm size. A high R-squared is not always a sign of success.

A fairer criticism would be of the regional distribution of the sample. It is possible, though perhaps unlikely, that tenancy only affects investment in Southern Counties. By using a sample that covered a larger proportion of the country it would be possible to determine the relationship between tenancy and investment for the whole country. Such a sample was unavailable and until a broader study is carried out we can only assume that the results for the Southern Counties are true for the rest of the country.

Chapter 5

Conclusion

The evidence for Thompson's idea of a Second Agricultural Revolution is his data for increased expenditure on fertiliser and feed. The data shows a huge rise in the sale of agricultural inputs and I think that he quite rightly sees this as evidence for a change in techniques. He makes the point that by the end of the nineteenth-century entire industries were dependent on agricultural demand for their products. Agricultural products used about a third of the UK's total output of sulphuric acid.

> "..this transformation, financed and managed by tenant farmers, took place within an unregenerated institutional framework of landlord and tenant relations, before any statutory enactment of comp
> ulsory compensation ... which did not come until 1883"
> "In the face of the evidence of what actually happened to agriculture it seems idle to pretend that these legal and institutional arrangements discouraged enterprise by tenant farmers"
> "Institutional arrangements which were theoretically objectionable did in fact work in practice, and cases of hardship ... [*exaggerated for political reasons*] ... were of no economic importance."[39]

However, I believe he takes his evidence for rising consumption too far. From the evidence contained within Mr Little's report, this clearly was not the case. Professor Thompson has seen rising investment and taken this as an indication of healthy institutional arrangements. What he fails to see is that under different institutional conditions investment may have risen faster. If this had

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[39]Thompson, 'Second Agricultural Revolution', p72

been the case then perhaps we would have seen higher levels of productivity at earlier dates. This would not have been of "no economic importance".

Ó Gráda also tries a similar form of argument.

".. there is no sign that the system materially hindered the development of fruit farming and market gardening at this time, though these involved considerable fixed outlays on the part of the tenant."[40]

He is saying that, because we see farmers making investments this is evidence for the smooth workings of landlord-tenant relationships. He fails to see is that, had institutional conditions been different then we may have seen investment in fruit farming take place at an earlier date and in larger amounts.

The evidence from Mr Little's report has shown that the institutional arrangements were not satisfactory. Lease holders and holders of tenant right invested significantly more than those farmers without security of tenure. Furthermore, holders of long leases invested in larger quantities of fertiliser than other farmers, indicating their greater security. Lord Ernle believed that countries like Holland and Germany were consuming considerably more artificial fertiliser than Britain and that this was due to the falling acreage under arable cultivation.[41] Perhaps, if British farmers had had the greater security afforded to long lease holders then arable acreage would not have fallen and British farmers would have been more profitable.

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[40] Ó Gráda, 'Agricultural Decline 1860-1914', p187

[41] Lord Ernle, 'The Great Depression and Recovery', in P.J. Perry, (ed), 'British Agriculture 1875-1914', p13

Appendix

1. Regional Variation

	Berks	Hants	Kent	Surrey	Sussex	Wilts	Cornwall	Devon	Dorset	Somerset
Acreage of:										
ORCHARD	1,888	1,502	16,861	1,956	2,080	2,890	4,809	26,123	3,975	23,104
GARDEN	305	1,077	5,632	2,186	1,178	206	1,168	850	122	625
NURSERY	160	176	673	1,328	485	108	54	342	106	193
WOODS	29,120	105,489	82,849	42,974	113,043	45,270	28,987	77,459	32,250	39,850
# OF CATTLE	35,476	67,377	73,409	45,495	100,352	86,989	166,742	233,409	76,602	210,671
TOTAL ACREAGE	376,574	708,687	745,215	299,233	675,233	757,402	558,757	1,165,926	487,520	856,317
Percentage of total										
ORCHARD	0.50	0.21	2.26	0.65	0.31	0.38	0.86	2.24	0.82	2.70
GARDEN	0.08	0.15	0.76	0.73	0.17	0.03	0.21	0.07	0.03	0.07
NURSERY	0.04	0.02	0.09	0.44	0.07	0.01	0.01	0.03	0.02	0.02
WOODS	7.73	14.89	11.12	14.36	16.74	5.98	5.19	6.64	6.62	4.65
CATTLE PER ACRE	9.42	9.51	9.85	15.20	14.86	11.49	29.84	20.02	15.71	24.60

Source: Parliamentary Papers LXXIV 1882 p50 and p20-32
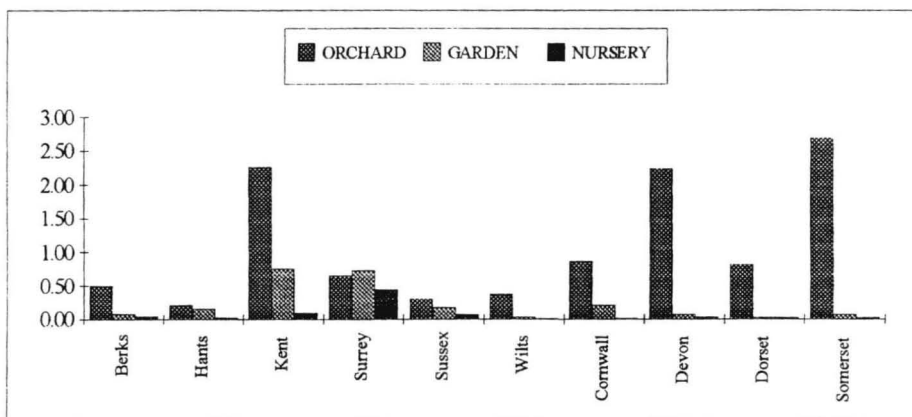
2. Fertiliser Prices

Where possible, the prices derived from the Appendix in F.M.L. Thompson, 'Second Agricultural Revolution' were used. The prices derived from Accounts and Papers were used as a check on the Thompson figures and to provide a price for Lime.

Fertiliser prices from FML Thompson - Second Agricultural Revolution (£ per ton)

Period -1877-81

Price of general fertiliser	8.01	Table 5 p77	value of all fertilisers	- Divided by -	tons of all fertilisers	Table 4 p76
Price of guano	9.16	Table 3 p76	value of guano	- Divided by -	tons of guano net	Table 2 p75
Price of superphosphate	8.00	Table 3 p76	value of superphosphate	- Divided by -	tons of superphosphate	Table 2 p75
Price of bones	6.06	Table 3 p76	value of bones	- Divided by -	tons of bones	Table 2 p75
Price of cake	8.11	Table 3 p76	value of oilseed cake	- Divided by -	tons of oilseed cake	Table 1 p74
Price of maize	6.00	Table 3 p76	value of maize	- Divided by -	tons of maize	Table 1 p74

Fertiliser Prices

Price of bones	5.87
Price of guano	9.73
Price of cake	7.98

Source: B.P.P. LXXIV 1882   Pages 60-61

Table 8 - Quantities and values of manures imported into the UK -1881

Table 9 - Quantities and values of oilcake, ... clover seeds imported into the UK -1881

Fertiliser Prices

Price of bones	5.87
Price of guano	9.73
Phosphate of Lime and Rock	3.07
Price of cake	7.98

Source: B.P.P. LXXIX 1890   Pages 142-143

Table XLVIII - Quantities and values of oilcake, ... clover seeds imported into the UK -1881

Table XLIX - Quantities and values of manures imported into the UK -1881/1882

Lime

300 hogsheads of lime=16,200 gallons	
Assume same density as water	72.5 ton
@ £3 per ton	£223
1000 bushels = 8000 gallons	35.8 ton
@ £3 per ton	£110

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3. Corn Prices

There are many sources for the price of corn per quarter or bushel. The problem is trying to convert the volume of grain to mass. Some of the farmers stated their consumption in tons and hundredweights, others used bushels and quarters. The density of grain came from Mitchell's Abstract of Historical Statistics, the average density was used in conjunction with the prices for 1881.

Price per Imperial quarter (£)			
	Wheat	Barley	Oats
1880	2.22	1.65	1.15
1881	2.27	1.60	1.09
1882	2.25	1.56	1.09
Mitchell - Abstract of Historical Statistics P489			

Density of corn crops (bushels per ton) 1910-39			
	Wheat	Barley	Oats
High	37.32	42.88	59.01
Low	35.29	40.50	52.59
Average	36.21	41.56	55.95
Mitchell - Abstract of Historical Statistics P86			

Price per Bushel (£)			
	Wheat	Barley	Oats
1880	0.28	0.21	0.14
1881	**0.28**	**0.20**	**0.14**
1882	0.28	0.19	0.14

Weight of bushel (lbs)			
	Wheat	Barley	Oats
High	60.02	52.24	37.96
Low	63.47	55.31	42.59
Average	61.86	53.90	40.04

Price per long ton (£)			
	Wheat	Barley	Oats
1880	10.03	8.59	8.07
1881	**10.26**	**8.29**	**7.61**
1882	10.20	8.10	7.63

4. Other Prices and Conversion Factors

Maize (assume 50lbs per bushel)	
8 quarters=64 bushels=3200lbs=1.4 tons	
Maize @ £6 per ton	
Approx. value of 8qtrs	£8
175 bushels=8750lbs=3.9 tons	
Approx. value of 175 bushels	£23
25 quarters of maize	£26

Source for maize: F.M.L. Thompson 'Second Agricultural Revolution'

Agricultural Returns - Export prices

Malt price per quarter in 1884	2.18
20 quarters of malt	£44

Source: B.P.P. LXXIX 1890 Page 146-7

1 cwt =112 pounds

1 ton=2240 pounds

1 cwt=0.05 tons

1 qtr=8 bushels

1 bushel=8 gallons

1 cwt=1 hundredweight=112 lbs

1 hogshead=54 gallons

Source: Collins English Dictionary, Third Edition

5. The Data Set

Order #	Farm #	ACRES	LEASE	DURAT	OCCUP	OFFLAND	ALLOW	FERT	FEED
1	1	720	1	14.0	7	1	0	80	0
2	2	645	0	0.5	40	1	0	168	300
3	3	426	1	12.0	75	0	0	360	417
4	4	700	0	1.0	36	0	1	30	884
5	6	488	1	20.0	13	0	1	40	0
6	8	420	0	0.5	80	0	1	0	150
7	9	1150	1	5.0	300	1	1	230	0
8	10	900	1	4.0	90	0	0	185	450
9	11	560	1	1.0	46	0	0	0	500
10	12	500	1	8.0	47	1	0	0	550
11	13	670	1	12.0	8	0	0	0	1,005
12	14	515	0	0.5	70	0	0	0	1,000
14	81	500	0	4.5	41	1	1	96	550
15	82	800	1	14.0	41	1	1	100	500
16	83	660	0	2.0	48	1	0	100	200
17	83.5	1300	1	2.0	48	1	0	0	1,177
18	85	1200	1	2.0	65	1	0	200	2,200
19	85.5	850	1	2.0	65	1	1	289	870
20	86	1600	1	19.0	14	1	1	1,500	1,000
21	87	1100	1	14.0	19	1	1	200	450
22	88	1100	1	14.0	41	1	0	500	200
23	89	900	0	2.0	14	1	0	120	100
24	90	730	1	8.5	22	0	0	641	649
25	91	475	0	0.5	23	1	0	100	100
26	92	520	1	7.0	33	1	0	9	400
27	94	800	1	14.0	13	1	0	145	400
28	95	190	0	0.5	22	1	1	86	294
29	97	800	1	14.0	41	1	0	400	800
30	98	330	1	14.0	25	1	1	300	300
31	101	780	0	1.0	30	0	1	800	1,900
32	102	188	0	1.0	22	0	0	60	24
33	103	500	0	1.0	12	0	1	61	90
34	104	400	1	14.0	64	1	1	200	500
35	105	500	1	14.0	113	1	0	0	195
36	106	360	0	1.0	34	1	1	447	523
37	107	550	1	14.0	60	1	0	280	300
39	109	380	1	21.0	8	1	0	441	0

The Data Set Continued

Order #	Farm #	ACRES	LEASE	DURAT	OCCUP	OFFLAND	ALLOW	FERT	FEED
40	110	460	1	21.0	14	1	0	150	478
41	111	290	0	1.0	28	1	0	344	475
42	112	420	1	14.0	21	1	1	100	718
43	113	610	0	1.0	63	1	1	0	371
44	122	330	1	14.0	6	1	1	117	162
45	123	500	1	17.5	9	1	1	100	162
46	124	350	0	2.0	26	0	1	0	0
47	125	220	1	14.0	15	0	1	40	600
49	126	250	1	14.0	9	0	1	36	1,539
50	129	330	1	14.0	55	1	0	52	105
52	132	944	1	14.0	41	1	1	100	850
53	134	900	0	0.5	58	1	1	100	200
54	136	1180	1	14.0	28	1	1	150	1,100
55	138	350	0	0.5	53	1	1	150	150
56	140	177	1	14.0	60	1	1	83	150
57	141	1000	1	14.0	13	1	0	200	0
58	142	500	0	2.0	23	1	1	125	0
59	142.5	150	1	8.0	23	1	0	46	133
60	143	320	0	1.0	15	0	1	115	176
61	144	400	1	14.0	27	1	1	150	600
63	147	1050	0	2.0	30	0	0	100	930
64	148	1750	0	1.0	30	1	0	303	283
66	150	550	0	1.0	12	0	0	24	300
68	153	840	1	17.0	63	1	1	163	776
69	154	630	0	1.0	40	0	1	68	200
70	157	1600	0	2.0	41	0	1	450	500
71	158	1200	1	16.0	13	1	1	280	420
72	159	1900	1	21.0	18	0	0	180	500
73	163	720	0	1.0	41	0	0	35	0
74	164	1000	1	14.0	27	0	0	140	243
75	165	700	0	0.5	50	0	1	80	943
76	16	600	1	21.0	46	1	0	300	0
78	19	220	1	14.0	8	0	0	88	0
82	23	200	1	14.0	19	1	0	100	81
84	25	270	1	14.0	29	0	0	215	12
86	27	518	1	21.0	29	0	0	110	0
88	30	253	0	0.5	100	0	0	200	110

The Data Set Continued

Order #	Farm #	ACRES	LEASE	DURAT	OCCUP	OFFLAND	ALLOW	FERT	FEED
89	31	354	1	14.0	25	1	0	220	0
90	32	173	1	21.0	23	0	1	184	36
91	33	530	1	14.0	20	0	0	450	100
92	34	560	0	1.0	15	0	1	650	270
94	36	300	1	21.0	10	0	0	160	0
95	37	385	1	14.0	40	0	0	320	99
96	39	320	0	1.0	28	0	1	100	50
98	41	105	1	21.0	8	1	0	40	30
99	42	326	1	14.0	80	1	0	150	150
100	43	236	0	1.0	60	0	1	104	73
101	46	70	0	1.0	200	1	1	32	44
103	50	247	1	14.0	16	1	1	314	162
105	53	200	0	1.0	70	0	1	130	200
106	55	309	1	14.0	8	0	1	130	165
109	59	600	1	14.0	70	0	0	160	178
111	61	288	1	12.0	36	0	1	300	200
112	62	212	0	0.5	21	1	0	120	120
113	66	222	0	0.5	13	0	0	64	32
114	67	225	1	21.0	54	0	0	200	89
115	68	300	1	21.0	30	0	0	190	300
116	69	1000	1	21.0	30	0	0	195	470
118	71	360	0	1.0	16	0	1	220	130
119	72	800	0	1.0	12	1	1	250	660
120	73	350	0	1.0	36	1	1	50	50
121	74	600	0	2.0	150	1	1	320	446
122	75	1250	0	0.5	35	1	1	300	500
123	76	1100	0	0.5	60	0	1	280	354
124	77	1600	1	8.0	54	0	0	248	506
125	78	321	1	14.0	17	1	0	50	150
126	79	503	0	0.5	100	1	1	100	147
127	114	298	0	1.0	21	1	1	71	40
128	115	421	0	0.5	51	0	0	170	650
130	117	360	1	10.0	41	0	0	30	750
131	118	469	0	1.0	60	0	0	66	300
132	119	441	0	1.0	16	0	1	60	500
133	119.5	325	1	20.0	30	0	1	25	395
135	121	500	0	0.5	70	1	1	19	450

Source: B.P.P. (1882), XVI, The Report of Assistant Commissioner Little, Appendix E

6. Farms Excluded From the Data

Number	Commission Number	Reason for Exclusion
13	15	Missing answer to Question 15
38	108	Missing answers to Questions 14,15
48	127	Size of farm missing
51	131	Missing answer to Question 14
62	146	Part lease, part yearly agreement
65	149	Missing answers to Questions 14,15
67	152	Missing allowance and offland
79	20	Part lease, part yearly agreement
80	21	Quantity of feedstuffs unknown
81	22	Part lease, part yearly agreement
83	24	Part lease, part yearly agreement
85	26	Part lease, part yearly agreement
87	28	Quantity of feedstuffs unknown
93	35	Unknown value of feed
97	40	Unspecified feedstuffs
102	49	Unspecified feedstuffs
107	56	Missing answers to Questions 23,14
108	57	Unspecified feedstuffs
110	60	Missing answers to Questions 3,4,15
117	70	Part lease, part under agricultural holdings act
129	116	Missing answers to Questions 14,15
134	120	Unspecified feedstuffs
104	52	Oats grown on the farm
77	17	Unspecified feedstuffs

Total of 24 excluded

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