Agricultural and Forestry Land Prices in Ireland

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SUMMARY

Ireland is one of the few developed countries which does not produce an official series of land prices. One reason for this is that land has many uses and, as a result, prices vary enormously depending on the purpose for which the land is bought. Hence, to derive a composite land price, very large samples of sales are required and difficult classification problems are involved.

In the absence of an official agricultural land price series, An Foras Taluntais (AFT, now Teagasc) has tried to fill the void. To this end, three series of prices prepared by Dr Paul Kelly have been published by this body. The first series was based on the sample of farmers participating in the AFT Farm Management Survey in 1977. These were asked to state the price per acre for any land purchased by them since 1950. The results of this enquiry were published as a series of land prices from 1950 to 1977. As this series was based on a very small number of transactions (less than 10 in some years) the average price given cannot be very reliable. Nevertheless, they give the expected trend showing a rise from £57 per hectare in 1950 to £292 in 1970 and a further rise to £2,918 per ha. in 1977 (Kelly, 1979).

The second series of agricultural land prices published by AFT was based on a small sample of sales by 5 auctioneers who submitted returns for a number of years. Published figures for this series run from 1970 to 1983 when they were discontinued (Kelly, 1981 and 1984(a)). As the number of transactions available in preparing these results was small (ranging from 56 in 1976 to 21 in 1980), it was not possible to classify prices by size of holding, by region, or by land quality.

The third series of prices produced by Dr Kelly was based on a sample of land sales taken from the Valuation Office records. This office has records known as Particulars Delivered (PD forms) of all land sales in the State, giving name of vendor, location of holding, rateable valuation of land and buildings, name of purchaser, price received and several other items of information. These completed forms are obtained from the Revenue Commissioners.

At the time Kelly was working on this project the Valuation Office had begun to make classifications of the land transactions into sales for agriculture and for a number of other users. He thus had populations of agricultural land transactions from which to draw his samples. These populations varied from 5,500 in 1978 to about 2,000 in 1981. From these he drew samples of from 10 to 20 per cent and was thus able to classify his results by three provinces (Leinster, Munster and Connacht/Ulster), by size of holding

and by use range class.

The transactions were allocated to different use range classes by locating them on the AFT soil map and assuming the holdings belonged to the same class as the District Electoral Division in which they were located.

In calculating the per acre prices, Kelly excluded all transactions in Co. Dublin, those with very high prices which he deemed would not be economical for farming, and transactions between relatives at very low prices. The price series produced from Valuation Office data run from 1978 to 1987, when they were discontinued. The average price per hectare for all land in this series rose from £3,160 in 1978 to £4,122 per hectare in 1979, and then declined erratically to £2,886 in 1987 (see Tables S.1 and S.2).

Table S.1: *Average Agricultural Land Prices Classified by Province, 1978 to 1991*

Year	Province			
	Leinster	Munster	Connacht/Ulster	State
	£/ha			
1978	4307	3578	1940	3160
1979	5263	4764	2780	4122
1980	4799	4127	2026	3380
1981	4534	3514	2197	3281
1982	3529	3538	2560	3188
1983	3763	3289	2854	3338
1984	3546	3126	2434	3020
1985	3395	3116	2649	3094
1986	3180	3020	2478	3039
1987	3291	3136	2656	2886
1988	3123	3153	2597	3012
1989	3940	3546	3036	3607
1990	4230	3484	3121	3709
1991	3843	3816	3006	3634

Source: Figures for 1978 to 1987 taken from An Foras Taluntais publications (see Kelly 1983(b), 1984(b), Kelly, *et al.*, 1985, 1986, 1987 and 1988).

Table S.2: *Agricultural Land Prices Classified by Size of Holding, 1978-1991*

	Size of Holding (ha)					
Year	*0-4*	*4-8*	*8-12*	*12-20*	*20+*	*All Sizes*
			£/ha			
1978	3674	3005	2765	2829	3094	3160
1979	4633	3882	3998	3751	4208	4122
1980	4132	3529	3084	2728	2782	3380
1981	4824	2891	3398	2861	2525	3281
1982	3850	3296	2659	3328	2343	3188
1983	4569	3190	3027	2849	2607	3338
1984	4060	3138	2901	2498	2535	3020
1985	4013	3269	2822	2975	2629	3094
1986	4285	3380	2560	2716	2350	3044
1987	3749	2928	2805	2617	2157	2886
1988	4193	3294	2985	2827	2968	3012
1989	4204	3849	3776	3176	3518	3607
1990	4581	4109	3961	3756	3321	3709
1991	4482	3954	3503	3893	3388	3634

Source: Same as for Table S.1.

Updating An Foras Taluntais Land Price Series

The purpose of this paper is to update An Foras Taluntais agricultural land price series and produce forestry land prices as well. In doing this, we contacted the Valuation Office, to discover that the relevant data were now being computerised. With the kind permission of the Commissioner we were given access to the computer printouts for both agricultural and forestry transactions for 1988, 1990 and 1991. Figures for 1989 were not computerised and we had to draw manually a random sample of transactions for that year from the PD forms which were stored on microfilm.

In order to produce a series of agricultural land prices comparable with An Foras Taluntais series, the data were edited in the same way by excluding transactions in Co. Dublin, transactions at very high prices, over £12,355 per hectare, intra-family transactions at very low prices and purchases by companies and other non-agricultural businesses.

When the editing was completed, there were available for analysis - 2,182 transactions for 1978 covering 29,737 hectares, 992 transactions for 1989 covering 11,411 hectares, 2,856 transactions for 1990 covering 31,735 hectares and

1,705 transactions for 1991 covering 17,629 hectares.

Because such a large number of transactions were available, it was possible to calculate average county prices for all transactions as well as provincial figures classified by size of transaction.

For the State as a whole, the average price of all land sold for agricultural purposes was £3,012 per hectare in 1988 and £3,634 in 1991, an increase of £622 per hectare over the three-year period. There was little difference between the average price of land in Leinster and Munster in 1988 (£3,123 and £3,202 per hectare, respectively). The average price in that year in Ulster was £2,748 per hectare and in Connacht £2,476 per hectare.

In 1991 the average price per hectare in Leinster was £3,842 per hectare compared with a price of £3,816 per hectare in Munster, while Connacht and Ulster prices were £2,907 and £3,205 per hectare, respectively.

In regard to county prices, Leitrim had the lowest average agricultural land price in all years, with Wicklow having the highest price in 1988, Kilkenny in 1989, Louth in 1990, and Limerick in 1991.

Generally, in all the provinces in the four years, the smaller sized holdings had higher prices than the larger ones. For the State as a whole in 1988 the average price of a 0-4 hectare holding was £4,193 per hectare compared with £2,968 per hectare for the over 20 hectare parcels. In 1991 prices varied from £4,482 for the 0-4 hectare parcels to £3,388 per hectare for the over 20 hectare holdings but in 1989 the 20+ hectare holdings had higher average prices than the 12-20 hectare holdings.

Average agricultural land prices (for the years 1978 to 1991) classified by province are given in Table S.1 and by size of holding in Table S.2.

Classification by Use Range Class

A classification of transactions based on use range class in 1988 and 1990 was carried out using the AFT soil map in the same way as that done by Dr Kelly. The transactions were located on the soil map and allocated to the same soil association as the area in which they were located. As this was considered to be a rather crude method of allocation, we carried out a more detailed allocation in Johnstown Castle on the transactions in 9 counties in 1990, using the townland soil records available in that centre for those counties. The two methods gave very different results to such an extent that we were not satisfied with either method of

classification. This check indicates that the allocation of a
particular holding to the same use range class as the
townland or DED in which it is located is a very hit and miss
affair. Accordingly, we concluded that if such a
classification is to be undertaken, it should be done on the
basis of visual inspection by an expert. If this is not
feasible, we cannot recommend the publication, on a regular
basis, of land prices classified by use range class using the
soil map technique of allocation. For certain purposes,
however, where a great deal of accuracy is not required this
method can be used. It appears generally to price the land
according to quality.

The Working of the Agricultural Land Market

It was found that there was a significant relationship
between the area of land traded (land price deflated by the
Consumer Price Index) in any year and the real price of land
traded in the following year. Though it is impossible to
determine causation, this relationship would seem to indicate
that when the real land prices rise, extra land is traded and
vice versa when these prices decline.

It was assumed that demand for land was influenced
considerably by agricultural economic conditions, i.e.,
levels of agricultural prices and farm incomes. When this
assumption was examined, it was found that between 1970 and
1991 agricultural land prices moved erratically in line with
agricultural output prices and income arising in agriculture.
Over this period the correlation coefficient between
agricultural land prices and output prices was 0.89, and
between land prices and income arising it was 0.78. Both
these coefficients are significant at the 1.0 per cent level.
Hence it was concluded that as might be expected, land prices
are positively influenced by agricultural prices and incomes.

Forestry Land Prices

Valuation Office records for forestry land transactions
were used to calculate forestry land prices for the years
1984-1991. Prices for the years 1978 to 1983 were calculated
by dividing the amount paid for land by the Department of
Forestry (given in the Government Appropriation Accounts) by
the area of land purchased in these years (given in the
Department's Annual Reports). The unit prices calculated in
this way rose from £108 per hectare in 1978 to £515 in 1983.
It was not possible to classify these prices by province or
by size of transaction.

For the years 1984-1991 the number of forestry land
transactions identified in the Valuation Office varied from
86 in 1988 covering 1,434 hectares to 268 in 1990 covering

6,670 hectares. The average price per hectare rose from £600 in 1984 to £1,203 in 1991 (see Table S.3). Some of this rise may be due to inflation and to improved grants and planting premia, but some is also probably due to the quality of land purchased. It is generally agreed that better land is now being purchased for forestry purposes than in the early 1980s. Very little bogland is being planted at the present time.

Table S.3: *Forestry Land Prices Classified by Province 1984-1991*

		Province		
Year	Leinster	Munster	Conn./Ulster	State
		£/ha		
1984	530	816	538	600
1985	599	751	738	707
1986	678	883	534	687
1987	867	905	668	796
1988	1047	1029	945	994
1989	1114	1258	973	1022
1990	1208	1177	1081	1130
1991	1141	1258	1174	1204

Table S.4: *Forestry Land Prices Classified by Size Group 1984-1991*

		Size Group			
Year	0-10	10-20	20-40	40+	All Sizes
1984	1067	951	862	400	600
1985	1293	942	997	570	707
1986	1065	984	944	443	687
1987	1085	954	918	536	796
1988	1186	1119	922	704	994
1989	1170	1222	1113	737	1022
1990	1412	1318	1177	963	1130
1991	1467	1430	1269	961	1203

Average forestry land prices for the years 1984-1991, classified by province, are given in Table S.3, by size of transaction in Table S.4 and by potential yield class in Table S.5.

Table S.5: *Forestry Land Prices Classified by Potential Yield Class 1987-1991*

Yield Class

Year	< 14	14-15	16-17	18-19	20-21	22+	All Classes
				£/ha			
1987	305	439	586	699	904	1116	796
1988	352	566	670	852	1030	1296	994
1989	308	587	643	840	992	1267	1022
1990	560	722	871	1021	1442	1656	1130
1991	na	813	886	1101	1248	1504	1203
All years	381	625	731	903	1231	1362	1048
Index	100	164	192	237	295	357	275

* Yield class here is defined as the potential production of sitka spruce from a given area of land in cubic metres per hectare per annum.

In practically all years, the Munster prices are higher than those in the other provinces while Leinster prices are generally higher than those in Connacht/Ulster. Generally speaking, also, the smaller size groups have higher prices than the larger groups. For example in 1991 per hectare prices ranged from £467 for the 0-10 hectare holdings through £1,430 for the 10-20 hectare holdings, through £1,269 per hectare for the 20-40 hectare holdings, to £961 for the 40+ holdings.

In all years the higher yield class lands fetched higher prices than the lower classes. When yield class prices were averaged for the 5 years shown and the average expressed in

index number form, the indices ranged from 100 for the under 14 Sitka Spruce yield classes to 420 for the 24+ yield classes.

Standard deviations and confidence intervals show that the various forestry prices are reasonably robust except for the 40+ hectare group. It is expected therefore that in future years the Valuation Office data can be used to give reliable provincial and size group prices.

Relationship Between Certain Forestry Variables

A limited regression analysis shows that increased real prices for forestry land in any year stimulate forestry land sales the following year. A 10 unit increase in the forestry land price index is positively associated with a 3.3 unit increase in the land traded index.

Increased grants and compensatory payments, particularly since 1985, have been a powerful stimulus to promote afforestation. Regression analysis shows that a 1 unit increase in per hectare grants and other payments index can be expected to bring about a 6 unit increase in the private afforestation index.

Another important but a not unexpected result is that increased grants and compensatory payments are strongly reflected in land prices. An increase of 10 per cent per hectare in the former is positively associated with a 9.2 per cent in the latter. This relationship is however not entirely straightforward. The grants and other payments increase the amount of land planted but they also make it possible to use better and hence higher priced land for forestry and this is now happening.

National average prices for agricultural and forestry land for the years 1978 to 1991 are plotted in Figure SI.

Suggestions for the Publication of the Different Series on a Regular Basis in Future Years

Now that the data on land prices are being computerised in the Valuation Office it will not be a difficult operation to continue the publication of both agricultural and forestry land prices on a regular basis. We recommend that the publication be done by the Central Statistics Office so that there will be available in future years official series of land prices. We suggest to the Revenue Commissioners that provision be made on the PD forms for the recording of milk quotas and the use for which the land was purchased, if this can be done without creating legal difficulties.

Figure S1
Relation between Agricultural and Forestry Land Prices 1978-1991

£/ha.(000) (Thousands)
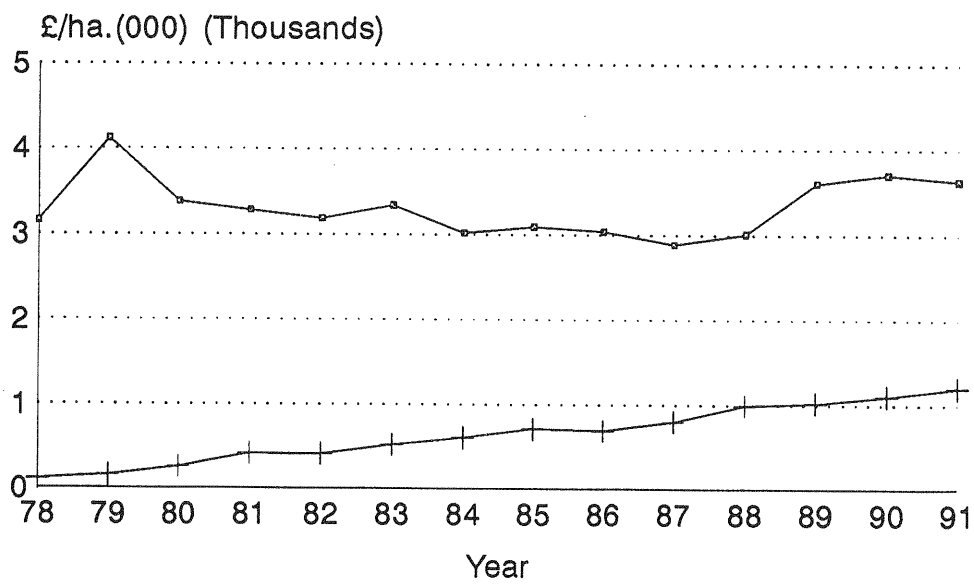
— Agricultural Prices + Forestry Prices

Year

Chapter 1

INTRODUCTION

The purpose of this study is to determine ways and means of updating the calculation of agricultural land prices initiated by Dr Paul Kelly of An Foras Taluntais (now Teagasc) in 1978 and discontinued in 1987 and to produce a series of forestry land prices as well. We commence by describing the procedure adopted by Dr Kelly and present different series of prices which he calculated at different times. We then explain the approach we have adopted and present a series of agricultural land prices for the years 1988-1991 on a comparable basis to Kelly's most recent series. We then present a series of forestry land prices for 1984 to 1991 and unit prices based on Department of Forestry Purchases for the years 1978-1983. Such series were not produced by Kelly. The paper concludes by suggesting how the different series might be continued in future years.

Variation in Land Prices

Land prices at any point in time vary enormously, depending on at least four factors - location, use for which purchased, quality and size of lot sold. All of these factors are to some extent interrelated. Land located in or near an urban centre will usually fetch a high price because it may be used for building purposes, roads, parks or high class market gardening. There is little demand for land for such purposes in remote areas. However, even in remote areas, land for building sites or for amenity purposes fetches much higher prices than land purchased for agricultural or forestry use.

In the case of agricultural land, quality is an important determinant of price. Using a sample of over 800 farm sales in 1975 (obtained from the Valuation Office), Lee and Ormonde (1979) showed that the average price per acre for top quality agricultural land (Class A.1) was £1,806 per hectare, whereas that for very poor quality land (Class E.5) was only £291 per hectare. These authors stated, however, that for agricultural land, quality was not the main determinant of price. There was a sizeable variation in the price of similar type land between counties. In 1975 Class A.2 land varied in price from £2,201 per hectare in Kildare to £1,044 per hectare in Galway. Class B land ranged from £1,475 per hectare in Sligo to £735 per hectare in Cavan, while Class C land ranged from £2.039 per hectare in Louth to £592 per hectare in Monaghan.

Because of the magnitude of these price ranges, it is clear that factors other than quality affect agricultural

land prices. Location appears to be one of these.

Size of lot offered for sale can affect price also. More people can afford to buy smaller rather than larger holdings; consequently, demand for the former is greater and other things being equal, prices are higher. Size is very often related to purpose for which the land is used. In many instances only small parcels, are required for building sites, road widening, etc., and these pieces can fetch very high prices.

Other factors which affect land prices are availability of planning permission for housing, offices or industrial use, and whether or not a holding has a milk quota or good buildings. The presence of a good house or other good buildings can enhance the price per acre considerably, particularly of smaller holdings.

It is obvious from this discussion that an average price per acre for all land sold in a particular period is not fully informative. It is useful, therefore, in calculating meaningful land prices to classify the different parcels of land into different categories such as:

    (a) use for which purchased,
    (b) location,
    (c) size of holding, and
    (d) quality, if this can be ascertained.

In this paper we are only concerned with the price of agricultural and forestry land and for that reason we eliminate from the calculations land purchased for other purposes.

Chapter 2

AN FORAS TALUNTAIS/TEAGASC LAND PRICE SERIES

Three series of land prices have been prepared and published by Dr Paul Kelly of An Foras Taluntais (AFT/Teagasc.) The first series was based on the sample of farmers participating in the AFT Farm Management Survey in 1977. These farmers were asked to state the purchase price per acre of any parcels of land purchased by them since 1950. The replies to this question were analysed and the results published as a series of land prices from 1950 to 1977 (Kelly, 1979).

As this series was based on a small number of observations (less than 10 in some years), the average prices given could not be expected to be reliable. However, they give the expected trend, showing a rapid rise from £63 per hectare in 1950 to £323 per hectare in 1970 and to £3,237 per hectare in 1977. Annual prices for this series from 1970 to 1977 are given in Appendix Table A.1.

The second series, also produced by Dr Kelly, was based on information obtained from 5 auctioneers in different parts of the country who submitted data on public auctions in which they were involved. This series ran from 1970 to 1983, when it was discontinued. The first tabular results of these prices, giving figures from 1970 to 1980, were published in the June 1981 issue of the AFT Farm and Food research (Kelly, 1981). The final results giving prices from 1978 to 1983 appeared in the June 1984 issue of Farm and Food Research (Kelly, 1984(a)).

As the number of transactions available in preparing this series was small, ranging from 65 in 1978 to 21 in 1980 (see Table A.1), it was not possible to classify prices by size of holding by region, or by soil class. Such classification was carried out by Kelly on a third series of prices which he prepared from a sample of land sales taken from the Valuation Office records.

Valuation Office Data

There is a statutory obligation on all solicitors involved in the sale of land or premises to return to the Revenue Commissioners certain details of each transaction on a standard Particulars Delivered (PD) Form. The Revenue Commissioners automatically submit copies of this form to the Valuation Office so that the latter body has a record of all sales of land and premises in the State.

The details recorded on the PD forms are:-

(1) Date of instrument.
(2) Names and addresses of vendors and purchasers.
(3) Consideration, including (a) capital payment, (b) any mortgage or debt, (c) rent, (d) tenure arrangement, if any.
(4) Precise situation of land in Townland, Electoral District, County.
(5) Rateable valuation of land and buildings.
(6) Area sold.
(7) Covenants by the purchaser or lessee.
(8) Folio number of registered land.
(9) In addition the OS number (the number of the 6 inch Ordnance Survey map on which the property is situated) is entered on the PD form when it is received in the Valuation Office.

The PD forms received from the Revenue Commissioners are classified in the Valuation Office into different use groups, such as: purchases for agriculture, forestry, industrial use, amenity use, office use, etc. This classification is made by the valuers on the basis of their experience, local knowledge and name of purchaser. In particular, the designation of land for forestry depends to a large extent on recognition of the name of the purchaser as being active in the forestry industry.

Activity in the Land Market

The estimated number of transactions in the agricultural land market, as recorded in the Valuation Office and given in Dr Kelly's reports for the years 1978 to 1984, is shown in Table 1. Comparable figures are not available for later years from this source. The table shows that the number of land transactions was exceptionally high in 1978 at a time when real agricultural output prices were at their highest level ever. Presumably, there was a strong demand for agricultural land at the time. High prices were offered and land was sold in response to these prices. The relationship between land prices, agricultural output prices and income arising in agriculture is discussed in a later chapter.

The number of transactions declined after 1978, presumably in response to the decline in real agricultural prices. In line with the decline in the number of transactions, the area of land traded for agricultural uses declined from 98,000 hectares in 1978 to 23,500 in 1983 but rose to 46,900 hectares in 1984. The area traded as a per cent of crops and pasture in the state dropped from 2.1 per cent in 1978 to 0.4 per cent in 1983 and rose to 1.0 per cent in 1984.

Table 1: *Estimated Number of Transactions in the Agricultural Land Market, Area of Land Traded and Area Traded as Percentage of Crops and Pasture in the State, 1978-1984**

Year	No. of Transactions	Average Area of each Parcel	Total Area Traded	Area traded as % of Crops and Pasture in State
	No.	ha	000 ha	%
1978	5527	17.39	97.9	2.1
1979	3477	12.29	42.9	0.9
1980	2501	17.80	44.5	0.9
1981	1933	22.14	42.9	0.9
1982	2301	13.33	30.8	0.6
1983	1969	11.93	23.5	0.4
1984	3630	12.97	46.9	1.0

* Comparable figures are not available for later years.
Source: Kelly 1983(a), 1983(b), 1984(b), Kelly and McIntyre, 1985.

Agricultural Land Prices Based on Valuation Office Records

Lists of the transactions in agricultural land were made available to Dr Kelly by the Valuation Office. Using a sample of these transactions, Kelly prepared his third series of land prices for the years 1978 to 1987, when due to cutbacks in the grant-in-aid to Teagasc, the series was discontinued.

The method of making the calculations is described in the Situation and Outlook Bulletin No. 5 of An Foras Taluntais (Kelly, 1983(a)). The land prices obtained from these calculations for the years 1978 to 1981 are presented in this publication also. Subsequent prices for the years 1982 to 1987 are given in An Foras Taluntais update series (Kelly, 1983b, 1984b, Kelly and McIntyre 1985, Kelly, McIntyre and Shanahan 1986, and 1987, and Kelly and Shanahan 1988). The procedures adopted in preparing these price series are outlined briefly below.

After selecting his sample from the Valuation Office records, Kelly did a further editing of the data by omitting transactions in Co. Dublin which he deemed were influenced very much by urban demand. Lands in other parts of the country fetching very high prices were also omitted. He reasoned that land at such high prices would be uneconomic for agriculture and that it must be purchased for other uses. He also omitted what he considered to be sales between relatives at very low prices.

Average annual prices per hectare based on the adjusted Valuation Office samples are compared with those from the other two sources in Appendix Table A.1, while these prices are presented in graphical form in Figure 1. This figure shows that for years where the series overlap (1970-1977) the prices from the auctioneers' sample are not greatly different from those from the Farm Management Survey. For the year 1979, the price from the Valuation Office sample is considerably lower than that from the auctioneers' returns, but for the other overlapping years (1980 to 1983) these two series are quite close. We have presented Dr Kelly's earlier figures here so as to have a series of land prices, going back to 1970, available in one single source. However, for those using the data we would recommend the auctioneers figures up to 1977 and the Valuation Office data for subsequent years.

Classification by Size and Province

Because he had several thousand transactions available from the Valuation Office, Dr Kelly could select a relatively large sample and was thus enabled to classify his price series by size of holding and province. These prices are given in Appendix Tables A2 and A3 and show that prices for the smaller sized holdings generally are higher than those for the larger ones and prices in Leinster are higher than those in Munster, while Munster prices are higher than those in Connacht or Ulster.

Classification by Use Range Class

Kelly also made a classification of the land sales by use range class based on the An Foras Taluntais soil classification which has been carried out in detail for 9 counties and in a more global form for the remaining 17 counties. In the soil survey, all the land in the State was classified into 44 associations and these have been recorded on a soil map using a different colour for each association whose number is also recorded on the map (AFT, 1980).

The 44 associations have been integrated by Gardiner and Radford (1980) into six use range groups and these groups were used by Dr Kelly in classifying land prices by use range class. The six use range classes are described below.

Class 1 - Wide use range - Soils in this range have no limitations which cannot be overcome by normal management practices.

Class 2 - Moderately wide use range - This use range refers to soil with minor limitations such as coarse texture, moderately high altitude, somewhat shallow depth, weak structure, etc.

Figure 1: Agricultural Land Price Series 1970-1987
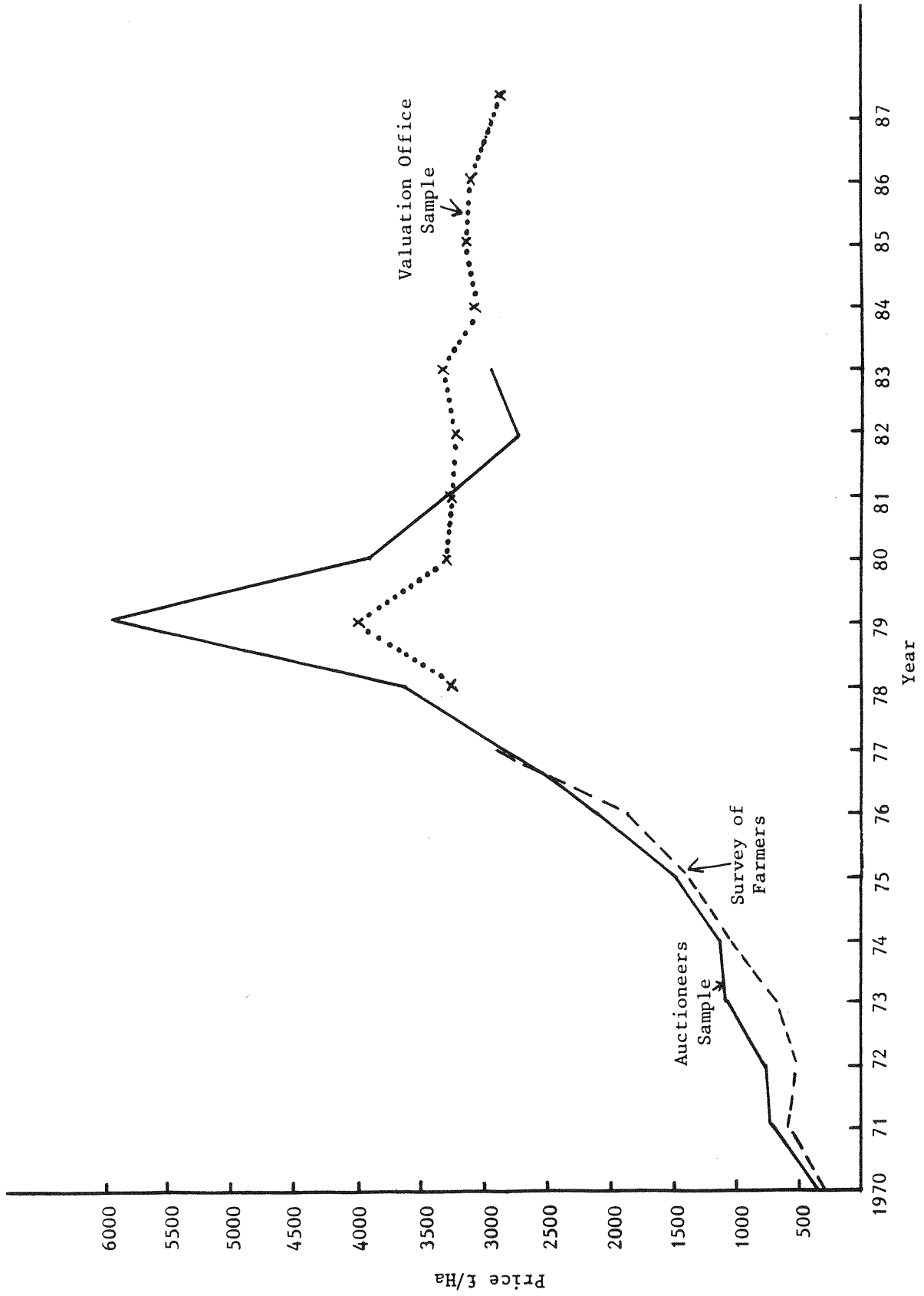
Class 3 - Somewhat limited use range - This class has similar limitations to those of Class 2 but to a greater degree. Soils with altitude limitations in this category usually occur between 150 and 365 metres. The more free-draining Drumlin associations are also in this category.

Class 4 - Limited use range - Soils in this category are generally unsuited to tillage but suited to a permanent grassland system. The predominant limitation is poor drainage except for Association 8 which is placed in this class because of somewhat high altitude combined with rock outcrops.

Class 5 - Very limited use range - This class contains those soils whose agricultural potential is greatly restricted. They are widespread in the western and north-western regions, particularly in the mountain zones where high altitude and steep slopes are major limitations. Much of the land in this class would be suitable for forestry.

Class 6 - Extremely limited use range - This class contains soils in which agricultural potential is virtually non-existent. These are mostly mountain top areas where steep slopes have contributed to the existence of very shallow soils with many boulders and rock outcrops. This class includes the Burren of Clare. Much of this land would be unsuitable for forestry.

The proportions of the different use range classes in each province are given in Appendix Table A4, while the numbers of the associations in each use class are given in Appendix Table A5.

Leinster has the highest proportion of Class 1 and Class 2 use range classes (54.3 per cent) with Munster second, having 39.5 per cent of its land in these classes. Connacht and Ulster have very high proportions of their lands in Classes 5 and 6, over 40 per cent, with much lower proportions in Classes 1 and 2.

In classifying transactions based on use range class, Kelly used two maps, the Ordnance Survey (OS) index map and An Foras Taluntais soil map. The OS index map shows in small numbered squares the location of every OS 6 inch map in the State. The soil map, as stated above, has a different colour and number for each of the 44 soil associations. Since the OS index number is included on the PD forms, this number is known for every parcel of land sold; hence, the location of any parcel can be found by reference to the OS index map.

Kelly had the index map reproduced on transparent acetate to exactly the same size as the soil map. By sliding

the acetate over the soil map, the approximate soil type of every parcel of land sold could be ascertained by locating its OS number on the index acetate and then reading off on the soil map the predominant soil association covered by this numbered square.

Where a square covered more than one soil association, it was difficult to determine the one to which the particular parcel of land belonged. However, Kelly said that this was rarely a problem since adjoining soil associations often belong to the same use range class.

Land prices classified by use range class for the years 1978 to 1987 are given in Appendix Table A6, while prices classified by use range class and province for the years 1986 and 1987 are given in Appendix Table A7.

Table A.6 shows that Class 1 land generally fetches the highest price except in 1978 and 1985 when the average price of Class 2 land was slightly higher. Class 5 and 6 lands have average prices which are less than half the price of Class 1 land. This indicates the wide range of land prices and how changes in the proportions of wide use and limited use land sold in different years could affect the overall average land price. Table A.7 shows that in Munster, in both 1986 and 1987, Class 1 land had a much higher price than Class 2 land whereas in Leinster in these years Class 1 and Class 2 land had about the same average price. The reliability of these prices is discussed in a later chapter.

Chapter 3

UPDATING THE AFT/TEAGASC AGRICULTURAL LAND PRICE SERIES

In updating the land prices produced by Dr Kelly, we contacted the Valuation Office and with the kind permission of the Commissioner, Mr James V. Rogers, we were given access, on a confidential basis, to whatever data we needed from that Office. On visiting the Office, we discovered that most of the data from the PD forms were now being computerised and printouts for these transactions were available for the years 1988, 1990 and 1991.* The 1989 data were not computerised and we had to extract a sample of these manually from the PD forms which are now stored on micro film.

The sample size for 1989 was determined on the basis of the standard deviations and confidence intervals calculated from the computerised data. We aimed to obtain a sample size which would give a confidence interval of less than 10 per cent of the provincial averages and at least 20 transactions for each county. The size of this sample worked out at 942 transactions. For the other years we used all the transactions on the computer printouts with the exception of those mentioned below.

Transactions Included in Agricultural Land Price Calculations, 1988 to 1991

To ensure that as far as possible purchases for non-agricultural use were excluded and to keep the prices comparable with those produced by Dr Kelly we edited the agricultural land transactions obtained from the Valuation Office to exclude all transactions in Co. Dublin, purchases by companies or business firms, all purchases at very high prices, over £14,000 per hectare and inter-family transactions at very low prices. The numbers and areas of the transactions included in the calculations classified by province are shown in Table 2.

The total number of transactions used in the price calculations in 1988 was 2,182, covering 29,737 hectares. This compared with 942 in 1989 covering 11,411 hectares, 2,856 in 1990 covering 31,735 hectares and 1,705 in 1991 covering 17,629 hectares.

* The records in the Valuation Office computer system while comprehensive are not exhaustive. Some transactions are excluded for one reason or another. For example if there is difficulty in identifying a particular property it is of little use for valuation purposes and it is excluded.

Looking at the provincial figures in Table 2 we note that in 1988 the number of transactions in Leinster was 791 compared with 744 in Munster. Connacht's transactions were 377 and those in Ulster (3 counties) 270. In 1990 transactions in Leinster were 1,106, in Munster 850, in Connacht 590 and in Ulster 310. The numbers in 1991 were much less than in these two years while those in 1989 were a sample covering almost half the 1988 numbers. The areas of the transactions in Leinster, in 1988 and 1990, averaged about 12,500 hectares, those in Munster averaged about 11,000 hectares; the average in Connacht was about 4,000 hectares and that in Ulster about 2,800 hectares. The areas in the other two years averaged 6,000 hectares in Leinster, 4,500 in Munster, 2,300 in Connacht and 1,500 hectares in Ulster (3 counties).

Table 2: *Number of Transactions and Area of Land Used in Calculating Agricultural Land Prices Classified by Province 1988-1991**

Year	Leinster	Munster	Connacht	Ulster	State
Number of Transactions					
1988	791	744	377	270	2,182
1989	335	265	190	152	942
1990	1,106	850	590	310	2,856
1991	652	487	374	192	1,705
Area (Hectares)					
1988	12,272	10,552	3,837	3,076	29,737
1989	4,673	3,391	1,752	1,595	11,411
1990	13,140	11,424	4,630	2,542	31,735
1991	7,596	5,566	2,979	1,488	17,629

* Excludes sales in Dublin County, those at very high and low prices and land purchased by business companies.

In a preliminary analysis of the data, the returns were segregated between those with and without buildings and the average prices for both groups compared. There was no significant difference between these averages. It was concluded, therefore, that a classification along those lines would not be necessary. Dr Kelly had a similar experience with his data. It is difficult to explain this result; the presence or absence of a good house must enhance the value of a property. There is likely to be a problem with the data here. As modern farm buildings are not valued for rates they would not be accounted for in whatever rateable valuation

might be reported on the PD forms. There would therefore be no means of ascertaining from the Valuation Office lists whether such buildings existed on a property or not. Hence a comparison of land prices with and without buildings may not be valid. If, however, we assume that agricultural land sales each year have similar classes of buildings then the overall average annual price trends should not be greatly affected by this problem.

Results, 1988-1991

Classification by Region, 1988-1991

The number of transactions per county and province, the county, provincial and national per hectare prices, the standard deviations and the confidence intervals around the average prices are given in Tables 3 and 4. Looking first at the prices, we note that for the State as a whole the average per hectare land price was £3,012 in 1988, £3,607 in 1989, £3,709 in 1990 and £3,634 in 1991, a rise of about £600 per hectare over the three-year period.

Looking at the provincial prices, we see that there was little difference between the average price of land in Leinster and Munster in 1988 (£3,123 and £3,202 per hectare, respectively). The average price in that year in Ulster was £2,748 per hectare while that in Connacht was £2,476 per hectare. In 1989 the average price per hectare was higher in Leinster than in Munster and again in Ulster than in Connacht. In 1990 Leinster prices were again higher than in Munster, and Ulster prices higher than those in Connacht. Similar relationships occurred in 1991.

Turning to the county prices, we note that Wicklow had the highest per hectare land price in 1988 (£4,020 per hectare) while Leitrim had the lowest (£1,737 per hectare). Other counties with relatively high land prices (over £3,200 per hectare) in that year were Kerry, Kildare, Carlow, Kilkenny, Louth, Meath, and Cork. Counties, in addition to Leitrim, with relatively low land prices in 1988 (less than £2,475 per hectare) were Roscommon and Offaly.

Kilkenny had the highest average price in 1989, Louth in 1990 and Limerick in 1991. Leitrim had the lowest average prices in all the years.

We look next at the standard deviations of the different prices. These are large relative to the prices indicating wide variations in land prices in the different counties. The price variations are, as stated above, due to a number of factors but since purchases for non-agricultural purposes have, as far as possible, been eliminated, a good deal of the variation must be due to the quality of the land sold and

Table 3: *County, Provincial and National Agricultural Land Prices, Number of Transactions, Standard Deviations and Confidence Intervals 1988 and 1989*

County and Province	1988				1989			
	T No.	Price £/ha	SD £/ha	CI± £/ha	T No.	Price £/ha	SD £/ha	CI± £/ha
Carlow	40	3,408	1,090	339	22	4,097	1,667	697
Kildare	59	3,432	1,680	430	31	4,022	2,198	774
Kilkenny	71	3,331	1,258	292	29	4,861	2,791	1,016
Laois	69	2,856	1,285	304	30	3,069	1,094	391
Longford	30	2,723	937	336	20	2,475	1,061	465
Louth	46	3,442	1,552	447	30	4,306	1,729	619
Meath	192	3,341	1,250	178	69	4,304	1,871	441
Offaly	57	2,310	1,013	262	32	2,832	1,205	418
Westmeath	73	2,550	1,174	269	22	3,926	1,590	664
Wexford	97	2,763	838	166	29	3,602	1,705	621
Wicklow	57	4,020	2,202	571	21	4,256	2,974	1,272
Leinster	791	3,123	1,411	99	335	3,940	2,053	227
Clare	105	2,503	1,339	257	45	2,879	1,307	382
Cork	231	3,366	1,450	199	73	3,596	1,747	401
Kerry	81	3,795	1,636	356	25	4,081	2,242	879
Limerick	129	3,183	180	259	39	3,835	2,073	651
Tipperary	154	3,043	1,055	166	58	3,526	1,964	505
Waterford	44	2,545	1,144	339	25	3,523	1,377	540
Munster	744	3,202	1,423	101	265	3,546	1,839	221
Galway	126	2,706	1,255	220	48	3,429	1,389	393
Leitrim	34	1,737	613	205	23	2,312	817	334
Mayo	90	2,473	1,137	235	44	2,994	1,351	399
Roscommon	68	2,216	1,082	257	40	2,697	918	284
Sligo	59	2,837	1,399	356	35	2,907	1,335	442
Connacht	377	2,476	1,211	121	190	2,915	1,261	179
Cavan	126	2,760	1,129	198	66	3,031	2,392	577
Donegal	79	2,685	1,371	301	48	3,216	1,588	449
Monaghan	65	2,849	1,063	259	38	3,365	2,041	649
Ulster	270	2,748	1,198	143	152	3,169	2,039	324
STATE	2,182	3,012	1,391	59	942	3,607	1,917	124

Note:
  T = No. of Transactions; SD = Standard Deviation.
  CI = Confidence Interval at the 95 per cent level.

Table 4: *County, Provincial and National Agricultural Land Prices, Number of Transactions, Standard Deviations and Confidence Intervals 1990 and 1991*

County and Province	1990				1991			
	T No.	Price £/ha	SD £/ha	CI+ £/ha	T No.	Price £/ha	SD £/ha	CI+ £/ha
Carlow	46	5,196	2,108	610	34	4,387	1,732	582
Kildare	68	4,685	1,727	410	57	4,421	2,246	583
Kilkenny	144	4,146	1,932	316	66	3,682	1,410	340
Laois	60	4,020	1,604	405	63	3,677	1,515	374
Longford	59	2,916	1,240	316	28	3,208	1,457	540
Louth	51	5,691	1,994	546	39	4,184	1,840	577
Meath	231	4,700	2,039	262	108	4,278	1,639	309
Offaly	73	2,982	1,450	234	62	3,491	2,074	516
Westmeath	108	2,074	1,092	205	74	3,100	1,108	252
Wexford	199	4,554	1,730	240	81	3,855	1,495	326
Wicklow	67	3,776	1,631	390	40	4,117	2,143	664
Leinster	1,106	4,230	1,910	111	652	3,843	1,731	134
Clare	101	3,153	1,663	324	68	2,834	1,100	261
Cork	243	3,476	2,874	361	156	4,066	2,312	363
Kerry	96	3,405	1,819	363	57	2,896	1,707	443
Limerick	123	2,698	2,543	450	64	4,575	1,734	425
Tipperary	213	3,956	1,700	227	118	3,931	1,604	289
Waterford	74	4,655	1,685	383	24	3,901	1,645	658
Munster	850	3,484	2,372	161	487	3,816	1,943	173
Galway	200	3,375	1,478	205	89	3,297	1,618	336
Leitrim	48	2,182	1,596	452	38	2,119	1,028	327
Mayo	123	3,071	1,626	287	91	2,966	1,347	277
Roscommon	134	2,953	1,280	217	109	2,785	1,221	229
Sligo	85	3,091	1,621	343	47	3,017	1,570	449
Connacht	590	3,064	1,534	124	374	2,907	1,416	144
Cavan	101	3,190	1,433	279	69	2,900	1,178	287
Donegal	111	2,866	1,418	264	74	2,978	1,483	338
Monaghan	98	3,794	1,759	348	49	3,986	1,863	522
Ulster	310	3,222	1,564	173	192	3,205	1,558	220
STATE	2,856	3,709	2,071	77	1,705	3,634	1,777	84

Note:
   T = No. of Transactions; SD = Standard Deviation.
   CI = Confidence Interval at the 95 per cent level.

whether or not the holdings had milk quotas. The confidence
intervals, which are the ranges within which the average
prices of other samples drawn from the same populations could
be expected to occur are calculated from the following
formula:

$$C = 1.96 \sqrt{\frac{S^2}{n} \left(1 - \frac{n}{N}\right)}$$

where C = the confidence interval,
      S = the standard deviation of the price,
      n = the sample size which in this case is the number
          of transactions in each area in each year, and,
      N = the total population, i.e., the number of land
          holdings in each area which could be offered for
          sale in any year.

In calculating the confidence intervals we assume that
the number of transactions (n) in the different counties in
any year are random samples of the number of holdings in the
counties which could have been offered for sale in that year
(N). Furthermore, we assume that n is a very small fraction
of N. The assumption of randomness is questionable since
various factors could influence land sales in any year, such
as changes in the Common Agricultural Policy, changes in
agricultural output prices, etc. It is not known if these
factors have influenced the pattern of sales in recent years
but the possibility should be kept in mind.

Looking now at the actual confidence intervals (CIs) in
Tables 3 and 4, we note that they are quite low for the
national and provincial averages because the number of
transactions in these areas is relatively large. The county
CIs on the other hand are much larger because the number of
transactions in each county is relatively small. However, in
all years (except for Kilkenny and Wicklow in 1989), the CIs
are all within 20 per cent of the average prices and in the
three years 1988, 1990 and 1991 a high proportion of the
county CIs are very close to, or within, 10 per cent of the
county averages. Because of the smaller number of holdings
used in the calculations in 1989, none of the county CIs in
that year is within 10 per cent of the average prices. Hence,
for the three years 1988, 1990 and 1991 the county averages
are fairly robust but they do not permit further
classification into smaller groups

Classification by Size of Holding, 1988-1991

The number of transactions classified by size of holding
and by province for the four years 1988-1991 is given in
Table 5 together with the percentage of transactions in each
size group in the State in these years. The table shows that
the total number of transactions in the different size groups

Table 5: *Number of Agricultural Land Transactions Classified by Size Group and by Province, 1988 to 1991*

Province	Size Group (Hectares)					
	0-4	4-8	8-12	12-20	20+	All Sizes
1988						
Leinster	71	207	164	176	173	791
Munster	79	210	135	157	163	744
Connacht	44	143	99	64	27	377
Ulster	30	106	66	42	26	270
State No.	224	666	464	439	389	2182
%	10.3	30.5	21.3	20.1	17.8	100
1989						
Leinster	31	100	73	63	68	335
Munster	28	89	44	56	48	265
Connacht	34	71	43	33	9	190
Ulster	23	60	34	18	17	152
State No.	116	320	194	170	142	942
%	12.3	34.0	20.6	18.0	15.1	100
1990						
Leinster	239	341	169	187	170	1106
Munster	192	237	137	152	132	850
Connacht	193	197	105	66	29	590
Ulster	88	115	51	33	23	310
State No.	712	890	462	438	354	2856
%	24.9	31.2	16.2	15.3	12.4	100
1991						
Leinster	140	199	115	103	95	652
Munster	110	131	95	83	68	487
Connacht	106	132	80	43	13	374
Ulster	50	70	44	21	7	192
State No.	406	532	334	250	183	1705
%	23.8	31.2	19.6	14.7	10.7	100

varied considerably over the four years. In 1988 and 1989 10-12 per cent of the transactions were in the 0-4 hectare group, while in 1990 and 1991 the proportions in this group had about doubled. The proportions in the 4-8 hectare group remained fairly constant over the years but the proportions in all the other groups declined slightly over the period.

Agricultural land prices classified by size of holding for the four years 1988-1991 are given in Table 6. For the State as a whole, in all the years, the smaller sized holdings had higher average prices than the larger ones, except for 1989, when the 20+ ha holdings had a higher price than the 12-20 size group.

In all the provinces in these years average prices for the 0-4 ha size group were higher than for any of the other groups but for the other size groups in some years the larger holdings had higher average prices than some of the smaller ones. For example, in 1989, the 8-12 ha size groups in Leinster and Munster had higher average prices than the 4-8 ha groups. Similarly, in Connacht in 1988 and in Ulster in 1991 the prices for the 12-20 ha group were higher than those for the 8-12 ha group. Again in 1988 and 1989 a number of 20+ ha size group averages were higher than the corresponding 12-20 ha group averages. As a general rule, however, it can be said that smaller holdings fetch higher prices than larger ones.

Because the smaller sized holdings have higher per hectare prices than the larger ones, changes in the proportions of large and small holdings sold in different years could be expected to influence the overall provincial and national land prices in these years. To test this hypothesis we weighted the size group prices for 1988 and 1990 by constant weighting factors in both years, only to discover that this process had little effect on the overall provincial and national land price trends in the two years. The increase in the number of very small holdings in 1990 had little influence on the overall 1990 price which is a weighted average of all the transactions. We decided, therefore, to present the unadjusted prices for all years.

Classification of Transactions by Use Range Class, 1988 and 1990

For this classification we adopted the soil map technique designed by Dr Kelly. Because this technique is very laborious, we experimented with the method for two years 1988 and 1990 using a random sample of 866 transactions in each year. The sample size was determined on the basis of the provincial size group confidence intervals. We tried to arrive at the number of transactions in each provincial size group which would give average sample prices within one-tenth

Table 6: *Agricultural Land Prices Classified by Size Group*
and by Province, 1988-1991 (£/ha)

Province	Size Group (Acres)					
	0-4	4-8	8-12	12-20	20+	All Sizes
			1988			
Leinster	4458	3467	3304	3015	3010	3123
Munster	4366	3511	3333	2891	3086	3202
Connacht	3951	2797	2793	2308	2315	2476
Ulster	3492	3202	2548	2538	2671	2748
State	4193	3294	2985	2827	2968	3012
			1989			
Leinster	4479	4263	4443	3339	3938	3940
Munster	4335	4148	4231	3532	3095	3546
Connacht	3872	3264	2595	2540	3146	2915
Ulster	4155	3375	3261	2646	3124	3169
State	4204	3849	3776	3176	3518	3607
			1990			
Leinster	5051	4349	4233	4211	4109	4230
Munster	4801	4594	4594	3805	2706	3484
Connacht	4038	3437	2965	2718	2525	3064
Ulster	4043	3484	3328	2955	2755	3222
State	4581	4109	3961	3756	3321	3709
			1991			
Leinster	4519	4144	3827	3853	3662	3843
Munster	4922	4637	4022	3875	3267	3816
Connacht	4273	3030	2861	2628	2304	2907
Ulster	3893	3778	2669	2986	2991	3205
State	4482	3954	3503	3593	3388	3634

of the average provincial size group prices given in Table 5. It was not possible to do this for all size groups because of small numbers of transactions.

In presenting the use range class data, we adopted the Gardiner and Radford Classification described above, namely (1) wide use, (2) moderately wide use, (3) somewhat limited use, (4) limited use, and (5 and 6) very-extremely limited use. The number of transactions in each of these use range classes in 1988 and 1990 classified by province is given in Appendix Table A.8 and by size of transaction in Table A.9. Average prices per hectare in 1988 and 1990 classified by use range class and by province are given in Table 7, and by use range class and by size of transaction in Table 8.

Table 7: *Average Price (£ per hectare) of Agricultural Land Classified by Use Range Class and Province in 1988 and 1990*

	Use Range Class				
Province	1	2	3	4	5&6
	1988				
Leinster	3949	4070	3158	2375	1851
Munster	4117	3501	2495	2451	1515
Connacht	4087	3603	3212	2083	1730
Ulster	4421	3538	3388	2343	1532
State	4077	3800	3106	2333	1700
	1990				
Leinster	4883	4628	3573	3375	1950
Munster	3514	3951	3593	3096	1932
Connacht	4038	3919	3674	2602	1401
Ulster	3768	3422	4119	2963	1774
State	3993	4164	3662	3029	1722

Table 7 shows that, in general, prices for Class 1 land were greater than those for Class 2 land, Class 2 prices were greater than those for Class 3, and so on. However, in Leinster in 1988 and in Munster in 1990 Class 2 land had a

higher price than Class 1 land. While in Ulster in 1990
Class 3 land had a higher price than either Class 1 or
Class 2 land. As a result of the relatively high price for
Class 2 land in Munster in 1990 the estimated State price for
Class 2 land was higher than that for Class 1 land in that
year. This result throws some doubt on the validity of the
method adopted.

Looking at Table 8, which gives use range class by size
of transaction, we note again that in general the wide use
range lands have higher prices than the narrow use range
parcels. However, in both 1988 and 1990 Class 2 land had a
higher price than Class 1 land on the over 20 hectare
holdings. This again throws some doubt on the validity of the
classification method, particularly between Class 1 and Class
2 lands. The reliability of this classification is examined
below.

Table 8:   *Average Price of Agricultural Land (£/hectare)*
           Classified by Use Range Class and by Size of
           Transaction 1988 and 1990

Size of Transaction (Hectares)	Use Range Class				
	1	*2*	*3*	*4*	*5&6*
	1988				
0-4	5266	4265	3610	3531	2360
4-8	4450	4075	3410	2637	2234
8-12	4109	3390	3291	2476	1715
12-20	4015	3412	2842	2254	1443
20+	3842	3976	3091	2177	1680
All Sizes	4077	3800	3106	2333	1700
	1990				
0-4	5794	5083	4292	4174	2402
4-8	5132	4599	2763	3944	2246
8-12	5080	4255	4213	2948	1997
12-20	5318	4475	3477	2871	1908
20+	3222	3726	3504	3042	1327
All Sizes	3993	4164	3662	3029	1722

Testing the Reliability of the Use Range Classification

In order to test the reliability of the soil map method of classifying holdings we carried out a more detailed method of classification in Johnstown Castle with the kind permission of Dr John Lee, Head of the Centre, who advised on the procedure. In making this classification, the transactions were identified on townland rather than DED soil survey records (which are available for 9 counties) and were then allocated to the main soil associations in these townlands. The soil associations were later grouped to give the same use range classes as those in Tables 7 and 8.

The work carried out in Johnstown Castle was very time consuming, taking one of the authors about 7 weeks to classify all the 1990 transactions (827) in the 9 counties (Wexford, Carlow, Clare, Meath, Westmeath, Kildare, Laois, Leitrim and Limerick). These transactions were also classified into the same categories, using the soil map method (which is based on DEDs rather than townlands), and the two results compared. The comparisons are given in Table 9. This table shows that the two methods of classifying the transactions give very different results except for Classes 5 and 6. On the basis of the average prices, the Johnstown Castle (JC) method would appear to be the more accurate since prices decline as quality of land disimproves. This is not the case with the soil map (SM) method where average prices for Class 2 and Class 3 lands are higher than those for Class 1 land.

When we examine the number of transactions in each use range class there is also a wide discrepancy between the two methods of classification. The JC method gives 446 holdings in Class 1, whereas the SM method puts only 267 of the holdings in this class. In Class 2, the numbers were 65 for the JC method and 177 for the SM method. There were wide differences also in Classes 3 and 4 but the numbers were practically the same for the two groups in Classes 5 and 6.

There seems to be an anomaly also in relation to the price of Class 5 and 6 lands, one would expect this to be the type of land purchased for forestry yet its price when purchased for agriculture as shown in Table 9 is about twice the price of land purchased for forestry (see Table 12). This situation could be due to the fact that there are dwellings on these lands when purchased for agriculture whereas forestry land is usually purchased without dwellings, the latter being retained by the vendor or sold separately.

Because of the different results obtained using the two methods we would not recommend the publication of an annual series of agricultural land prices classified by use range class where the classifications are made using available soil records. The error involved in giving a holding the same

Table 9: *Comparison of Agricultural Land Prices in 1990 Classified by Use Range Class[1] Based on the Johnstown Castle[2] and the Soil Map[3] Methods of Classification*

	Use Range Class[1]					
	1	*2*	*3*	*4*	*5 & 6*	*All Classes*
	Price £/ha					
Johnstown Castle Method[2]	4552	4025	3185	2980	2088	3870
Soil Map Method[3]	4087	4712	4117	2995	2098	3870
	Number of Transactions					
Johnstown Castle Method[2]	446	65	220	51	45	827
Soil Map Method[3]	267	177	135	193	55	827

1. Use range classes as defined by Gardiner and Radford 1980.
2. Johnstown Castle method uses townland soil records.
3. Soil map method uses DED soil records.

classification as the townland or the DED in which it is located must be very high, particularly when it is considered that management factors such as fertilisation and drainage can affect land quality considerably. Also, on many farms there are different classes of soil ranging from very good upland fields to poor quality lowland boggy or rocky lands.

It is our view that if prices based on land quality are to be published on a regular basis, the classification of holdings should be based on visual inspection by an expert. However, the benefit/cost ratio of such an inspection is unlikely to be positive. For certain purposes, however, where too much accuracy is not required, the soil map method can be used to classify land. It appears as shown in Tables 7 and 8 generally to price the land on the basis of quality.

Chapter 4

THE WORKING OF THE AGRICULTURAL LAND MARKET

It was stated above when discussing the data in Table 1 that there appeared to be a relationship between the amount of land sold for agricultural purposes and the price of land. The relationship is shown in diagrammatic form in Figure 2 where an index of the area of land traded for agricultural purposes is compared with an index of real land prices for the years 1978 to 1991. The data on which this figure is based are given in Appendix Table A.10. The area of land traded for years prior to 1978 is not available. Figure 2 shows that the index of real agricultural land prices (land prices deflated by the Consumer Price Index) and the area of land traded tend to move in the same direction and even though they diverge somewhat in the earlier years, the correlation coefficient between the two series (0.56) is significant at the 5 per cent level. If this correlation is carried out using a one-year lagged price for land, the coefficient is 0.77 which is significant at the 1.0 per cent level. Though it is impossible to determine causation this relationship would seem to indicate that when real land prices rise, extra land is sold and vice versa when prices fall.

Of course, a certain amount of land comes on the market each year as a result of deaths, family settlements, etc. Except for these forced sales, the remaining land stock is relatively static but can be activated in some cases by demand expressed in the form of increased prices. In other words, if the prices offered are considered good, certain people will sell land, otherwise they will hold on to it. What we get then is an agricultural land supply curve fairly inelastic at low prices where the only land traded is that due to forced sales but becoming more elastic as prices rise and people are prepared to sell voluntarily (Higgins, 1979).

The supply curve is fairly constant over time but it can shift as a result of changes in expectations about future land prices, the introduction of government policies which change the cost of holding land (land tax) or because more people see land as an appreciating asset in inflationary times (ibid, p. 14).

On the other hand, it would appear that the demand for agricultural land is influenced by the economic conditions ruling in different years, i.e., levels of agricultural prices and/or farm incomes.* When agricultural conditions are

* A number of other factors may influence demand such as purchasers' expectations about future growth in the value of land and expectations about technical and price changes, credit restrictions, etc.

Figure 2

Real Land Price Index Related to Area Traded for Agriculture
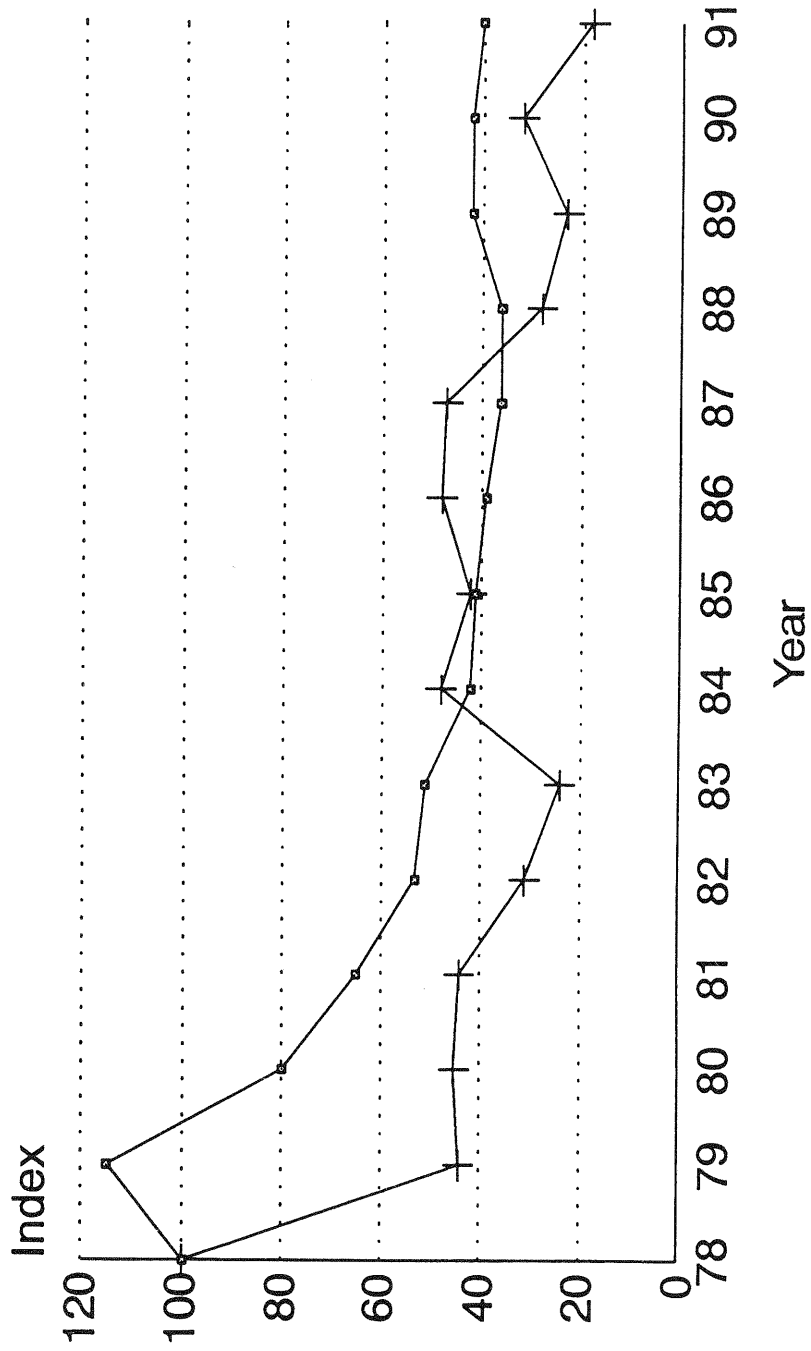
Correlation Coefficient=0.56

favourable, demand for farm land can be expected to rise, causing an increase in land prices and vice versa, when economic conditions are unfavourable. Because of collinearity in the available data it is not possible to derive meaningfuldemand and supply curves for land and so we must rely on graphical analysis.

The relationship between agricultural land prices and economic conditions as represented by agricultural output prices and income arising at current prices (each expressed in index form) is shown in Figure 3 for the years 1970 to 1991. We have included the years 1970 to 1977 in the analysis so as to have as long a series as possible. For the earlier years we have used Dr Kelly's land prices based on auctioneers' returns, given in Appendix Table A.1. (All the data for Figure 3 are given in Appendix Table A.10.)

Figure 3 shows that between 1970 and 1972 agricultural land prices moved closely in line with output prices and income arising in agriculture. From 1973 to 1979 (in the early EC years) land prices rose much faster than the other two series. Between 1979 and 1984 land prices declined erratically, while output prices and income arising increased. Thereafter, the three series move more or less in line with each other, with the income arising index, in particular, tracking land prices fairly closely. Over the whole period 1970 to 1991 the correlation coefficient between land prices and agricultural output prices is 0.88 and between land prices and income arising it is 0.78. Both these coefficients are significant at the 1.0 per cent level. It seems, therefore, that as might be expected, agricultural land prices are strongly influenced by agricultural prices and incomes.

Figure 3

Agricultural Land Price, Output Price and Income arising indices
(1970 = 100)

-■- Land Price Index + Agricultural Output Px * Income Arising Index
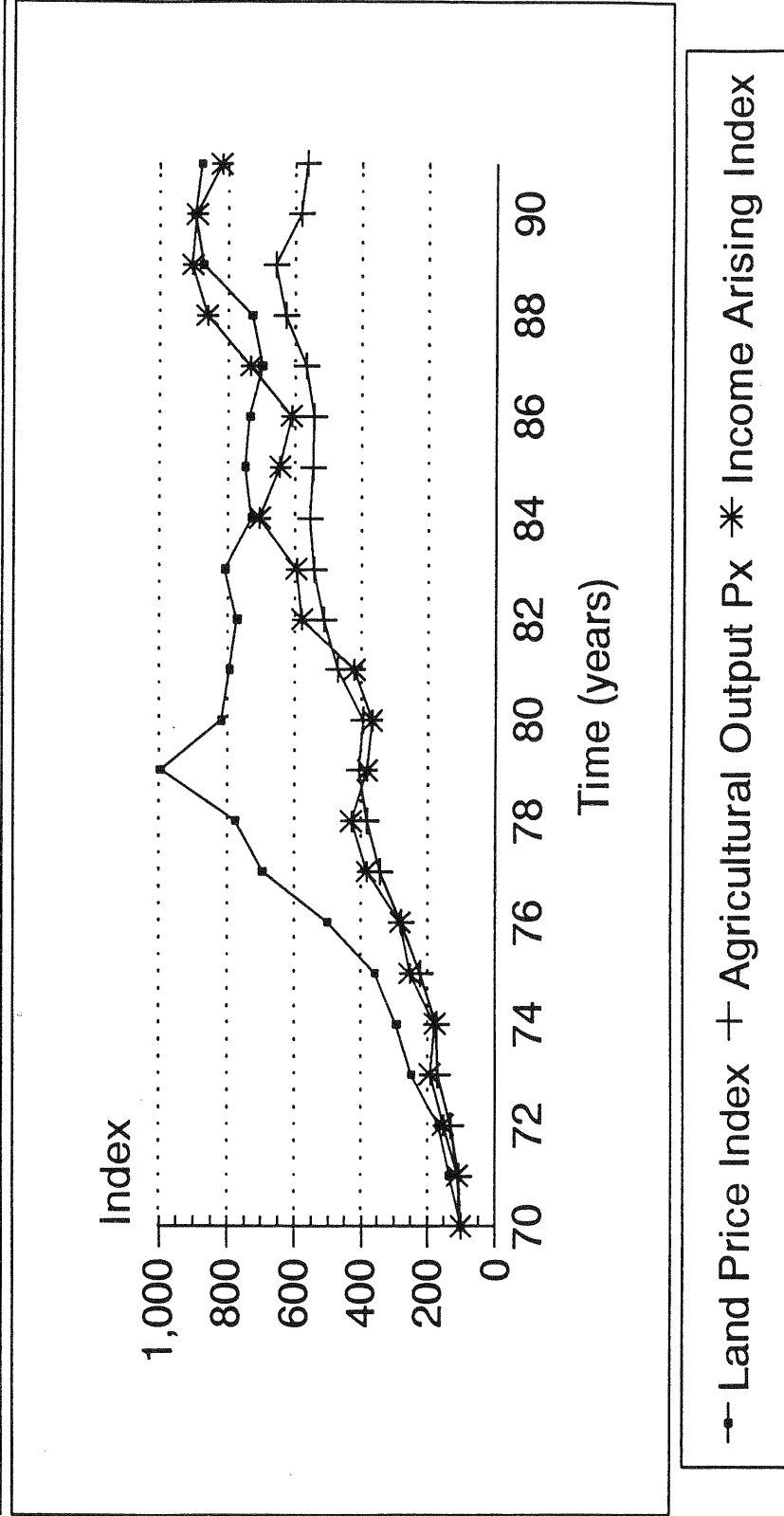
Correlation Coefficients
Land Price Index on Income Arising Ind.=0.78
Land Price Index on Agri. Output Price Ind.=0.88

Chapter 5

FORESTRY LAND PRICES

As stated above, forestry land prices are also being computerised in the Valuation Office since 1988 and we were very kindly given access to the computer printouts for the three years 1988, 1990 and 1991. The 1989 prices were not computerised but as they had been classified in the Valuation Office, it was not a difficult job to extract them manually from the records. All the transactions relate to lands which *were purchased* for forestry purposes by the Department of Energy, Coillte, companies and individuals. They do not relate to land which might be deemed suitable for forestry, but was purchased for other uses.

In order to prepare a more long-term series of forestry land prices, we extracted manually from the Valuation Office records as many forestry land prices as we could identify as such for the years 1984 to 1987. All the land prices for those years were stored on micro films and it was a matter of going through these films and picking out the required transactions. This proved to be a very time-consuming operation as the identification had to be made on the basis of the names of the purchasers such as the Department of Forestry, the known forest companies and the investing Institutions. Lands purchased for forestry by private individuals could not be identified and had to be omitted.

It proved too difficult to extract forestry land prices for years prior to 1984 from the available records but in order to have a series of prices similar to those for agricultural land, we extended the series back to 1978 by reference to forestry land purchases by the Department of Forestry which was the main buyer of forestry land in these years. These prices were calculated by dividing the amount paid for land by the Department given in the Government Appropriation Accounts by the area of land purchased given in the Department's Annual Reports. It was not possible, however, to classify these unit prices by size group or by region.

Forestry Land Prices 1978-1983

The area of land acquired by the Department of Forestry, the amount paid and the unit prices for the years 1978 to 1983 are given in Table 10 which shows that unit price rose from £108 per hectare in 1978 to £515 in 1983. The area of land acquired for forestry in those years rose from about 3,400 ha in 1979 to about 9,300 ha in 1982.

In doing the provincial classifications, Connacht and Ulster figures had to be combined; there were too few transactions in Ulster in most years to give reasonably accurate results.

Forestry Land Prices Classified by Province

The provincial and national per hectare prices, the standard deviations and the confidence intervals around the average prices are given in Table 12. Looking first at the State prices, we note that they rose from £600 per hectare in 1984 to £1,203 in 1991, a rise of about 100 per cent over the eight-year period. Some of this rise may be due to inflation but some is probably also due to the quality of the land purchased. It is generally agreed that better land is now being purchased for forestry than in the early 1980s.

Table 12 shows that in practically all years the Munster prices were higher than those in the other provinces while in 5 of the 8 years, Leinster prices were higher than those in Ulster/Connacht.

In the early years the standard deviations are large relative to the prices, indicating wide variations in the prices in the different provinces in those years. In more recent years the standard deviations are relatively much smaller, indicating that buyers are now more interested in uniform quality land for forestry than heretofore.

Looking at the confidence intervals, we note that they are quite low for the average State prices. In all years they are within about 10 per cent of these prices and in 1990 they are within 5 per cent of that year's price. The confidence intervals for the provincial prices are relatively high, particularly those for Leinster. In the 4 years 1984 to 1987 the confidence intervals are well over 20 per cent of the Leinster prices. In the other 4 years 1988-1991 they are between 20 and 10 per cent of the average prices. The Munster confidence intervals are much smaller than those for Leinster. In none of the years are they greater than 20 per cent of the average prices and in 4 years they are less than 10 per cent of the averages. Ulster/Connacht confidence intervals are somewhat similar to those for Munster. The relatively high confidence intervals for Leinster are due more to the small number of transactions in that Province than to the variation in the land prices.

Table 12: *Forestry Land Prices, Standard Deviations, and Confidence Intervals Classified by Province 1984-1991*

Province	Price £/ha	SD £/ha	CI± £/ha	Price £/ha	SD £/ha	CI± £/ha
		1984			1985	
Leinster	530	427	138	599	607	225
Munster	816	415	111	751	414	102
Ulster/Conn.	538	401	82	738	447	123
State	600	425	61	707	486	80
		1986			1987	
Leinster	678	453	162	867	608	243
Munster	883	403	100	905	290	73
Ulster/Conn.	534	382	101	668	449	106
State	687	428	68	796	394	62
		1988			1989	
Leinster	1,047	297	146	1,114	290	159
Munster	1,029	537	203	1,258	302	120
Ulster/Conn.	945	335	100	973	389	154
State	994	408	86	1,022	444	78
		1990			1991	
Leinster	1,208	507	178	1,141	467	159
Munster	1,177	487	93	1,258	512	120
Ulster/Conn.	1,081	425	73	1,174	679	154
State	1,130	461	55	1,203	570	84

SD = Standard Deviation;
CI = Confidence Interval at 95 per cent level.

Forestry Land Prices Classified by Size of Transaction

Forestry land prices classified by size of transaction are given in Table 13. The standard deviations and confidence intervals around these prices are also given in this table which shows that in all years except 1989 the 0-10 hectare size group prices were generally higher than those for the 20-40 hectare group, while prices for the 40+ hectare group

Table 13: *Forestry Land Prices, Standard Deviations and Confidence Intervals, Classified by Size Group 1984-1991*

Size Group (Hectares)	T No.	Price £/ha	SD £/ha	CI+ £/ha	T No.	Price £/ha	SD £/ha	CI+ £/ha
		1984				*1985*		
0-10	58	1,067	649	167	33	1,293	1,042	355
10-20	58	951	306	79	44	942	256	76
20-40	42	862	388	117	36	997	270	88
40+	26	400	276	106	29	510	404	147
All Sizes	184	600	425	61	142	707	487	80
		1986				*1987*		
0-10	26	1,065	172	66	46	1,085	301	87
10-20	53	984	375	101	52	954	285	77
20-40	43	944	292	87	41	918	301	92
40+	25	443	356	140	15	536	391	198
All Sizes	147	687	428	69	154	796	394	62
		1988				*1989*		
0-10	29	1,186	427	180	33	1,170	135	46
10-20	32	1,119	494	171	39	1,222	610	191
20-40	22	922	268	112	41	1,113	324	99
40+	3	704	281	318	11	737	368	217
All Sizes	86	994	408	86	124	1,022	444	78
		1990				*1991*		
0-10	77	1,412	529	118	78	1,467	515	114
10-20	98	1,318	528	105	57	1,430	668	173
20-40	64	1,177	433	106	26	1,269	430	165
40+	29	963	353	128	17	961	484	230
All Sizes	268	1,130	461	55	178	1,203	570	84

T = No. of Transactions; SD = Standard Deviation;
CI = Confidence Interval at the 95 per cent level.

were lower than for any of the other groups. Because the number of transactions in the 40+ size group are less than 20 in 1987, 1988, 1989 and 1991 we cannot place much reliance on the average prices for this group in those years, particularly in 1988 when there were only 3 transactions for the 40+ size group.

For most of the size groups, the standard deviations and the confidence intervals are relatively low. For the 0-10 ha group the CIs are less than 10 per cent of the average prices in 5 of the 8 years. In only 1 year - 1985 - is the CI over 20 per cent of the price.

For the 10-20 ha group the CIs are less than 10 per cent of the average prices in 4 of the 8 years and in no year is any of them greater than 16 per cent of its average price. The results are similar to this for the 20-40 ha size group, four results being under 10 per cent and the other four between 10 and 14 per cent of the average prices. For the 40+ ha size group, on the other hand, only one CI is under 20 per cent of the average price while three are over 30 per cent and one of these is 45 per cent of the average. The average price for this group was therefore not very reliable.

As a general comment on the forestry land prices, it can be said that both the provincial and size group averages are fairly robust except for the 40+ hectare group. It is expected, therefore, that in future years the Valuation Office data can be used to give reliable average provincial and size group prices. Unfortunately, the number of transactions in any year is unlikely to be sufficient to give reliable county averages.

Forestry Land Prices Classified by Potential Yield Class

On the basis of figures received from Coillte Teo and from some of the large private forestry companies, it was possible to prepare forestry land prices classified by potential yield class for the years 1987-1991. Yield class here is defined as the potential production of sitka spruce from a given area of land in cubic metres per hectare per annum. Thus a parcel of land with a yield class of 18 would produce 18 cubic metres of sitka spruce per ha/annum. Land with a potential sitka spruce yield class of 20 or over is considered to be very productive forestry land. For many years the average sitka spruce yield class of land planted in Ireland was reckoned to be about 14. In more recent years the average is estimated at about 20. Some of the poorer lands, particularly boglands, are no longer being planted by Coillte or the commercial companies. Potential yield class is estimated by Coillte and the purchasing companies at time of purchase on the basis of inspection by expert foresters.

Table 14: *Forestry Land Prices Classified by Potential
Yield Class 1987-1991*

Yield Class*

Year	14 or less	16	18	20	22	24+	All Classes
				£/ha			
1987	305	439	586	699	904	1116	796
1988	352	566	670	852	1030	1296	994
1989	308	587	643	840	992	1267	1022
1990	560	722	871	1021	1292	1518	1130
1991	na	813	886	1101	1348	1656	1203
All years (simple average)	381	625	731	903	1113	1371	1048
Index	100	164	192	237	292	360	275

* Yield class here is defined as the potential production of
sitka spruce from a given area of land in cubic metres per
hectare per annum.

Forestry land prices classified by potential sitka
spruce yield class are given in Table 14 which shows that in
all the years the higher yield class lands fetch higher
prices than the lower classes. The rise in price between
1987 and 1981 for the 16 yield class is much higher than that
for the 22 or for the 24 yield class. However, the rise in
the 16 yield class price is from a very low base. When
yield class prices are averaged for the 5 years shown and
the averages expressed in index number form, the indices
range from 100 for the under 14 yield class to 357 for the
24+ yield class - a more than threefold increase.

Chapter 6

FACTORS INFLUENCING AFFORESTATION AND THE PRICE OF FORESTRY LAND

Series of forestry statistics for the years 1978 to 1991 are given in Table 15. This table shows that land traded for forestry increased from 7,219 hectares in 1978 to 11,360 hectares in 1991. The bulk of this increase was in private trading. Public purchases remained more or less constant over the period, increases in some years being followed by sharp declines in other years depending on the amount of exchequer money available for land purchase.

Similarly annual public afforestation (first time planting) remained static over the period with declines in some periods being followed by rises in others. The highest level of public afforestation occurred in 1978 when 8,074 hectares were planted and the lowest was in 1985 when only 4,625 hectares were afforested.

Table 15: *Miscellaneous Forestry Statistics*

Year	Land [a] Traded	Afforestation: Public	Private	Total	Land Prices Actual	Real [b]	Grants [c]	Compensatory Payments [d] Total	To new applicants
	Ha.	*Ha.*	*Ha.*	*Ha.*	*£/ha.*	*£/ha.*	*£'000*	*£'000*	*£'000*
1978	7219	8074	179	8253	108	108	20.2	-	-
1979	3368	7588	134	7722	153	135	18.6	-	-
1980	4282	5922	268	6190	252	188	43.5	-	-
1981	7758	6099	275	6374	462	287	62.2	-	-
1982	9378	6016	498	6514	408	216	139.7	-	-
1983	5840	5698	311	6009	515	248	138.0	-	-
1984	6334	5192	473	5665	600	265	237.7	-	-
1985	7250	4625	764	5389	707	296	504.5	-	-
1986	7012	4689	2561	7250	687	277	1788.6	-	-
1987	6855	5395	3215	8610	796	311	2395.2	10.0	10.0
1988	5252	7112	5252	12364	994	381	3978.2	54.0	44.0
1989	9782	6629	8594	15223	1022	376	6491.9	180.2	126.2
1990	10267	6670	9217	15887	1130	402	7187.3	429.0	248.8
1991	11360	7855	11298	19153	1203	418	9846.9	996.0	567.0

Notes: (a) Public purchases plus estimate of private purchases based on private plantings by non-farmers.
(b) Real land prices = actual land prices divided by Consumer Price Index.
(c) Grants for each year relate to areas planted in that year (see text).
(d) Compensatory payments. These are premia plus headage payments.

Private afforestation increased from 179 hectares in 1978 to 275 hectares in 1981. As a result of the introduction of the Western Package in that year, under which grants for planting were increased substantially, private afforestation rose to 498 hectares in 1982 and this area increased to 3,215 hectares in 1987 when cattle headage payments were introduced to compensate for loss of income from farming on afforested land. The introduction of the operational Forestry Programme in 1989, under which planting grants were further increased and area premia made available, gave an added stimulus to private afforestation and by 1991 private first time plantings reached 11,298 hectares. Up to 70 per cent of these plantings were carried out by farmers on their own land.

Because of the static nature of public afforestation total first time plantings declined erratically from 8,253 ha in 1978 to 5,389 ha in 1985 but thereafter rose rapidly as a result of increases in public and private afforestation to 19,153 ha in 1991.

The table shows that actual prices rose from £108 per ha in 1978 to £1203 per ha in 1991 - an increase of over 1,000 per cent. However when the actual prices were deflated by the Consumer Price Index the rise was reduced to about 300 per cent.

The planting grants included in Table 15 relate to private plantings only. Grants which are now paid to Coillte are not included. Planting grants are paid in two instalments; three-quarters on satisfactory formation of the plantation and the balance 4 years from the date the first instalment was paid. To relate the grants to the areas planted we increased the first instalment payments by one-third and entered the raised figure opposite the year the first instalment was paid. Table 15 shows that total grants calculated in this way rose from £20,200 in respect of 1978 to £9.8 million in respect of 1991.

The figures for compensatory payments given in Table 15 include total and additional cattle headage payments and direct per hectare premia paid each year. The headage payments were introduced in the disadvantaged areas in October 1986 and were discontinued on 17 June 1989 when national per hectare premia were brought in. The headage payments for the year 1986/87 were payable for a period of 15 years but as a result of a revision to the scheme those for later years were payable over a period of 20 years. The premia payments for evergreen trees are for 15 years and those for broadleaved trees are for 20 years. Total headage and premia payments in respect of the years 1987 to 1991 rose from £10,000 in 1987 to £996,00 in 1991. The headage and premia payments to new applicants in those years increased from £10,000 in respect of 1967 to 567,000 in respect of 1991.

Discounting the Various Payments

Headage Payments and Premia

As the headage payments and premia were designed to stimulate private planting by farmers (non-farmers do not receive these payments) it is hypothesised that the stimulant is not just the initial annual amounts paid but the discounted present values of the streams of annual payments. Using a 5 per cent discount rate the present value of £1 received one year in arrears in 15 instalments is £10.3797 and in 20 instalments £12.46622. Since the amount of broadleaved trees planted by farmers is very small we decided to apply the evergreen (15 years) coefficient to the (new additional) premia paid in respect of each year. This coefficient was also applied to the 1987 headage payments. The 20 years coefficient was applied to the new 1988 and 1989 headage payments.

Planting Grants

Since three quarters of the planting grants are paid in the year of planting there is no need to discount the first instalments. We did, however, discount the second instalments which were not paid until 4 years later. The discount factor for 4 years at 5 per cent is 0.8227. Applying this factor to the second instalments we obtain the discounted values which are entered in Table 16.

Table 16 shows that the total present values of planting grants rose from £19,300 in respect of 1978 to £9.4 million in respect of 1991. Present values of new headage payments and premia rose from £103,800 in respect of 1987 to £5.9 million in respect of 1991. When the present values of all the payments are totalled for each year it is found that the amounts increased from £19,300 in respect of 1978 to £15.3 million in respect of 1991. Dividing these figures by the areas planted each year by private operators – the per hectare payments are £108 in 1978 and £1,354 in 1991, almost a thirteenfold increase.

Table 16: *Discounted* Values of Forestry Planting Grants and Compensatory Payments in Respect of the Years 1978-1991*

Year	Planting Grants			Headage payments	Premia	Total payments	Per hectare payments+
	1st instal.	2nd instal.	Total				
	£'000			£'000			£
1978	15.2	4.1	19.3			19.3	108
1979	14.0	3.8	17.8			17.8	133
1980	32.6	9.0	41.6			41.6	155
1981	46.7	12.8	59.1			59.1	215
1982	104.8	28.7	133.5			133.5	268
1983	103.5	28.4	131.9			131.9	424
1984	178.3	48.9	227.2			227.2	480
1985	378.4	103.8	482.2			482.2	631
1986	1341.5	367.9	1709.3			1709.3	667
1987	1796.4	492.6	2289.0	103.8		2392.8	744
1988	2983.7	818.2	3801.9	548.5		4350.4	828
1989	4868.9	1335.2	6204.2	1146.9	355.0	7706.1	897
1990	5390.5	1478.2	6868.7		2582.5	9451.2	1025
1991	7385.2	2025.3	9410.5		5888.3	15,298.8	1354

* Discount rate 5 per cent per annum.
+ Private Plantings

Chapter 7

RELATIONSHIPS BETWEEN CERTAIN FORESTRY VARIABLES

The relationship between the index of the area of land traded for forestry and that of real forestry land prices is shown in Figure 4. This relationship does not appear to be very strong. The index of real land prices to base 1978 = 100 rose to 387 in 1991 whereas the index of land traded rose only to 157. The reason for the relatively small rise in the index of land traded is related to the nature of public purchases which, as stated above, have remained virtually static over the period and have thus dampened the effect of the large increase in private purchases. Because the two series (land prices and land traded) have moved in the same direction over the years their correlation coefficient is 0.6081 which is significant at the 2 per cent level. However when the correlation is carried out using a lag of 1 year for the price series the correlation coefficient becomes 0.8401 which is significant at the 1.0 level.

Although it is difficult to determine causation it seems from these results that increased real prices for forestry land in any year stimulate forestry land sales the following year. To test this hypothesis we regressed the index of land traded for forestry on that of real prices lagged by 1 year to obtain Equation (1) in Appendix B. This very limited equation indicates that a 10 unit increase in the real forestry land price index in any year is associated with a 3.3 unit increase in the land traded index in the following year. The equation is a reasonably good fit, the adjusted $\bar{R}^2$ being 0.67895.

The relationship between indices of discounted grants and compensatory payments per hectare, and that of private afforestation is shown in Figure 5. Indices of these two series moved very closely together between 1978 and 1985 but since then the afforestation index has greatly exceeded the other. Between 1985 and 1991 annual first-time private plantings increased almost 15 times whereas the per hectare grants and compensatory payments increased only about 70 per cent. Over the whole period however the correlation coefficient between the two series is 0.9143. This coefficient which is significant at the 1.0 per cent level indicates that the increased grants and compensatory payments, particularly since 1985, have been a powerful stimulus to private afforestation.

To test this hypothesis we regressed the index of private afforestation on that of discounted per hectare grants and compensatory payments to obtain Equation (2) in Appendix B.

Figure 4: Index of land traded for forestry related to index of real
forestry land price 1978-1991.

Index

Correlation Co-Efficient with Prices Lagged One Year = 0.8401
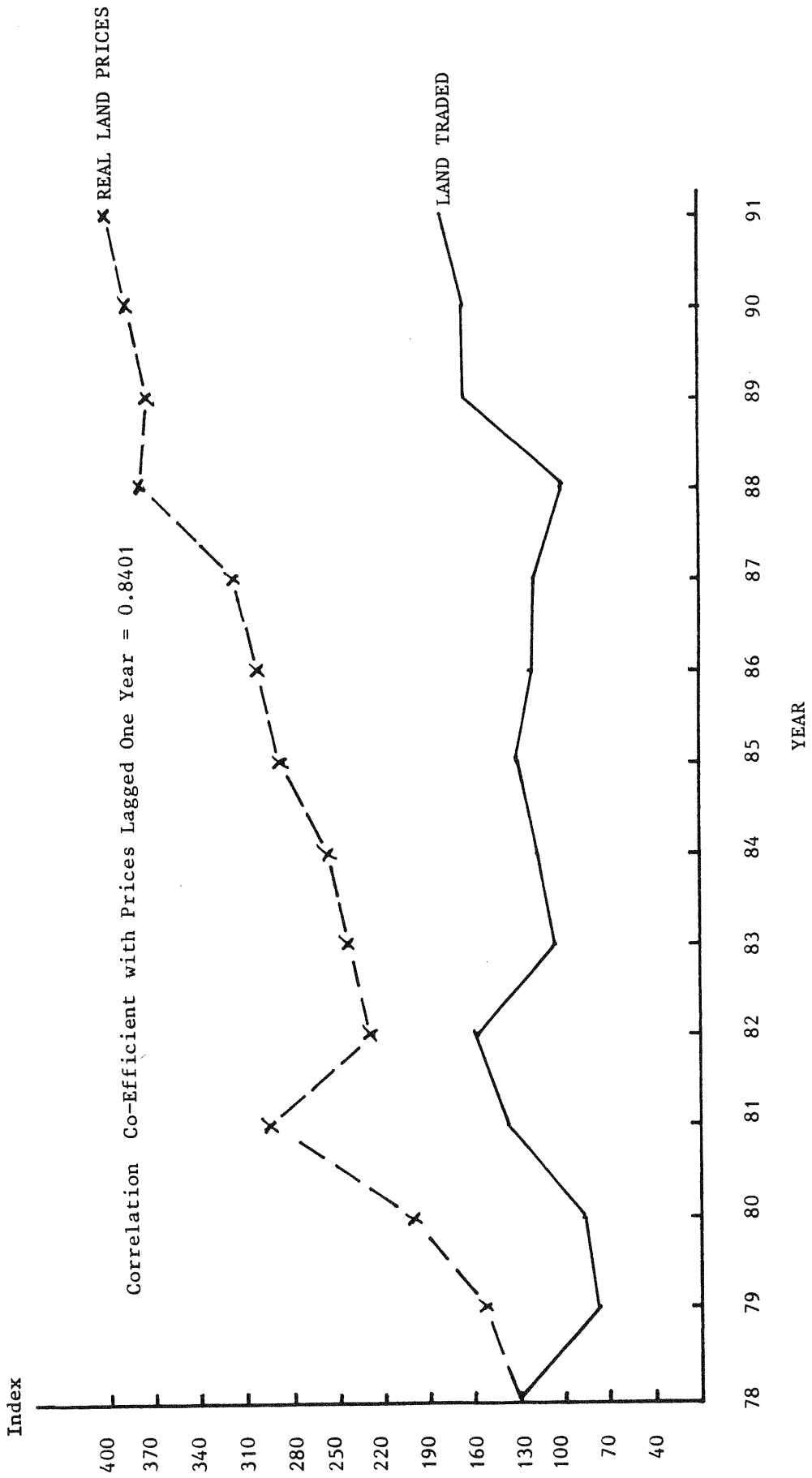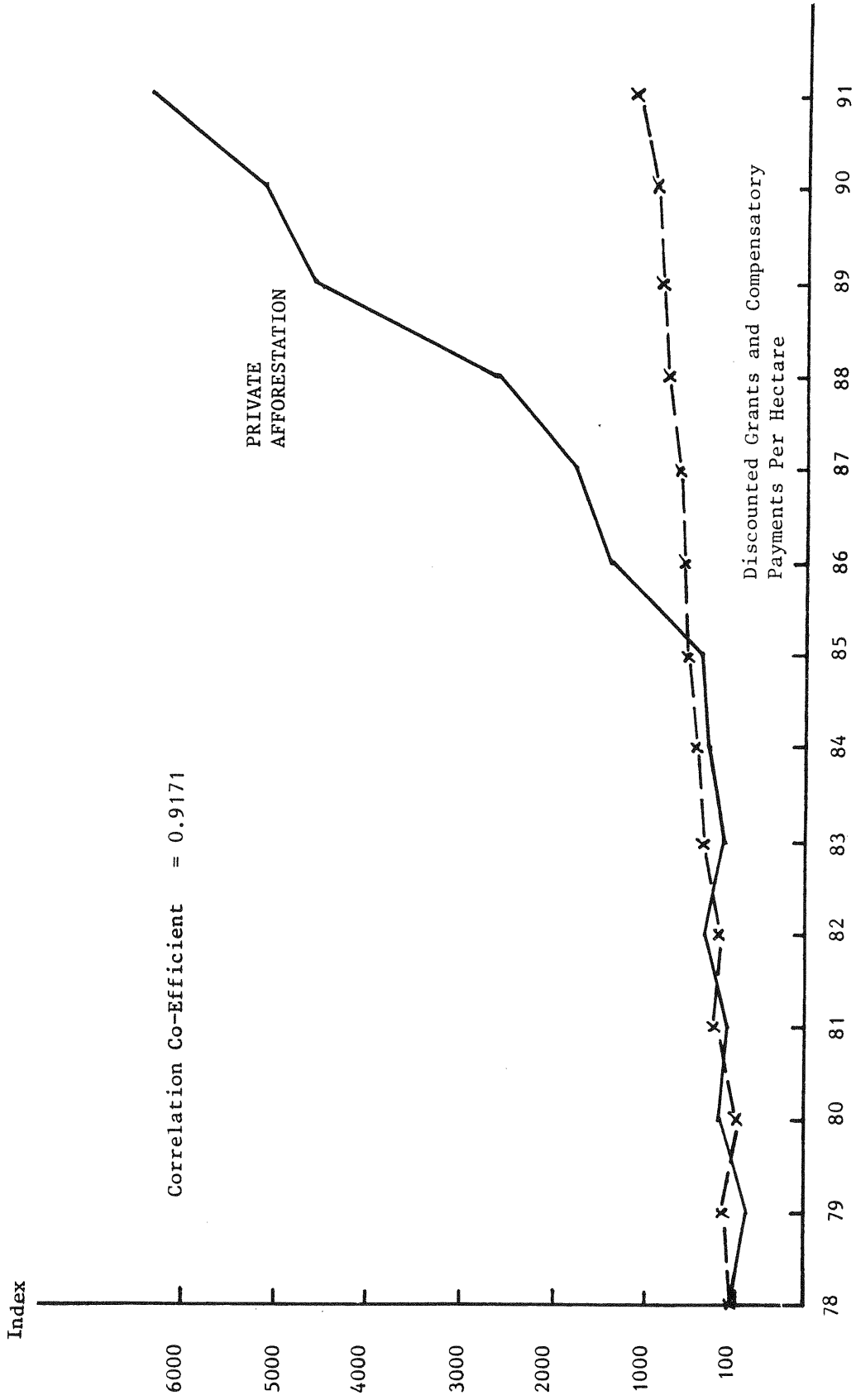

REAL LAND PRICES

LAND TRADED

YEAR

Figure 5: Index of Discounted grants and compensatory payments per hectare related to index of private afforestation 1978-1991.

Index

PRIVATE
AFFORESTATION

Correlation Co-Efficient = 0.9171

Discounted Grants and Compensatory
Payments Per Hectare

6000
5000
4000
3000
2000
1000
100

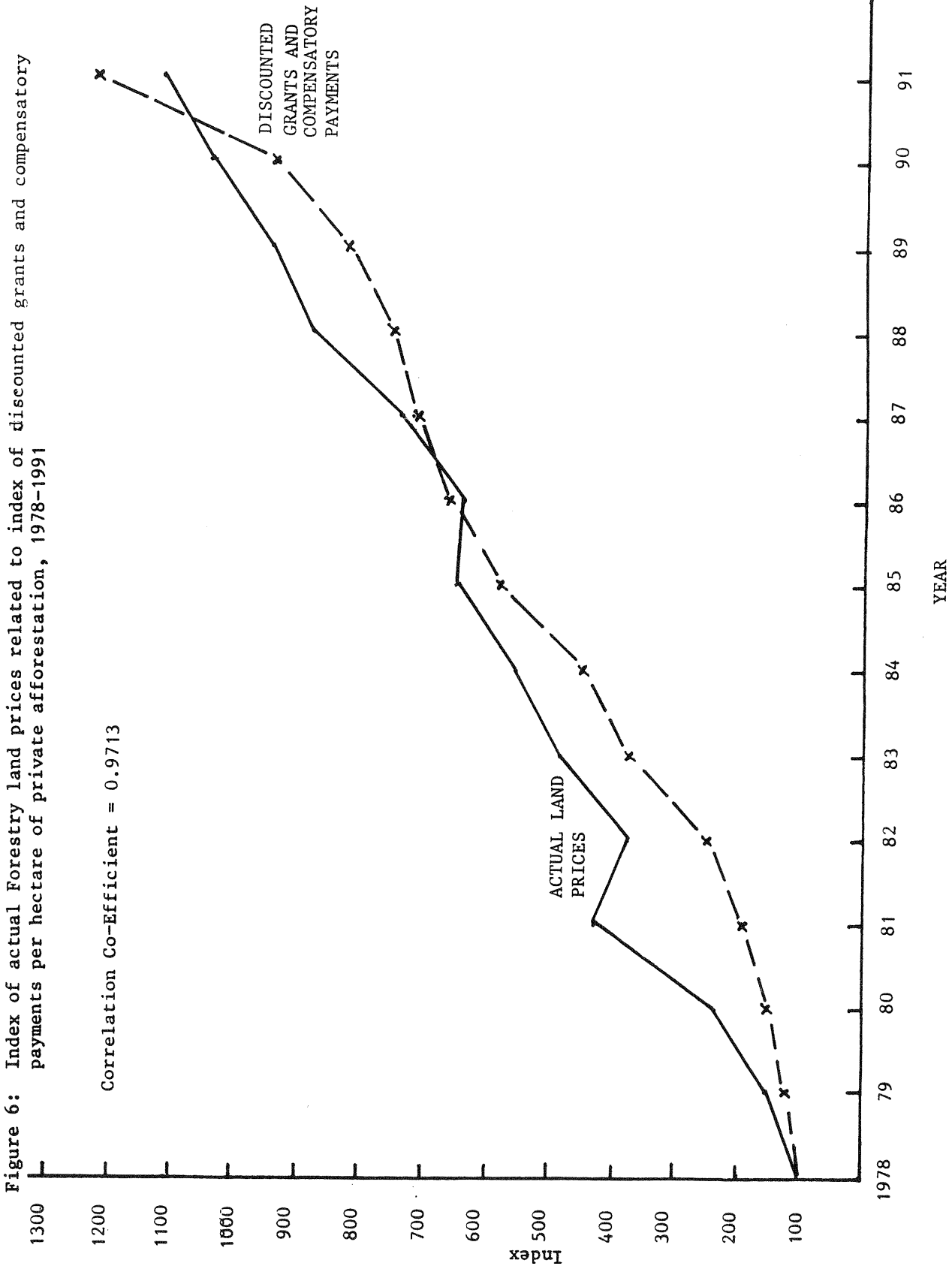78 79 80 81 82 83 84 85 86 87 88 89 90 91

49

This limited equation shows that an increase of 1 unit in the discounted grants and compensatory payments index can be expected to bring about a 6 unit increase in theprivate afforestation area index. Because the co-efficient of determination ($\bar{R}^2$) is 0.8222 this equation is a very good fit.

One final relationship is shown in Figure 6 where the actual forestry land price index is compared with the index of discounted grants and compensatory payments. As can be seen from this figure the two series move very closely together, their correlation coefficient being 0.9703 which is significant at the 0.1 per cent level. This indicates that as expected increased grants and compensatory payments become reflected in increased land prices. When the forestry land price index is regressed on that of discounted grants and compensatory payments we obtain Equation (3) in Appendix B.

The high value of $\bar{R}^2$, in this equation (0.9367), indicates that the equation is a very good fit, explaining 94 per cent of the variance in actual land prices. We can thus say with a good deal of confidence that an increase of 10 units in the discounted grants and compensatory payments index is associated with a 9.0 unit increase in the forestry land price index. It should be stated however that this relationship is not entirely straightforward. The grants and other payments increase the area of land planted but they also make it possible to use better and hence higher priced land for forestry and this is now happening.

A multivariate analysis of the data in which private afforestation is regressed on the other variables would be necessary to determine exact relationships. Because very little private planting was undertaken in the Republic of Ireland until recent years there is insufficient variation in the data to give meaningful results. Readers who may beinterested in such an analyses are referred to Kula (1992) who gives a log-linear equation with distributed lags for Northern Ireland forestry. In this exercise changes in annual private plantings over a 30 year period were related to land, timber and agricultural prices and the discounted values of the level of grants.

The results show that a 1 per cent increase in government grants in real terms generates about a 1.4 per cent increase in private forestry uptake over a 5 year period. An increase of 1 per cent in the price of sawn softwood generates an approximate 4.7 per cent increase in plantation. Likewise if there was a 1 per cent increase in the price index for certain agricultural commodities (cattle and sheep) this would generate a 5.8 per cent decrease in afforestation. Kula found a negative relationship between real land prices and private planting. However he stated that

Figure 6: Index of actual Forestry land prices related to index of discounted grants and compensatory payments per hectare of private afforestation, 1978-1991

Correlation Co-Efficient = 0.9713

in other parts of the UK where forestry is expanding this negative relationship may not pertain. This is primarily because financial institutions such as pension funds and investment banks which are attracted by grants and tax exemptions have placed upward pressure on land prices. This seems to have happened in the Republic of Ireland.

Chapter 8

SUGGESTIONS FOR THE PRODUCTION OF LAND PRICE SERIES IN FUTURE YEARS

Now that the land prices are being computerised in the Valuation Office, it will not be a difficult task to prepare average prices for agricultural and forestry land classified by province and size of transaction in future years. The calculation of agricultural prices classified by land use class will be a more difficult exercise, but as indicated above, we are not recommending the making of such a classification on a regular basis in the future.

So as to maintain comparability of prices for agricultural land from year to year, the Valuation Office data will need to be edited so as to eliminate exceptionally high and low priced land. In this publication we eliminated all transactions costing over £14,000 per hectare. For future years it is suggested that this ceiling should be adjusted by the Consumer Price Index. We also suggest that sales in Co. Dublin and purchases by companies and non-farm businesses should also be excluded. Practically all the Co. Dublin sales have a potential for other high valued uses, even though currently in agricultural use. Purchases by companies and non-farm businesses are unlikely to be used for agriculture.

In regard to very low priced parcels, the names of the sellers and purchasers should be examined closely to see if they are likely to be relatives selling and buying at artificial prices. If it is deemed the latter, the transaction should be eliminated. However, care must be taken to ensure that genuine low priced sales are not excluded.

The forestry land records in the Valuation Office require little editing. The purchases are known to be exclusively for forestry. Also, because the land is usually not very suitable for other uses, location is not as important as that for agricultural land. For that reason sales, if any, for forestry in Co. Dublin should not be excluded. Neither should sales at very high prices be removed. Such sales are usually of good quality land purchased to gain access to other forested areas and are therefore part of the forestry infrastructure. Yield class prices may be difficult to obtain in future years but it should be possible to get such prices from the larger forest organisations.

In regard to the agency that should do the calculations in future years, we suggest that the Central Statistics Office (CSO) should become involved. Ireland is one of the few developed countries which does not publish an official series of land prices and we recommend that this situation be

changed for future years. Now that the Valuation Office prices are being computerised, the CSO should have little difficulty in producing annual prices for both agricultural and forestry land classified by size and province and possibly by yield class for forestry land.

One further point needs to be made. The PD forms on which prices are returned to the Revenue Commissioners and forwarded to the Valuation Office do not record whether or not the holdings have milk quotas. This is unfortunate since the availability of a quota increases substantially the value of the holding. Since the PD forms are Revenue Commission documents we suggest to that body that for future years provision be made on the forms for the recording of milk quotas if this is possible without difficult legal changes. The solicitors involved in land transactions should have little difficulty in providing information on milk quotas since these are now widely used as a selling point in advertising land sales. Provision on the PD form for stating the purpose for which the land was purchased (agriculture, forestry, building roads, etc.) would also be of great benefit. We suggest to the Revenue Commissioners that they might also examine the possibility of obtaining this information.

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APPENDICES

Table A.1: *Comparison of Three Irish Land Price Series for the Years 1970 to 1987*

Year	Survey of Farmers Price £/ha	Survey of Farmers No. of Observations	Auctioneers' Returns Price £/ha	Auctioneers' Returns No. of Observations	Valuation Office Data Price £/ha	Valuation Office Data No. of Observations
1970	292	14	413	32		
1971	603	11	544	46		
1972	502	20	687	40		
1973	655	8	1023	47		
1974	1038	12	1208	41		
1975	1342	11	1475	47		
1976	1816	13	2073	56		
1977	2918	19	2876	46		
1978			3840	65	3160	505
1979			5844	23	4122	326
1980			3642	21	3380	220
1981			3281	33	3281	169
1982			2733	28	3188	214
1983			2891	25	3338	370
1984					3020	687
1985					3094	536
1986					3039	574
1987					2886	659

Source: An Foras Taluntais, various publications (see List of References).

Table A.2: *Average Price Per Hectare of Agricultural Land*
by Size Group 1978-1987

	Size Group				
Year	0-4 ha	4-8 ha	8-12 ha	12-20 ha	20 ha and over
	£/ha				
1978	3674	3005	2765	2829	3094
1979	4633	3882	3998	3899	4208
1980	4132	3529	3084	2728	2782
1981	4823	2891	3398	2861	2525
1982	3850	3296	2659	3328	2343
1983	4569	3190	3027	2849	2607
1984	4060	3138	2901	2498	2535
1985	4013	3269	2822	2975	2629
1986	4285	3380	2560	2716	2350
1987	3749	2928	2805	2617	2157

Source: Kelly 1983(a), 1983(b), 1984(b), Kelly and McIntyre
1985, Kelly, McIntyre and Shanahan 1986 and 1987,
Kelly and Shanahan, 1988.

Table A.3: *Average Price Per Hectare of Agricultural Land*
Classified by Province 1978-1987

Year	Leinster	Munster	Connacht/ Ulster
	£/ha		
1978	4307	3578	1940
1979	5263	4752	2780
1980	4789	4127	2026
1981	3299	3514	2197
1982	3529	3538	2560
1983	3763	3289	2854
1984	3546	3126	2434
1985	3395	3116	2649
1986	3291	3136	2656
1987	3180	3020	2478

Source: Same as for Table A.2.

Table A.4: *Percentage of Land in Each Use Range Class in Each Province*

	Use Range Class					
	1	*2*	*3*	*4*	*5*	*6*
Province	*Wide*	*Moderately Wide*	*Somewhat Limited*	*Limited*	*Very Limited*	*Extremely Limited*
			%			
Leinster	32.9	21.4	16.9	15.0	12.5	1.5
Munster	36.4	3.1	11.3	22.8	22.7	3.7
Connacht	3.6	13.8	18.5	21.8	37.7	4.6
Ulster	2.6	9.8	14.2	29.7	41.2	2.5
State	23.4	11.7	15.0	21.0	25.5	3.1

Source: Gardiner and Radford, 1980, p. 128.

Table A.5: *Numbers of the Soil Associations Contained in Each Use*
Range Class

		Use Range Class			
1	*2*	*3*	*4*	*5*	*6*
Wide	*Moderately Wide*	*Somewhat Limited*	*Limited*	*Very Limited*	*Extremely Limited*
		Numbers of the Associations			
13	12	6	8	1	4
14	20	9	11	2	7
15	30	10	18	5	
31	33	16	18	23	
34	35	19	21	24	
36	37	28	22	44	
	38	29	25		
		32	27		
		40	39		
			42		
			43		

Source: Kelly, 1983(a).

Table A.6: *Average Price Per Hectare of Agricultural Land*
Classified by Use Range Class 1978-1987

	Use Range Class					
Year	1	2	3	4	5 & 6	All Classes
1978	4473	4537	3632	2765	1085	3160
1979	6165	5046	4176	2768	986	4122
1980	5308	4060	3692	2775	976	3380
1981	5350	3929	3277	2464	1075	3281
1982	4364	3652	2666	2639	1752	3188
1983	4601	4080	3368	2545	1391	3338
1984	4322	3464	3034	2407	1426	3020
1985	3724	3815	2829	2362	1374	3094
1986	3870	3734	3170	2436	1515	3039
1987	3647	3272	3025	2313	1216	2886

Source: Same as for Table A.2.

Table A.7: *Average Price Per Hectare of Agricultural Land Classified by Use Range Class and by Province in 1986 and 1987*

(£/ha)

Province	Use Range Class				
	1	*2*	*3*	*4*	*5 & 6*
	1986				
Leinster	3714	3810	3277	2202	732[a]
Munster	3986	3615	2483	2706	521
Connacht/Ulster	4038[a]	3637	3546	2244	1559
	1987				
Leinster	3452	3459	2646	2461	1399[a]
Munster	3944	2876[a]	2216	2278	1334
Connacht/Ulster	3183	3084	3526	2293	1072

(a) Less than 20 observations.
Source: Kelly *et al.*, 1987, Kelly and Shanahan, 1988.

Table   A.8:   *Number of Transactions in Each Use Range Class*
Classified by Province for 1988 and 1990.

	Use Range Class					
Province	1	2	3	4	5&6	Totals
1988						
Leinster	74	49	49	46	30	248
Munster	103	26	27	74	36	266
Connacht	22	28	46	49	52	197
Ulster	20	21	38	53	23	155
State	219	124	160	222	141	866
1990						
Leinster	91	53	41	35	29	249
Munster	110	21	32	69	39	271
Connacht	23	31	48	52	49	203
Ulster	7	22	26	67	21	143
State	231	127	147	223	138	866

Table A.9: *Number of Transactions in Each Use Range Class Classified by Size of Holding in 1988 and 1990*

Size of Holding	Use Range Class					
	1	*2*	*3*	*4*	*5&6*	*Totals*
			1988			
5-10	47	24	25	24	20	140
10-20	61	25	40	54	25	205
20-30	48	26	29	52	32	187
30-50	30	24	39	51	29	173
50+	33	25	27	41	35	161
All Sizes	219	124	160	222	141	866
			1990			
5-10	45	24	29	27	28	153
10-20	54	27	38	56	36	211
20-30	45	26	28	51	23	173
30-50	37	28	24	51	27	167
50+	50	22	28	38	24	162
All Sizes	231	127	147	223	138	866

Table A.10: *Agricultural Land Prices, Agricultural Output Price Index, Index of Income Arising in Agriculture, Consumer Price Index and Area of Agricultural Land Traded in Recent Years.*

Year	Land Price £/ha	Agric. Output Price Index	Income Arising Index+	Consumer Price Index	Area of Land Traded* ('000) ha
1970	413	100	100	100	
1971	544	107	110	109	
1972	687	130	152	118	
1973	1023	170	191	132	
1974	1208	172	177	154	
1975	1475	221	251	187	
1976	2073	277	281	220	
1977	2876	340	384	250	
1978	3160	384	430	269	97.98
1979	4122	407	383	305	42.90
1980	3380	396	366	361	44.52
1981	3281	470	422	434	42.90
1982	3188	513	519	508	30.76
1983	3338	545	596	561	23.47
1984	3020	557	706	609	46.95
1985	3094	546	646	643	41.50
1986	3039	545	611	667	46.95
1987	2886	567	733	688	45.95
1988	3012	627	862	703	27.74
1989	3607	658	905	731	22.52
1990	3709	583	893	755	31.74
1991	3634	565	819	775	17.63

* Area of Agricultural land traded estimated from Valuation Office data.
+ Income arising at current prices

Appendix   B

Regression Equations

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(1)   T =   18.70   +   0.3309RP $\bar{R}^2$ = 0.67895
                  (5.136)

where   T = Land traded index
        RP = Real forestry land price index lagged by 1 year

The figure in brackets (5.136) is the t-value of the regression coefficient which is significant at the 3 per cent level.

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(2) PA = -1,281.3 + 5.7182GC $\bar{R}^2$ = 0.8222
                  (7.817)

where   PA = Private afforestation index
        GC = Index of grants and compensatory payments per hectare

The figure in brackets (7.817) is the t-value of the regression coefficient which shows that this coefficient is significant at the 1.0 per cent level.

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(3)   AP = 121.30 + 0.90859GC $\bar{R}^2$ = 0.9367
                  (13.906)

where   AP = Actual forestry Land price index
        GC = Index of grants and compensatory payments per hectare

The figure in brackets (13.906) is the t-value of the regression coefficient which is significant at the 0.1 per cent level.

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