THE IMPACT OF AGRICULTURAL AND FORESTRY SUBSIDIES ON LAND PRICES AND LAND USES IN IRELAND

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EXECUTIVE SUMMARY

In an effort to increase the rate of afforestation, the government has made the system of forestry grants and premia more generous in recent years. This has generated a concern that the increased generosity would lead to increased land prices facing farmers remaining in agriculture and a reduction in the amount of land coming on the market. More recently, a new concern has arisen with regard to the Rural Environment Protection Scheme (REPS), which was introduced in 1994 but which has been gaining in popularity. The concern is the mirror opposite of that generated by the forestry premia: it is argued that REPS is bidding up the price of land facing those wishing to buy for forestry purposes while reducing the amount of land coming on the market.

This report has two objectives. First, we present trends in the price of both forestry and agricultural land in recent years. Second, we analyse the impact that various grants and premia have had on the price of agricultural and forestry land and on the rate of afforestation.

Using data provided to us by the Valuation Office, we find that the price of both agricultural and forestry land has risen rapidly in recent years. In Table 1 we present the national average figures for both for the years 1990 to 1997. The nominal price of an average hectare of agricultural land in 1992 was £3,743 while in 1996 it was £5,402 representing an increase of 44 per cent over the four-year period. During the same four-year period the average price of one hectare of forestry land rose from £1,472 to £2,011, representing an increase of 37 per cent. By contrast, the Consumer Price Index over the same period rose by 8.1 per cent. In the case of forestry land, part of the price increase is due to better quality land being purchased for forestry purposes. However, price increases for forestry land have also occurred within land quality categories.

Table 1: National Average Prices/Hectare of Agricultural and Forestry Land, 1990-1997

Year	Agricultural land (£ per hectare)	Forestry land (£ per hectare)
1990	3,777	1,153
1991	4,079	1,345
1992	3,743	1,472
1993	3,935	1,472
1994	4,247	1,568
1995	4,538	1,923
1996	5,402	2,011
1997*	5,361	1,978

Note: *The 1997 figures are based on an incomplete set of records.

In order to assess the relative impact of forestry and agricultural subsidies, we begin by taking a theoretical perspective. We demonstrate how land-related subsidies tend to increase the average price of land and to divert land use towards the subsidised activity. Both forestry and agricultural subsidies tend to increase land prices, whether the land is intended for agricultural or forestry use. Forestry premia tend to increase afforestation, while agricultural subsides tend to keep land in agricultural use, thereby acting to reduce the rate of afforestation. Which subsidy dominates depends on the relative sizes of the subsidies and on the relative up-take.

In order to look empirically at the relative effects issue, we first make use of the Valuation Office data and estimate a set of regression equations. These data are far from ideal for this purpose so we must be cautious in interpreting the results. With this cautionary note in mind, we fail to find evidence that the forestry premia are associated with higher land prices, either agricultural or forestry. We do, however, find evidence to suggest that the "accompanying measures" of the McSharry reforms, in particular the Rural Environment Protection Scheme, are reducing the rate of afforestation. Agricultural subsidies are also found to increase the price of forestry land while the accompanying measures are found to have been associated with an increase in the price of agricultural land in recent years.

Given the weakness of the data, it is not desirable to rely solely on these statistical results for our conclusions. We have already noted that the relative impacts of subsidies is partly related to the degree of take-up. With this in mind, we look at recent figures on the take-up of REPS and compare these with recent figures on afforestation. The relative figures are striking. In spite of higher per hectare payments for forestry, the number of new hectares under REPS in 1997 was nearly twenty-five times higher than the level of afforestation. Given this imbalance, we believe it to be highly unlikely that the forestry premia, at the national level, are having more of an impact in the land market than REPS, let alone all the other agricultural subsidies combined.

While private afforestation appeared to be on the rise in the mid-1990s, the relatively low level of afforestation in more recent

years gives rise to the following issues: why are the targets not being met, even with the generous premia? Among the answers suggested are the lack of the required forestry-related human capital on Irish farms, negative attitudes to forestry among farmers and non-farmers and the long time commitment that forestry requires.

How then is forestry to be encouraged? Two alternatives are immediately apparent. The forestry premia could be increased again or agricultural subsidies could be cut. The recent conclusion to the CAP reform negotiations would indicate that agricultural subsidies will not be cut back significantly, at least before 2006. In any event this may not be desirable so the latter option is not possible. As regards increasing the generosity of the forestry premia, it seems that any increase aimed at encouraging farmers into forestry would have to be very large. It may be that the only way forward is for some combination of REPS and forestry premia to be found, as a combined scheme to protect farm incomes and to protect, and enhance, the rural environment.

1. OBJECTIVES AND BACKGROUND

Writing in 1996, the Department of Agriculture, Forestry and Food noted that, in December 1995, Ireland's total forest cover was 570,000 hectares or 8 per cent of the land area.[1] The Department expressed the view that the forestry industry could best achieve its full economic potential if a "critical mass" of activity could be generated. The target they suggested was for the total area of planted land to increase to 1.2 million hectares by 2030. Annual afforestation targets were set at 25,000 hectares per year to the year 2000 and 20,000 hectares per year thereafter until 2030.

In order to reach these goals, the system of forestry grants and premia was made more generous.[2] This in turn generated a concern that the increased generosity would increase the land prices facing farmers remaining in agriculture and reduce the amount of land coming on the market. More recently, a new concern has arisen with regard to the Rural Environment Protection Scheme (REPS), a scheme that was introduced in 1994 but which has gained in popularity.[3] The concern is the mirror opposite of that generated by the forestry premia: it is argued that REPS is bidding up the price of land facing those wishing to buy for forestry purposes and also reducing the amount of land coming on the market.

These concerns are the motivation for this study, which has two primary objectives. The first objective is to present data on the price of agricultural and forestry land in Ireland in recent years so as to establish the "facts" about the markets for agricultural and forestry land. In so doing we update the work of O'Connor and Conlon (1993) and supplement the work of the Central Statistics Office as published in their Agricultural Land Sales series. The second objective is to assess the impact of various agricultural and forestry subsidies on the price of agricultural and forestry land and on the rate of afforestation. This is a substantially more difficult task and, as a result, material presented in relation to the second task is less definitive. We

[1] Department of Agriculture, Food and Forestry (1996), *Growing for the Future: A Strategic Plan for the Development of the Forestry Sector in Ireland.*

[2] Precise details of the current scheme are provided later in this chapter.

[3] The details on REPS are also presented later in this chapter.

address the issue in a statistical framework. However, as the available data are not entirely adequate for the exercise, we also draw conclusions from more straightforward observation of trends in this area.

The report is structured in the following way. Chapter 2 assesses what economic theory predicts will happen in the market for forestry and agricultural land as a result of the introduction of different types of subsidies. We present the economic reasoning in an effort to underpin our later discussion of the impact of the subsidies. In Chapter 3 we analyse recent trends in agricultural land prices and the area of agricultural land traded by drawing on data provided by the Valuation Office. In Chapter 4 we analyse the recent trends in the forestry market, again using Valuation Office data. In Chapter 5 we return to the issue of the impact of the subsidies. We present results from a rather elementary piece of econometric work undertaken to assess quantitatively the impact of various premia on the price of agricultural and forestry land and the rate of afforestation as the available data do not allow for more thorough analysis. The results of this exercise must consequently be viewed with great caution. We go on to look at the impact issue from a more straightforward perspective and suggest reasons why we believe that the impact of forestry premia on the land market to be relatively less significant than the impact of agricultural subsidies.

The Current Subsidy Regime

Before moving to the analysis and data presentation, we want to describe briefly the range of schemes that operate in agriculture and forestry. As our interest is in the effect of subsidies on land prices and land usage it is important to have an idea of the range of alternatives available to farmers and other landowners. Since the structure of agricultural payments is extremely complex, we will not attempt a comprehensive presentation. Instead, we highlight the main issues in an effort to provide context, particularly for those who may not be familiar with the schemes.

We begin by considering agricultural schemes. Government interventions in agriculture can be categorised according to the objectives, even though the objectives are not necessarily mutually exclusive. One objective is to ensure an adequate food supply for the population. Another is to increase farm incomes and also to reduce fluctuations in farm incomes. For many years the European Union has attempted to achieve both of these objectives through the use of price supports which guarantees prices for farm output. Should prices fall below the guaranteed level, the EU buys up the surplus. Competition from non-EU producers is restricted through tariffs.

In the 1980s, the emergence of large surpluses led the EU to alter its policy focus. The culmination of this process was the McSharry reform package of 1992. At that time, the production objective of farm policy was seen as being of reduced significance but the desire to protect farm incomes remained. The result was a

shift from market-based supports to direct payments to farmers or "cheques in the post". While market supports continued to exist, especially in the case of milk, farm income was to come increasingly from a range of direct payments. Some of these payments were to be based on production; however, others were to be explicitly related to an objective of agricultural policy that has been gaining in prominence, namely the protection of the rural environment. In 1996, direct payments amounted to around £900 million and as such represented about 45 per cent of farm income in that year.

Direct payments are made under a variety of headings but we discuss three broad categories here: (i) compensatory headage payments, (ii) premia payments and (iii) "accompanying measures".

(i) Compensatory headage payments: First introduced in 1975, 75 per cent is now sourced from the structural funds, with 25 per cent from the national exchequer. The idea behind headage payments is to assist farmers in disadvantaged areas in achieving reasonable incomes. It should be noted that the term "disadvantaged" applies at present to 72 per cent of Ireland's land area so a substantial proportion of farmers are eligible for these payments.

The payments are made under four headings. In the case of cattle headage in more severely handicapped areas, the 1998 payment was £84 for each beef cow, up to a maximum of £3,360 on 40 beef cows.[4] Payments on other cattle livestock units are allowed, at a lower rate and again subject to a maximum. The beef cow headage which applies in less severely handicapped areas and coastal areas with specific handicaps pays £75 for each beef cow, up to a maximum of £2,250 on 30 beef cows. The equine headage which applies in all disadvantaged areas pays £70 for the first eight mares and £66 for the next 22, up to a maximum of £2,012 on 30 mares. Finally, the sheep/goat headage in all disadvantaged areas pays £10 a ewe/goat up to a combined limit of 200 sheep/goats, amounting to a maximum of £2,000. An overall limit of £4,000 applies to combined headage payments and payments are also limited by amount per hectare.

(ii) Premia payments: These payments pre-date the McSharry reforms of 1992 but have become significantly more important since then for the reasons discussed above. These payments are available throughout the country and are not, in general, subject to limits. The premia payments are funded entirely by the EU, under the Guarantee Section of the CAP. There are eight schemes which relate to livestock so we will briefly describe each, before mentioning crop-related payments:

- the *suckler cow premium* pays £140.23 a cow on all eligible cows. Eligibility is partly determined on a quota basis which,

[4] All payments mentioned are for 1998 and are taken from the Department of Agriculture and Food (1998).

in turn, is related to the number of cows owned on specific dates prior to the introduction of the premium. A stocking rate restriction also applies;

- the *suckler cow premium for non-suppliers of milk* again pays £140.23 a cow on all eligible cows with the same restrictions as above;
- the *special beef premium (10 and 22-month castrated male animals)* makes two payments of £90 per head at 10 months and 22 months;
- the *special bull premium* pays £112 a head once;
- the *deseasonalisation slaughter premium* is payable to producers of castrated male bovines slaughtered between January and June. The rate of payment is determined by the date of slaughter with the highest payments of £60 an animal being made from January to mid-April and the lowest payment of £15 an animal being made in June;
- the *calf processing scheme* pays £92 on male calves less than 20 days old;
- the *extensification premium* is somewhat different from many of the other payments in that it has an environmental objective in addition to its income support objective. A payment of £29.86 a head is made on all eligible male bovines and suckler cows if the stocking density is less than 1.4 livestock units per hectare. The payment rises to £43.13 if the lower stocking density of 1.0 livestock units per hectare is achieved; and
- the *ewe premium* pays about £12 a ewe throughout the country, with an additional £5.50 being paid in disadvantaged areas.

All the premia discussed so far relate to livestock. Payments also exist for producers of arable crops. Under the relevant scheme the following per hectare payments are made in respect of the crops mentioned: cereals – £274.06; maize silage – £261.43; oilseeds – £502.81; proteins – £395.85; linseed – £530.06. Entrance into the scheme requires an amount of land to be set aside, but a set-aside payment of £347.13 is also paid.

(iii) Accompanying measures: The McSharry reforms of 1992 included a range of "accompanying measures" such as the Rural Environment Protection Scheme (REPS), the Early Retirement Scheme and the Installation Aid for Young Farmers Scheme. These are direct payments which have specific structural objectives. We briefly discuss each in turn:

The Rural Environment Protection Scheme (REPS) has the following stated objectives:

- to establish farming practices and controlled production methods that reflect the increasing public concern for conservation, landscape protection and wider environmental problems;
- to protect wildlife habitats and endangered species of flora and fauna; and

- to produce quality food in an extensive and environmentally friendly manner. (Department of Agriculture and Food, 1998).

Participant farmers are required to draw up a waste storage, management, liming and fertilisation plan for his/her farm and a grassland management plan that avoids overgrazing of land. Farmers in REPS are paid a basic premium of £125 per hectare, to a maximum of 40 hectares, amounting to a maximum of £5,000. Additional payments can also be obtained by undertaking one or more of the supplementary measures such as preserving the Natural Heritage Areas, Organic Farming or the Rearing of Animals of Local Breeds in Danger of Extinction.

The *Early Retirement Scheme* is essentially a pension scheme. It allows farmers aged between 55 and 66 to retire and transfer their land by gift, lease or sale to a qualified young farmer. The retiring farmer gets a basic annual pension of £4,000 or £250 per hectare up to a maximum of £10,000 for a farm of 24 hectares or over. The pension is paid for a maximum of 10 years, but not beyond the retired farmers 70th birthday. This scheme, and REPS, are 75 per cent co-funded by the EU.

The *Installation Aid for Young Farmers Scheme* aims to generate the earlier transfer of land to young farmers. A premium of £5,600 is payable to farmers aged under 35 who satisfy a range of conditions:

- they practice farming as their main occupation on land owned and/or held on long-term lease;
- they have certain occupational skills and competence;
- they are set up on the farm with a requirement of one man work unit; and
- they have obtained full title/leasehold title to the land.

Before leaving the agricultural schemes, we should note that it is possible to combine payments from schemes although stocking rate requirements ultimately impose limits on claims.

Turning to the forestry grants and premia, the primary objective is to increase the rate of afforestation in Ireland.[5] Grants are available throughout the country and come in two forms, afforestation grants and maintenance grants. The afforestation grant covers ground preparation, drainage, plants, planting, fencing, fertilisation, plant protection and the preparation of a management plan. The payments range from £1,155 per hectare to £3,000, depending on whether the land is unenclosed or enclosed and on the species being planted. The maintenance grant is paid four years after the payment of the afforestation grant and covers vegetation contract, replacing failures, pest control and shaping broadleaves. The payments range from £385 per hectare to £1,000. Total grants therefore range from £1,540 to £4,000.

In addition to the grants, farmers and non-farmers are eligible for annual premia payments. In the case of farmers the grants are paid for 20 years. The amounts vary by land designation (more

[5] We again take our figures from the Department of Agriculture and Food, 1998.

severely handicapped, less severely handicapped and non-disadvantaged), by enclosed and unenclosed land and by species mix. The range of payments goes from £145 per hectare for any planting on unenclosed land to £340 per hectare on enclosed land in non-disadvantaged areas with oak and beech.

For non-farmers and companies the premia are paid for 15 years. The payments are as follows: £90 per hectare for conifers on unenclosed land; £115 for conifers on enclosed land; £135 for broadleaves on enclosed land.

Given the range of schemes available to farmers, the question arises as to the relative attractiveness of the various schemes. Once again, the complexity of the alternatives reduces the usefulness of trying to generalise from particular cases. However, some useful figures from Teagasc (1999) can allow us to see what proportion of farmers might benefit from a move into forestry. According to Teagasc, in 1996, 21 per cent of farms generated incomes of less than £150 per hectare. This figure varied from 3 per cent in dairying to 32 per cent in "other cattle". Given that forestry premia of around £200 per hectare are available to these farmers, Teagasc argues that forestry is a worthwhile alternative for many farmers. In spite of this, the number of farmers entering forestry has been below the target set in the 1996 publication (Department of Agriculture, Forestry and Food, 1996). The low level of take-up is clearly relevant in a discussion of the effect of forestry grants and premia on the land market so we return to this issue in a later chapter.

2. A Theory of Land Prices, Land Usage and Subsidies

As discussed in Chapter 1, our objectives in this report are to present data on forestry and agricultural land prices in the 1990s and to assess, to the degree allowed by the available data, the impact of forestry premia and agricultural subsidies on land prices and the use to which land is put. Before presenting the data, it is useful to present the issues in a conceptual framework so in this chapter we present a theoretical view of how subsidies affect land prices and land usage.

We begin by assuming that land has only one use, namely agricultural production. The value of the amount that can be produced on each hectare of land is called the marginal revenue product (MRP) of the land;[6] it is the units of output which are added to total production by the hectare, multiplied by the unit price of the output. In Figure 2.1, the total amount of land is fixed and can be arranged in terms of productive capacity or quality. At the origin, we have the hectare of lowest quality L_L. From there, the quality of each hectare on the horizontal axis increases as reflected in the upward slope of the MRP line. The hectare of highest quality is thus L_H.

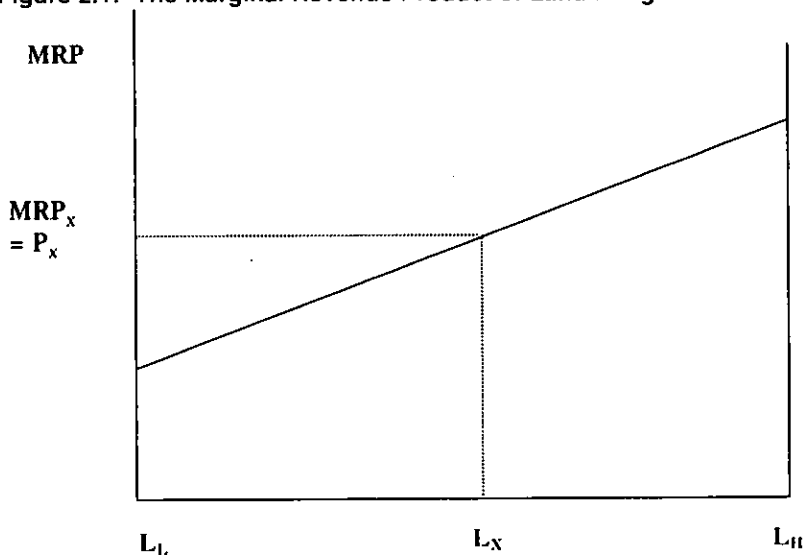
We know from economic theory that under certain conditions factors of production are paid their MRPs.[7] Put another way, the rental price that would have to be paid to rent per hectare of land is simply its MRP. If one wanted to buy the piece of land, the price would be the sum of the MRPs stretching into the future, appropriately discounted. Hence, there is a direct relationship between the rental price of the land and the purchase price; this

[6] See Fitz Gerald (1996).

[7] The precise conditions relate to the market being perfectly competitive. While this assumption may well be violated in the present context, the broad thrust of the conclusions remains the same.

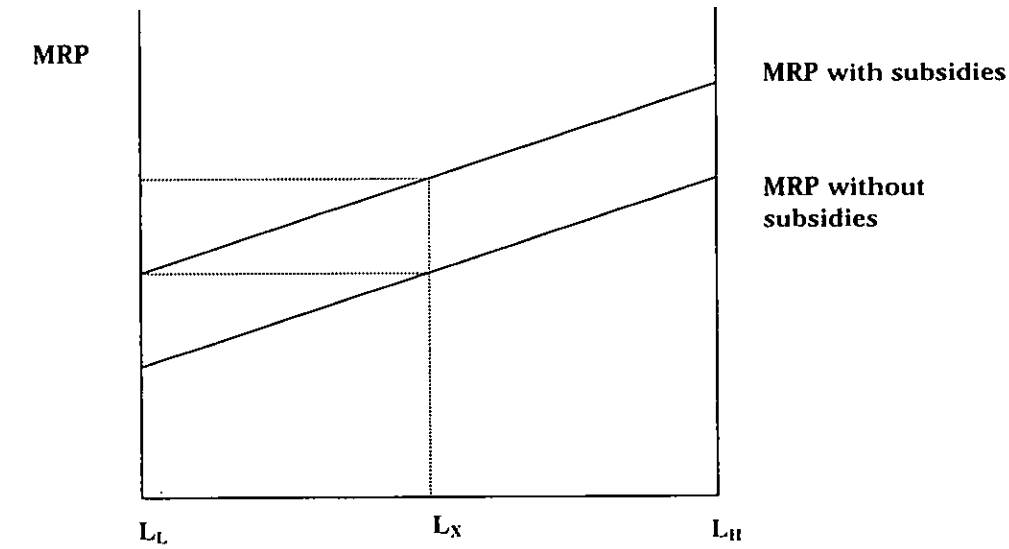
allows us to talk in terms of rental prices with the corresponding impact on land prices implied. From Figure 2.1 we can say that the rental price of the hectare L_x is P_x (= MRP_x).

Figure 2.1: The Marginal Revenue Product of Land in Agricultural Use



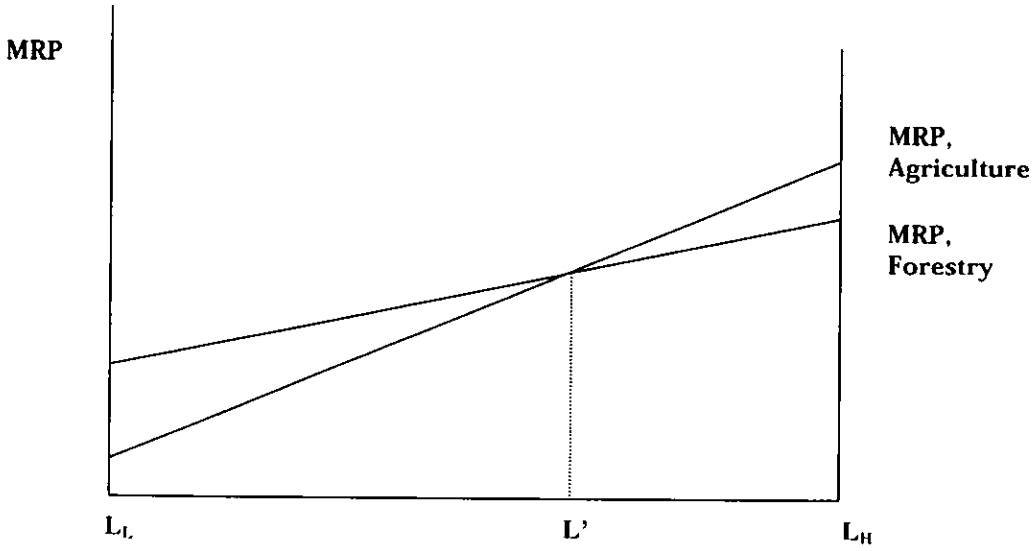
We can now ask what happens when a subsidy is introduced into the agricultural sector. Suppose the subsidy takes the form of additional payments for each unit of output. The effect is to raise the MRP of each unit of land, as reflected in the upward shift in the MRP line in Figure 2.2. The rental price of each piece of land also increases – as the value of output from land has increased, it is clear that people will be prepared to pay higher rents for the land. As noted earlier, the purchase price will rise in line with the rental price.

Figure 2.2: MRP and the Introduction of Subsidies



We now wish to consider the situation when there are two uses to which the land can be put, agriculture and forestry. Suppose that the lower quality land is more productive in forestry use but the higher quality land is more productive in agriculture. The respective MRP curves are depicted in Figure 2.3.

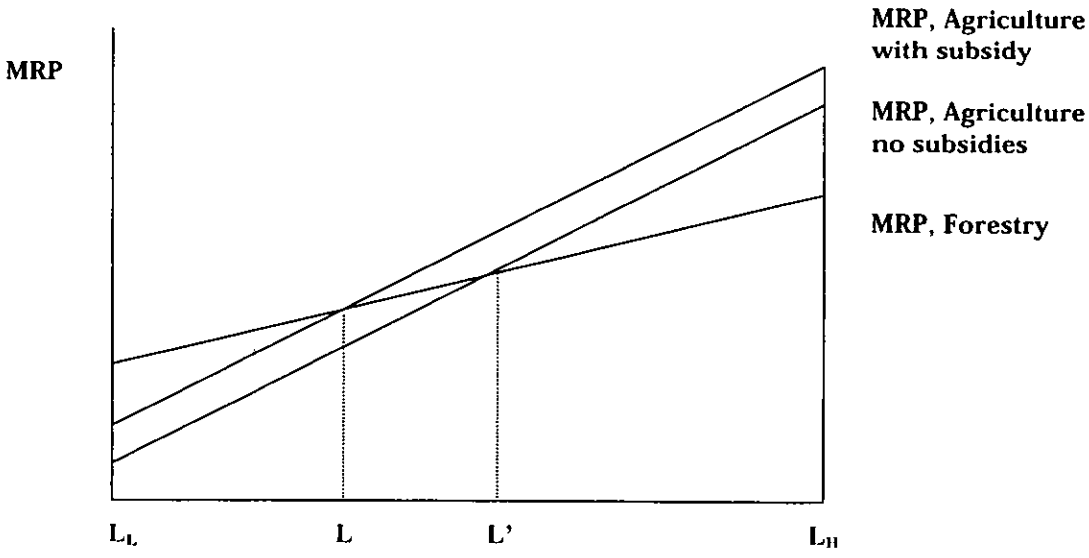
Figure 2.3: The MRP Curves of Agriculture and Forestry



It can be seen from Figure 2.3 that land below the quality of L' will be used for forestry purposes whereas land above this quality will be used for agricultural purposes. Given the effect of a subsidy, which was demonstrated in Figure 2.2, we can now show the impact of an agricultural subsidy on the forestry market. In Figure 2.4, the MRP of agriculture is shifted up. Land that was previously more valuable in forestry is now made more valuable in agriculture as a result of the agricultural subsidy. Land between hectares L and L' are taken out of forestry and put into agricultural production.[8] Although land prices below L are not affected by the agricultural subsidy, the rental price of land has increased on average. In addition, on the land of quality between L and L' where forestry and agricultural returns are similar, the price of land has been bid up for anyone wishing to expand an existing forestry holding.

[8] The movement from forestry into agriculture may take a long time, given the nature of forestry production. But in the long run, we would expect to see land used in the activity that yields the highest return to the owner.

Figure 2.4: The Impact of an Agricultural Subsidy



The situation depicted in Figure 2.4 captures to a degree the situation which the Department of Agriculture, Forestry and Food was writing about in 1996 when the level of forestry in Ireland was described as being below its optimum. The level of forest cover shown in the figure (L) can be taken as the 8 per cent level which pertained in 1996. The Department's proposal for increasing this level was to increase the levels of subsidy available for forestry. In terms of the diagram, the hoped for effect was to shift the MRP of forestry line upwards and to move the intersection point with the agriculture MRP line to the right.

Were the strategy to work, land prices would again rise on average in a manner similar to the effect generated by agricultural subsidies. As such, agricultural subsides and forestry subsidies will tend to act in similar ways. Indeed, if forestry subsidies are to achieve their objective they must be sufficiently attractive relative to agricultural subsidies to induce a switch in land use. As regards the question of which subsidy, or set of subsidies, has had a greater impact on the land market, the issue can be thought of in terms of which MRP line has been moved to a greater degree. If money were all that mattered, the figures presented in Chapter 1 on the relative generosity of the forestry premia would lead one to expect that the forestry MRP had been given a significant upward shift. We will argue below that there may be more to the forestry versus agriculture decision than money and that any upward shift in the forestry MRP has been discounted to a degree. We develop this point more fully in our conclusions.

However, for now the following can be taken from the discussion:

- land-related subsidies tend to raise the price of land;

- a subsidised activity tends to expand; and
- once one activity is subsidised, a greater level of subsidy must be offered to a competing activity if the competing activity is to be expanded.

3. Agricultural Land Price Series

We now begin our analysis of agricultural and forestry land prices by updating the land price information contained in the ESRI report of 1993 by O'Connor and Conlon. Until relatively recently Ireland was one of the few European countries that did not produce an official agricultural land price series. Following a recommendation by O'Connor and Conlon in their report, *Agricultural and Forestry Land Prices in Ireland*, the Central Statistics Office (CSO) has recently begun to produce such a series. Although the information which we present is based on the same source as the CSO data,[9] we present a more detailed breakdown and add a land quality dimension which is not included in the CSO output. We also present figures (in Chapter 4) on forestry land prices.

The earliest work on agricultural land price series for Ireland was undertaken by Kelly, as discussed by O'Connor and Conlon (1993). The first series he produced was based on the "Farm Management Survey" of An Foras Talúntais in 1977. The second was based on a small sample of auctioneers who submitted returns for several years. His third land price series was based on samples of land sales taken from the Particulars Delivered (PD) forms from Valuation Office records. The results are summarised in O'Connor and Conlon (1993) who produced the next major land price series in the 1993 report. The data source for this work was again the PD forms from the Valuation Office. The results obtained by the CSO; O'Connor and Conlon; and Kelly are summarised in Appendix 1.

In order to produce an updated agricultural and forestry land price series similar to that produced in O'Connor and Conlons' 1993 report, we again obtained data included on the PD forms from the Valuation Office. After each land transaction the solicitors involved are obliged by law to fill out a PD form and return it to the Revenue Commissioners Office, which then submits a copy of each PD form to the Valuation Office. The Valuation Office therefore have a record of each and every land transaction in the State.

[9] The source is discussed below.

Transactions are sorted into those for agricultural, forestry, industrial, amenity use etc, on the basis of recognition of the purchaser's name. The designation of land for forestry purposes, in particular, relies upon the recognition of the name of the forestry purchaser. Since not all persons involved in forestry transactions are known, the data set for forestry is not a complete list of all forestry transactions in the State. The data included on the PD form critically contain the following:

- the date at which the transaction took place;
- the names of the purchasers and vendors;
- the price agreed upon;
- the total area transacted in acres or hectares; and
- the Ordinance Survey (OS) number.

It was decided early on to ensure that the agricultural series produced in this report would be consistent, insofar as was possible, with that produced by the Central Statistics Office (CSO). Thus, in line with CSO methodology, all transactions in County Dublin, purchases by companies, transactions for forestry or industrial purposes, transactions under 2 hectares in total, transactions at less than £400 per hectare, transactions at more than £25,000 per hectare and inter-family transactions at low prices are excluded. The reason behind excluding transactions outside the £400-£25,000 range is that these transactions are unlikely to be for agricultural purposes. Transactions under 2 hectares, and those in Dublin county, are more likely to be for construction rather than agricultural purposes, and are thus excluded. Inter-family transactions, which were identifiable, were excluded; in many cases the price at which these transactions took place would not reflect the true market price for the land in question. It is noted that for some counties, even though the land is used for agricultural purposes, the transactions price is higher than similar land in different counties due to the possibility of the land being rezoned.

It is not possible to exclude transactions with a building attached, as new PD forms contain no information as to whether a building exists on a particular property. However, in the previous land price series constructed by Kelly and O'Connor and Conlon, it was noted that there was no significant difference between average prices of agricultural land with or without buildings. It is also apparent that if the proportion of transacted land with buildings, and the quality of building thereon, remains constant then the general trend in land prices should not be unduly distorted by the inclusion of transactions with buildings attached. The failure to exclude land with buildings should therefore not materially affect results produced in this paper. A more troubling omission relates to milk quotas. As these quotas have existed since the mid-1980s, we can make a similar argument to that made in respect of buildings and so the trend in the series since the mid-1980s should not be affected by the omission. It has to be conceded, however, that agricultural land price changes

around the mid-1980s will have been influenced by this development which is "unobserved" in our data.

Number of Identifiable Agricultural Land Transactions and Area Transacted, 1990-1997

The number of transactions and the area of land upon which calculations are based are shown in Table 3.1. The total number of transactions varied substantially from year-to-year, ranging from a maximum of 3,040 in 1991 to a minimum of 839 in 1993. (The transactions number for the year 1997 is smaller but this is partly related to the fact that when we received the data in April 1998 many transactions were probably still being processed.)

Table 3.1: Number of Transactions and Area by Year and Province

Year	Leinster	Munster	Connacht	Ulster	Total
			Number of Transactions		
1990	1,007	816	552	319	2,694
1991	1,195	925	606	314	3,040
1992	598	538	288	185	1,609
1993	298	327	149	65	839
1994	445	332	184	95	1,056
1995	773	507	459	259	1,998
1996	511	283	326	184	1,304
1997	254	102	222	119	697
			Area (hectares)		
1990	12,638	10,339	4,940	2,826	30,743
1991	15,714	11,322	4,939	2,678	34,654
1992	8,611	7,398	2,635	1,826	20,470
1993	5,737	5,216	2,204	709	13,865
1994	8,535	5,999	2,451	1,143	18,128
1995	11,688	6,799	4,976	2,953	26,415
1996	8,748	4,372	3,821	2,184	19,125
1997	3,386	1,700	2,398	1,429	8,913

Source: Valuation Office Data.

In 1996, the most recent year for which we have a complete set of transactions, the total number of identifiable agricultural land transactions in the State is 1,304, of which 511 were in Leinster, 283 in Munster, 326 in Connacht and 184 in Ulster.[10] In the period 1990-1997 that particular pattern of land transactions remained fairly constant with the greatest number of land transactions occurring in Leinster (with the exception of 1993) and the least number of transactions occurring in Ulster.

The total area of land transacted in Leinster in 1996 measured 8,748 hectares, compared with 4,372 hectares in Munster, 3,821 hectares in Connacht and 2,184 in Ulster. The general trend in the area of agricultural land transacted each year is downwards. In

[10] The data set only has information on those transactions within the Republic of Ireland and therefore contains data on only three Ulster counties.

1991, the total area of the agricultural land sold in the State was 34,654 hectares, in 1996 this fell to 19,125 hectares.

The decline in the area of agricultural land sold each year is a result of fewer transactions and also falling average land transaction size. Table 3.2 shows that there was a fall in average land transaction size between 1994 and 1997. Average land transaction size reached a peak of 21 hectares in the first quarter of 1994 and fell sharply to 11.1 hectares in the last quarter of 1997.

Table 3.2: Average Land Transaction Size by Quarter, 1991-1997 (in Hectares)

Year	January-March	April-June	July-September	October-December
1991	10.7	10.7	11.7	12.7
1992	12.5	11.6	12.8	20.0
1993	16.6	15.6	17.3	17.6
1994	21.0	17.3	20.6	15.0
1995	11.3	11.1	14.2	15.1
1996	13.6	13.7	13.6	16.6
1997	14.6	12.5	12.3	11.1

Source: Various CSO releases on agricultural land prices.

Classification by Region, 1990-1997

Average provincial agricultural land prices are summarised in Table 3.3. The national average price per hectare in 1990 was £3,777. In that year the average price of agricultural land in Leinster and Munster is almost identical (£4,048 and £4,045 respectively), while agricultural land in Connacht at £2,881 per hectare is slightly less expensive than in Ulster (£3,145). As regards agricultural land price trends over time, the national average price per hectare rose from £3,777 in 1990 to £4,247 in 1994 and reached £5,402 in 1996. Over the seven-year period land prices thus rose by 43 per cent at national level, while at provincial level the rises were 56 per cent in Leinster, 30 per cent in Munster, 24 per cent in Connacht and 65 per cent in Ulster.[11]

Table 3.3: Average Price per Hectare of Agricultural Land Transactions by Province, 1990 -1997

	1990	1991	1992	1993	1994	1995	1996	1997*
Leinster	£4,048	£4,330	£4,189	£4,384	£4,461	£5,161	£6,317	£6,313
Munster	£4,045	£4,325	£3,526	£3,982	£4,433	£4,547	£5,278	£6,127
Connacht	£2,881	£3,221	£3,210	£2,771	£3,338	£3,505	£3,569	£3,767
Ulster	£3,145	£3,156	£3,285	£3,576	£3,624	£3,795	£5,199	£4,849
STATE	£3,777	£4,079	£3,743	£3,935	£4,247	£4,538	£5,402	£5,361

Source: Valuations Office Data. *preliminary estimates.

[11] Between 1990 and 1997, the Consumer Price Index rose by 16.8 per cent.

Table 3.4 shows agricultural land prices at county, provincial and national level in 1996. Appendices 2-8 show equivalent tables for the years 1990 to 1995 and 1997. It is apparent that land prices vary substantially not only between provinces but also within provinces. In Leinster the average price per hectare varied between £4,540 in Longford and £8,709 in Kildare. In Munster land was least expensive in Kerry, at £3,801 per hectare and most expensive in Cork at £7,633 per hectare. Agricultural land was traded at an average of £4,097 in Galway, while in Leitrim land traded at a mere £2,514 per hectare. In Ulster there were wide county differences in average price per hectare averaging £6,605 in Monaghan and £3,810 in Donegal. The highest average agricultural land price was in Kildare, at £8,709, while the lowest was in Leitrim at £2,514 per hectare. At a provincial level, the highest average price per hectare was in Leinster. Again, it is noted that higher land prices in counties such as Kildare and Wicklow may be in part due to the possibility that land may be rezoned for residential use.

Classification by Transactions Size, 1990-1997

It is apparent from Table 3.4 that one factor affecting average price per hectare is location, i.e. the province in which land is located. One other major determining factor of land prices is transactions size. Table 3.5 shows that the average price per hectare of agricultural land varies significantly with area transacted. In 1996, while the average price per hectare in the State was £5,402, the average price per hectare varied from between £7,736 for transactions between 2 and 10 hectares and £5,380 for transactions of between 30 and 50 hectares.

Average price per hectare appears to be negatively correlated with average land transaction size, i.e. the larger the size of land transacted the lower the price per hectare that land fetches. The proportionate spread between the price of smaller transactions and larger transactions seems to have kept fairly constant over the eight years that were analysed. One possible reason for this relates to the capital market. Farmers tend to be less able to raise finance for larger acquisitions and so competition for larger plots is smaller. In addition, farmers are sometimes prepared to pay substantial amounts for small plots if the plot is of particular significance, such as if it adjoins the purchaser's farm.

Table 3.4: County, Provincial and National Agricultural Land Prices, Number of Transactions and Standard Deviations, 1996

County and Province	Number of transactions	Price £/ha	Standard Deviation, £/ha
Carlow	23	7,261	5,001
Kildare	52	8,709	3,733
Kilkenny	47	5,591	3,166
Laois	38	5,014	3,671
Longford	37	4,540	1,807
Louth	23	7,231	4,606
Meath	79	6,256	3,238
Offaly	42	4,963	2,373
Westmeath	73	5,570	2,906
Wexford	61	6,979	3,383
Wicklow	36	7,999	4,540
Leinster	**511**	**6,317**	**3,620**
Clare	60	4,116	2,577
Cork	16	7,633	5,274
Kerry	50	3,801	3,654
Limerick	50	5,647	2,382
Tipperary	87	5,509	2,694
Waterford	20	6,644	2,261
Munster	**283**	**5,278**	**3,225**
Galway	75	4,097	3,031
Leitrim	57	2,514	1,093
Mayo	61	3,803	3,186
Roscommon	85	3,631	1,827
Sligo	48	3,430	2,640
Connacht	**326**	**3,569**	**2,584**
Cavan	92	5,709	2,975
Donegal	53	3,810	3,239
Monaghan	39	6,605	3,122
Ulster	**184**	**5,199**	**3,260**
STATE	**1,304**	**5,402**	**3,456**

Source: Valuations Office Data.

Table 3.5: Average Price per Hectare of Agricultural Land Transactions by Transactions Size, 1990-1997

Transactions size	1990	1991	1992	1993	1994	1995	1996	1997*
2-10 Hectares	£4,910	£4,836	£4,964	£4,154	£5,229	£5,606	£7,736	£8,934
10-20 Hectares	£4,050	£4,285	£4,011	£4,213	£4,169	£5,117	£6,246	£6,026
20-30 Hectares	£3,754	£4,025	£3,862	£4,194	£4,194	£4,674	£5,163	£5,538
30-50 Hectares	£3,566	£3,939	£3,508	£3,904	£4,321	£4,618	£5,380	£5,585
50+ Hectares	£3,651	£3,991	£3,624	£3,816	£4,231	£4,206	£5,194	£4,728
STATE	£3,777	£4,079	£3,743	£3,935	£4,247	£4,538	£5,402	£5,361

Source: Valuations Office Data.
*Preliminary estimates.

Classification by Region and by Transaction Size

The average price paid per hectare classified by province and size of transaction, between the years 1990 and 1997, is given in Table 3.6. We noted above that, for the State as a whole, average prices per hectare seem to be negatively correlated with average transaction size. It is possible that this is partly the result of an interaction between average transaction size per province and average land price for the province, e.g. if the average transaction size was lower in Leinster where land prices are highest then you would naturally observe, at national level, a negative correlation between average transaction size and average price per hectare. From Table 3.6 we can see, however, that at provincial, as well as at State level, average agricultural land price per hectare and average transaction size are negatively correlated. In 1996, average price per hectare in Leinster ranged from £9,587 for transactions less than 10 hectares, to £5,881 for transactions greater than 50 hectares.

Classification by Soil Quality

The measures of soil quality used in this paper are those identified by Gardiner and Radford (1980). They categorised all land in Ireland into 44 different soil associations and recorded the location of each on a soil map. Each colour on the map represents a unique soil association, which are further categorised into six different use range classes. The use range classes are briefly outlined below.

- Class 1 – wide use range: soils in this range have no limitations that cannot be overcome by good soil management practices;
- Class 2 – moderately wide use range: this use range refers to soil with minor limitations such as coarse texture, somewhat shallow depth, weak structure, moderately high altitude, etc;
- Class 3 – somewhat limited use range: this class has similar limitations to those of Class 2 but to a greater degree;

Table 3.6: Agricultural Land Prices Classified by Size Group and by Province, 1990-1997 (£/ha)

Province	Size group (Hectares)				
	0-10	10-20	20-30	30-50	50+
			1990		
Leinster	4,866	4,332	4,123	3,893	3,932
Munster	5,447	4,694	4,266	3,865	3,742
Connacht	4,697	3,223	2,936	2,521	2,194
Ulster	4,298	3,544	2,877	2,771	2,956
State	4,910	4,050	3,754	3,566	3,651
			1991		
Leinster	5,247	4,571	4,428	4,456	4,113
Munster	5,276	4,791	4,574	3,935	4,209
Connacht	4,206	3,562	2,956	3,007	2,812
Ulster	4,142	3,470	3,299	2,838	2,646
State	4,836	4,265	4,025	3,939	3,991
			1992		
Leinster	5,328	4,162	4,010	3,906	4,274
Munster	5,324	4,254	4,101	3,607	2,997
Connacht	4,185	3,686	2,858	2,902	3,089
Ulster	4,717	3,502	4,507	2,654	2,504
State	4,964	4,011	3,862	3,508	3,624
			1993		
Leinster	4,383	4,402	4,268	3,986	4,559
Munster	2,100	4,700	4,706	4,042	3,612
Connacht	5,510	3,687	3,368	2,875	2,170
Ulster	3,197	3,598	3,126	4,357	2,800
State	3,935	4,213	4,194	3,904	3,816
			1994		
Leinster	5,365	4,297	4,598	4,828	4,349
Munster	6,107	4,618	4,430	4,248	4,461
Connacht	3,893	3,744	3,259	3,491	3,139
Ulster	5,420	3,550	3,299	3,710	3,656
State	5,229	4,169	4,194	4,321	4,231
			1995		
Leinster	6,386	5,993	5,579	5,531	4,714
Munster	5,794	5,441	4,800	4,614	4,078
Connacht	5,101	3,844	3,172	3,557	3,225
Ulster	4,648	4,935	3,855	3,792	3,052
State	5,606	5,117	4,674	4,618	4,206
			1996		
Leinster	9,587	7,287	6,877	6,575	5,881
Munster	7,263	6,229	5,443	5,035	5,079
Connacht	6,621	4,657	3,203	3,484	3,094
Ulster	6,407	6,775	4,929	5,119	4,507
State	7,736	6,246	5,163	5,380	5,194
			1997*		
Leinster	10,442	7,393	6,605	6,191	5,784
Munster	8,853	6,073	4,870	7,151	5,900
Connacht	9,338	4,427	4,777	4,037	1,583
Ulster	6,345	6,596	4,931	5,442	3,249
State	8,934	6,026	5,538	5,585	4,728

Source: Valuations Office Data. *preliminary estimates.

- Class 4 – limited use range: soils in this category are permanently unsuited to tillage but suited to a permanent grassland system. One limitation with this category is inadequate drainage. All soil associations in this category suffer from this problem with the exception of those located in hilly areas;

- Class 5 – very limited use range: this class contains those soils whose agricultural potential is greatly restricted. Much of the land in this class is situated in western and north-western regions, where altitude and steep slopes are the main limitations. Much of this land is suitable for forestry; and
- Class 6 – extremely limited use range: this class contains soils whose productive potential is virtually zero. It includes mountain top areas and the Burren in Clare.

The proportion of land in each use range class is shown in Appendix 9. Munster has the highest proportion of land in use range class 1 at 36.4 per cent but the lowest in use range class 2 at 3.1 per cent. Leinster has a high proportion of its land in use range classes 1, 2 and 3 at 32.9 per cent, 21.4 per cent and 16.9 per cent respectively. Both Connacht and Ulster have a low proportion of land in use range class 1, 3.6 per cent and 2.6 per cent respectively, while they have a high proportion of their land in use range class 5 at 37.7 per cent and 41.2 per cent respectively. The percentage of land in the state in range class 1 is 23.4 per cent, in use range class 2 is 11.7 per cent, while in class 6 it is only 3.1 per cent.

In order to factor land quality into the analysis, it was decided to use the soil mapping technique designed by Kelly and discussed in O'Connor and Conlon. The technique involves trying to allocate one of the 44 known soil associations to each Ordinance Survey (OS) number, which were contained in the PD form data set. The technique used was relatively simple but time-consuming – two maps were used, the Ordinance Survey index map and the map published by An Foras Talúntais.

Acetates were made of sections of the OS index map, which shows each OS grid in the country. When the acetates were placed over An Foras Talúntais soil map it was possible to read off the predominant soil association for each OS grid number. In many cases two or more soil types fell within a given OS grid, thus complicating classification. However, since it is mostly the case that adjacent soil types have the same use range class, and we only look at results at the level of the use range class, this was deemed unlikely to bias results unduly. For the purposes of this paper, we have amalgamated use range classes 5 and 6, as in each year there were too few transactions involving the latter to produce reliable estimates of price per hectare. This should not be surprising as the agricultural potential of use range class 6 land is extremely low.

The average price paid per hectare by year and use range class is shown in Table 3.7. In 1990, land in the use range class 1 category transacted at an average of £4,547 per hectare, while, in the same year, land in the use range 5 and 6 category transacted at an average of £2,995 per hectare. In 1996, land prices had risen to the extent that transacted land in use range class 1 was worth an average of £5,933 per hectare and land in use range class 5 and 6 was worth an average of £3,543. The increases in the nominal price of agricultural land between 1990 and 1996 were 30

per cent for use range classes 1 and 2, 24 per cent for use range class 3, 28 per cent for use range class 4 and 37 per cent for the amalgamated use range classes 5 and 6.

Table 3.7: Value of Agricultural Land by Use Range Class (£/hectare)

Use Range Class	1	2	3	4	5 + 6
1990	£4,547	£4,191	£4,206	£3,435	£2,995
1991	£4,391	£3,758	£3,642	£3,410	£3,069
1992	£4,480	£3,818	£3,711	£3,301	£2,491
1993	£4,517	£4,164	£3,837	£3,462	£2,881
1994	£4,428	£4,258	£4,344	£4,001	£3,267
1995	£4,984	£5,125	£4,107	£3,687	£3,375
1996	£5,646	£5,189	£4,878	£4,107	£3,543
1997*	£5,933	£5,473	£5,206	£4,388	£4,112

Source: Valuations Office Data.

Note: In calculating use range class tables, only land sold at less than £5,000 per acre was included, so as to make our series comparable to those in O'Connor and Conlon.

* Preliminary estimate.

Classification by Transaction Size and Use Range Class

We have already shown that there is a relationship between average transaction size and price per hectare. Table 3.8 looks at average price per hectare by year, use range class and transaction size. Although there is wide variation in the table, a negative correlation between average transaction size and average price per hectare is notable. For instance, in 1992, for land in the use range 3 category, land transacted at an average of £3,919 for transaction sizes less than 10 hectares, £3,786 for transaction sizes between 10-20 hectares, £3,724 for transactions between 20-30 hectares and £3,353 for land with a transaction size greater than 30 hectares. The generally observed negative correlation between transaction size and price per hectare holds irrespective of soil quality (i.e. use range class).

Table 3.8 also shows that the relationship between soil quality and land price is independent of transaction size. In the majority of cases, for a given transaction size the use range classes 1, 2 and 3 (i.e. the land with higher soil quality) attract higher prices. In 1991, the average price per hectare for transaction sizes under 10 hectares, varied from between £4,544 for use range class 1 and £3,326 for use range class 5 + 6. Appendix 10 shows the area on which the calculations for Table 3.8 are based.

Table 3.8: Land Prices per Hectare by Year and Use Range Class

Year	Size class	Use range class 1	2	3	4	5
1990	2-9.99	£4,959	£4,309	£4,169	£3,833	£3,400
	10-19.99	£4,576	£4,122	£3,847	£3,158	£3,017
	20-29.99	£4,559	£4,645	£4,055	£3,323	£2,108
	30+	£4,109	£3,833	£4,863	£3,304	£2,800
	Total	**£4,547**	**£4,191**	**£4,206**	**£3,435**	**£2,995**
1991	2-9.99	£4,544	£4,164	£3,993	£3,766	£3,326
	10-19.99	£4,388	£3,286	£3,749	£2,960	£2,785
	20-29.99	£4,097	£4,304	£3,197	£3,635	£2,718
	30+	£4,396	£3,020	£3,289	£3,435	£3,494
	Total	**£4,391**	**£3,758**	**£3,642**	**£3,410**	**£3,069**
1992	2-9.99	£4,396	£4,047	£3,919	£3,531	£3,442
	10-19.99	£4,097	£3,919	£3,786	£3,252	£2,711
	20-29.99	£3,887	£3,062	£3,724	£3,608	£2,100
	30+	£5,194	£3,884	£3,353	£2,750	£1,623
	Total	**£4,480**	**£3,818**	**£3,711**	**£3,301**	**£2,491**
1993	2-9.99	£4,786	£4,317	£3,936	£3,716	£3,197
	10-19.99	£4,334	£3,506	£4,164	£3,650	£2,543
	20-29.99	£4,621	£3,741	£3,237	£2,533	£2,525
	30+	£4,532	£4,668	£4,043	£3,534	£3,165
	Total	**£4,517**	**£4,164**	**£3,837**	**£3,462**	**£2,881**
1994	2-9.99	£4,821	£4,648	£4,450	£3,531	£3,200
	10-19.99	£4,490	£4,922	£4,243	£4,223	£3,173
	20-29.99	£4,361	£4,297	£3,603	£3,289	£3,719
	30+	£4,334	£3,726	£4,549	£5,155	£3,314
	Total	**£4,428**	**£4,258**	**£4,344**	**£4,001**	**£3,267**
1995	2-9.99	£5,496	£5,589	£4,692	£4,045	£3,870
	10-19.99	£5,194	£5,631	£4,245	£3,739	£3,741
	20-29.99	£4,734	£5,278	£3,753	£3,375	£3,015
	30+	£4,579	£4,443	£3,469	£3,353	£2,669
	Total	**£4,984**	**£5,125**	**£4,107**	**£3,687**	**£3,375**
1996	2-9.99	£5,901	£5,740	£5,374	£4,265	£4,374
	10-19.99	£5,629	£5,236	£4,836	£4,238	£3,529
	20-29.99	34,935	£4,996	£4,317	£3,776	£2,926
	30+	£5,921	£4,982	£4,870	£3,872	£3,514
	Total	**£5,646**	**£5,189**	**£4,878**	**£4,107**	**£3,543**
1997	2-9.99	£6,217	£6,234	£5,671	£4,747	£4,463
	10-19.99	£5,733	£5,100	£5,414	£4,344	£3,709
	20-29.99	£5,676	£4,784	£4,616	£4,403	£2,397
	30+	£6,148	£5,602	£4,107	£3,684	£4,737
	Total	£5,933	£5,473	£5,206	£4,388	£4,112

4. FORESTRY LAND PRICES

We begin our presentation of forestry land prices by recalling the series contained in O'Connor and Conlon (1993). For the years 1978 to 1983, their prices per hectare were based on the area of land purchased by the Department of Forestry and total government expenditure on forestry land. For the years to 1989, the prices were based on data from the Valuation Office. Table 4.1 shows the summarised results from both data sets. As can be seen, the general trend shows increasing nominal forestry land prices. In 1978 average forestry land prices were £108 per hectare; that rose to £600 in 1984 and reached £1,022 in 1989.[12]

Table 4.1: Average Forestry Land Prices per Hectare

Year	Price per hectare	Year	Price per hectare
1978	£108	1984	£600
1979	£153	1985	£707
1980	£252	1986	£687
1981	£462	1987	£796
1982	£408	1988	£994
1983	£515	1989	£1,022

Source: O'Connor and Conlon (1993).

Forestry Land Prices in Ireland, 1990-1997

The data on forestry sales and average forestry land prices were included in the data supplied to us by the Valuation Office. All the transactions on which our forestry series are based relate to land purchased explicitly for forestry purposes. The purchasers include Coillte Teoranta, various government departments, forestry companies and individuals known to be in the forestry business. However, many of those purchasing privately for forestry purposes cannot be identified in the Valuation Office records. Hence, the forestry series estimated below do not include all forestry purchases in the State.

Transactions in the range £400 – £7,000 were selected for the following reasons: transactions at under £400 per hectare are

[12] Between 1978 and 1989, the Consumer Price Index rose from 139.9 to 380, based on November 1975 being equal to 100.

likely to be due to either incorrect inputting on the PD forms, or inter-family transactions at low prices. Some actual forestry transactions will be excluded, where the land is of low yield class, but since these transactions are relatively few the series should not be unduly affected. We exclude transactions at more than £7,000 per hectare as these are unlikely to be for forestry purposes.

Number of Transactions and Area Transacted by Province, 1990-1997

The number of transactions each year according to province are shown in Table 4.2. A separate provincial estimate for Ulster is not provided due to a paucity of observations; hence Connacht and Ulster are amalgamated. Unlike agricultural land transactions, more identifiable forestry transactions occur in Munster than in Leinster. In 1990, 115 transactions covering 2,797 hectares were conducted in Munster, while in Leinster 34 transactions occurred covering 653 hectares. In Connacht/Ulster in the same year there were 138 identifiable forestry transactions covering 3,738 hectares. As in the case of our agricultural series, caution must be taken in the interpretation of our 1997 figures as many transactions that occurred during that year would not have been included in the data set obtained and thus results for 1997 should be interpreted as preliminary estimates only.

Table 4.2: Number of Transactions and Area Transacted by Province

	Leinster		Munster		Connacht/Ulster		Total	
Year	No.	Hectares	No.	Hectares	No.	Hectares	No.	Hectares
1990	34	653	115	2,797	138	3,738	287	7,188
1991	46	951	115	2,155	132	1,981	293	5,087
1992	14	332	22	593	44	623	80	1,547
1993	5	147	14	506	13	301	33	953
1994	11	315	24	629	50	1,333	85	2,277
1995	15	269	33	607	75	1,257	123	2,132
1996	6	112	26	462	46	618	78	1,191
1997	0	0	11	198	14	387	25	585

Average Forestry Land Prices at National and Provincial Levels, 1990-1997

Table 4.3 below shows the average prices per hectare and standard deviations of forestry land at provincial and national levels. Unlike the agricultural land price series presented above, we were unable to produce useful results at a county level due to a lack of observations.

Turning attention first to the results at State level we note a general upward trend in forestry land prices. Average price per hectare rose from £1,153 in 1990 to £1,978 in 1997 (although again, caution must be taken in interpreting 1997 figures as not all transactions for that year are included in the data set). One factor driving average forestry land prices per hectare is that forestry is generally attracting a higher quality of land now than previously. This in itself would raise the average State figures for price per hectare. Thus movements in the forestry price index reflect, to a degree, increasing land quality used in forestry (or decreasing

Table 4.3: Forestry Prices and Standard Deviations for each Province

Year	Province	Leinster	Munster	Connacht/Ulster	State
1990	Price	£1,221	£1,223	£1,088	£1,153
	Standard deviation	£488	£489	£476	£487
1991	Price	£1,301	£1,399	£1,308	£1,345
	Standard deviation	£632	£617	£623	£624
1992	Price	£1,880	£1,319	£1,401	£1,472
	Standard deviation	£271	£436	£353	£431
1993	Price	£2,351	£1,232	£1,302	£1,427
	Standard deviation	£1,153	£648	£506	£816
1994	Price	£2,725	£1,385	£1,381	£1,568
	Standard deviation	£1,640	£483	£704	£970
1995	Price	£2,863	£2,100	£1,637	£1,923
	Standard deviation	£1,207	£745	£641	£867
1996	Price	£2,347	£2,050	£1,921	£2,011
	Standard deviation	£618	£469	£541	£536
1997*	Price	**	£2,049	£1,942	£1,978
	Standard deviation	**	£576	£642	£623

Source: Valuations Office Data.

* preliminary estimates.

** too few transactions noted to present figures.

availability of poorer land) as well as generally rising forestry land prices. We return to this point below.

At a provincial level we note that the average price per hectare is typically, but not always, higher in Leinster than in either Munster or Connacht/Ulster. In 1992, the average price per hectare for forestry transactions in Leinster, Munster and Connacht/Ulster is £1,880, £1,319 and £1,401 respectively. In 1996, the average price per hectare is £2,347 in Leinster, £2,050 in Munster and £1,921 in Connacht/Ulster. These represent nominal increases of 25 per cent in Leinster, 55 per cent in Munster and 37 per cent in Connacht/Ulster.

Turning to the standard deviations, we note that at a provincial level they are reasonably wide, on average approximately 30-40 per cent of the mean price per hectare. In years where total transaction numbers are high, standard deviations are correspondingly reduced.

Classification of Results by Transactions Size, 1990-1997

As in the case of agricultural land, forestry land prices vary not only with land quality but also with size of transaction. Table 4.4 below shows transaction numbers, average price per hectare and standard deviations for the various size groups between 1990 and 1997. For six out of the eight years analysed, the average price per hectare was highest in the 0-10 hectares size group, while for three out of the eight years the 50 hectares plus size group accounted for the lowest price per hectare. The average price per

hectare thus appears to be negatively correlated with mean transactions size. It may be the case that this negative correlation is due to an interaction between transaction size and land quality. If land for forestry purposes of relatively high quality is typically transacted in small lots, then you would expect a negative correlation between transaction size and price per hectare. It is also notable that the correlation between average transaction size and price per hectare does not appear to be as robust for forestry land as for agricultural land.

The number of forestry transactions on which the results are based varies widely from year-to-year. For instance, in 1991 there were 293 identifiable forestry transactions while in 1993 there were only 33. Such large observed differences in transaction sizes between years may only be partially accounted for by changes in land availability or changes in the rate of afforestation; they may also be due to deficiencies in the data set and problems in identifying actual forestry transactions. In years when there are low total transactions numbers, the standard deviations are correspondingly large.

Table 4.4: Price per Hectare and Standard Deviations by Size Group, 1990-1997

Year		Transaction size					
		0-9.9	10-19.9	20-29.9	30-50	50+	All
1990	Number of transactions	82	107	50	24	24	287
	Price (£ per ha)	1,470	1,358	1,300	1,152	933	1,153
	Standard deviation	692	504	398	409	374	487
1991	Number of transactions	125	99	34	20	15	293
	Price (£per ha)	1,625	1,520	1,427	1,385	947	1,345
	Standard deviation	878	585	419	467	439	624
1992	Number of transactions	30	31	7	7	5	80
	Price (£ per ha)	1,603	1,446	1,547	1,475	1,404	1,472
	Standard deviation	488	359	384	453	452	431
1993	Number of transactions	6	10	7	5	5	33
	Price (£ per ha)	2,148	1,605	1,170	1,557	1,322	1,427
	Standard deviation	1,387	807	319	235	985	816
1994	Number of transactions	24	37	10	7	7	85
	Price (£ per ha)	1,539	1,630	1,553	1,453	1,575	1,568
	Standard deviation	341	694	467	612	1,266	970
1995	Number of transactions	56	34	14	14	5	123
	Price (£ per ha)	2,239	1,893	1,807	1,700	2,113	1,923
	Standard deviation	1,040	559	810	612	1,207	867
1996	Number of transactions	26	33	15	3	1	78
	Price (£ per ha)	1,921	2,016	1,956	2,393	2,000	2,011
	Standard deviation	672	516	546	113	0	536
1997*	Number of transactions	4	8	8	2	3	25
	Price (£ per ha)	2,315	1,791	2,130	1,520	2,081	1,978
	Standard deviation	201	540	511	1,024	444	623

Source: Valuations Office Data. *Preliminary estimates.

Classification of Transactions by Soil Quality 1990-1997[13]

The average soil quality of land transacted for forestry purposes between 1990 and 1996 was poorer than that of land transacted for agricultural purposes. Table 4.5 shows the percentage of the area of agricultural and forestry land traded in each use range class as well as the percentage of total land in the Republic of Ireland in each use range class.

Table 4.5: Percentage of Agricultural and Forestry Transactions in Each Use Range Class 1990-1996

Use Range Class	1+2+3	4	5+6
		%	
Forestry land transacted in each use range class.	24.2	36.7	39.1
Agricultural land transacted in each use range class	66.3	23.7	10.0
Land in Republic of Ireland in each use range class	50.1	21.1	28.7

Sources: Gardiner and Radford (1980), and Valuations Office Data.

The total land area of the Republic of Ireland is relatively evenly distributed between the use range classes previously outlined, with 23.4 per cent, 11.7 per cent, 15 per cent, 21 per cent and 28.6 per cent in use range classes 1, 2, 3, 4 and 5+6 respectively (see Appendix 9). Agricultural transactions were concentrated in the higher use range classes, with 66.3 per cent of all agricultural land transacted in use range classes 1, 2 and 3. In contrast, forestry transactions were concentrated on lower use range classes (4, 5 and 6) with 75.8 per cent of the area of forestry transactions in these use range classes.

Boyle and McCarthy (1993) express a generally held view that in the past forestry land "was extremely marginal" but increasingly "land which is less marginal for agricultural uses is being cultivated for forestry". Table 4.6 broadly confirms this view. The percentage of the area of land transacted for forestry purposes which was in use range classes 1 - 3 increased from 18 per cent in 1990 to 34 per cent in 1996, while the percentage in use range classes 5 + 6 fell from 44 per cent in 1990 to 29 per cent in 1996. The percentage of forestry land transacted that was in use range class 4 remained fairly constant over the period at 37 per cent, 34 per cent and 37 per cent in 1990, 1993 and 1996 respectively. The findings in Table 4.6 are thus broadly consistent with prior expectations of a shift in forestry transactions towards better quality land.

[13] The method used for attaching quality measures to the parcels of land reported in the data is described in Chapter 3.

Table 4.6: Percentage of Area Transacted for Forestry Purposes by Use Range Class 1990-1996

Year	Use Range Class 1 - 3	Use Range Class 4	Use Range Class 5 + 6
		%	
1990	18	37	44
1993	34	33	34
1996	34	37	29

Source: Valuation Office Data.

For forestry purposes the most appropriate measure of soil quality is yield class rather than use range class or soil association. Yield class is typically defined as the productive potential of Sitka Spruce from a given area of land in cubic metres per hectare per annum (O'Connor and Conlon, 1993).

Table 4.7 shows the average price per hectare paid by Coillte for each different yield class between the years 1987 and 1997. It is notable that in any given year, with few exceptions, the higher the yield class, the higher the price at which land is transacted. The general upward trend in nominal forestry land within yield classes is also noted, with the price of land of yield class 22 rising from £1,040 in 1988 to £2,350 in 1997. For each hectare, land of yield class 20 on average fetched 80 per cent of the price of land of yield class 24, while land of yield class 17 yielded only 55 per cent of the revenue achieved by selling land of yield class 24. After 1994 there were no purchases by Coillte Teoranta of land with a yield class of less than 14, reflecting a shift in forestry transactions away from extremely marginal land.

Table 4.7: Average Price per Hectare Paid by Coillte by Yield Class by Year, 1987-1997

Yield Class	Price (£IR) per hectare/year										
	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997
12		247				317		309			
13				636				618			
14			308	500	686			950	1,118	1,052	1,254
15			487	675	686	787	762		1,029	1,457	1,481
16		441	510	755	835	840	767	1,092	1,238	1,194	1,440
17	483	541	594	787	850	839	797	1,170	1,315	1,306	1,850
18	611	573	729	829	974	1,055	1,014	1,226	1,400	1,685	1,859
19			945	1,058	1,118	1,091	1,097	1,375	1,691	1,721	2,104
20	1,258	879	945	1,134	1,210	1,363	1,289	1,420	1,650	1,881	2,253
21		859	956	1,153	1,230	1,223	1,330	1,535	1,854	2,146	2,340
22		1,040	1,087	1,370	1,407	1,444	1,453	1,691	1,965	2,159	2,350
23		997	1,118	1,388	1,510	1,499	1,580	1,685	2,268	2,484	2,328
24	1,194	1,154	1,272	1,522	1,628	1,674	1,583	1,844	2,068	2,522	2,687

Source: Coillte Teoranta.

The average forestry land price in Ireland increased at an annual average rate of 9.7 per cent between the years 1990-1996 (see Table 4.8). The annual average rate of increase across yield class prices, paid by Coillte, was 10.1 per cent. The increase in the

individual yield classes varied widely perhaps reflecting the low number of transactions on which averages are based. The price increases within yield classes are important to note: they imply that the rise in forestry land prices generally was not entirely, or even largely, a result of a greater propensity to buy higher quality land for forestry purposes.

Table 4.8: Average Annual Increases in the Price of Forestry Land Paid by Coillte Teoranta

	Average yearly increase 1990-1996
	%
Average all Forestry land*	9.7
Yield Class 14	13.2
Yield Class 15	13.7
Yield Class 16	7.9
Yield Class 17	8.8
Yield Class 18	12.5
Yield Class 19	8.4
Yield Class 20	8.8
Yield Class 21	10.9
Yield Class 22	7.9
Yield Class 23	10.2
Yield Class 24	8.8
Average all yield classes	10.1

* Relates to data from the Valuation Office and includes transactions by forestry companies and private purchasers.

Summary of Agricultural and Forestry Land Prices and Area Traded, 1990-1997

The trends in nominal agricultural and forestry land prices per hectare over the period 1990-1997 are shown in Figure 4.1.

Figure 4.1 shows that both agricultural and forestry land prices have tended to increase during the period 1990-1997. Agricultural land prices increased from £3,777 per hectare in 1990 to £5,361 per hectare in 1997, representing a 42 per cent increase. The price of forestry land increased from £1,153 per hectare in 1990 to £1,978 in 1997 representing an increase of 72 per cent over the eight-year period.

Figure 4.1: Agricultural and Forestry Land Prices, 1990-1997

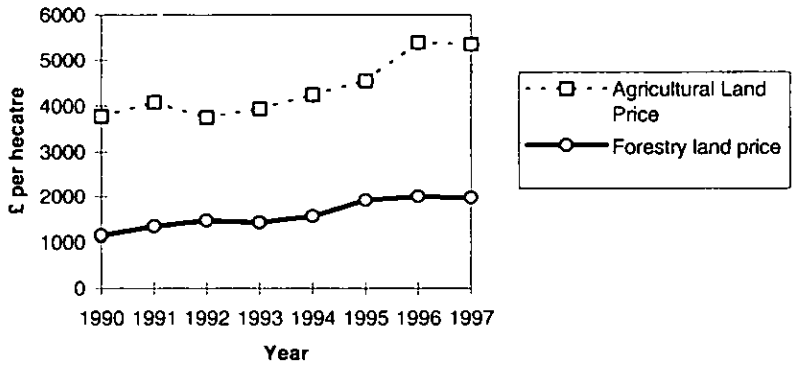
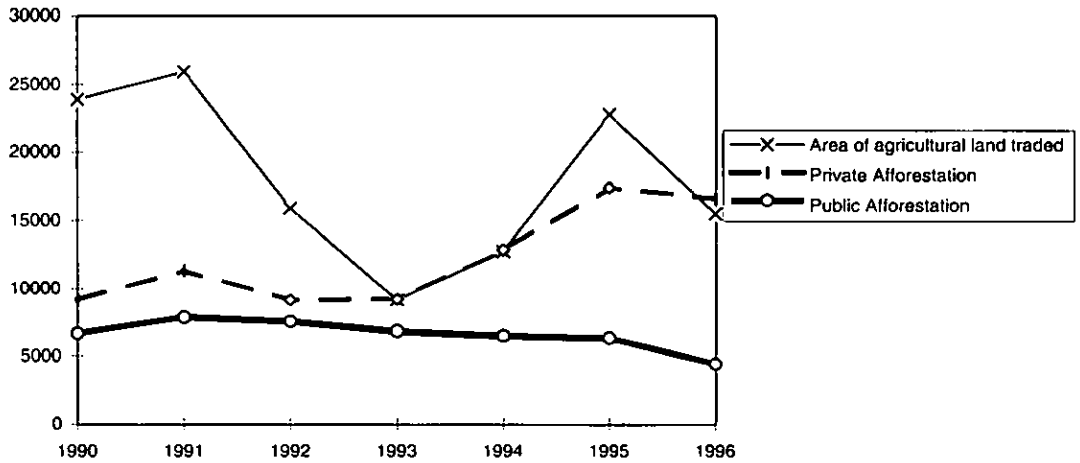


Figure 4.2 shows the trend in agricultural land traded and public and private afforestation during the period 1990-1996. The area traded for agricultural purposes varied widely from year to year between 1990 and 1996, reaching a maximum of 25,931 hectares in 1991 and a minimum of 9,134 hectares in 1993.

Figure 4.2: Area of Agricultural Land Traded, Public and Private Afforestation, 1990-1996



5. Assessing the Impact of Forestry and Agricultural Subsidies on Land Prices and Afforestation

In Chapter 2, we demonstrated in our model how subsidies tend to increase the price of land. In this section, we want to move beyond theory to assess the degree to which agricultural subsidies, and in particular REPS, have had an impact on the market for land relative to the forestry subsidies.

In order to address this issue in a statistical framework, ideally we would like to have a long time-series of data with information on the price of agricultural and forestry land, on land use and on the value of the subsidies in question. If the subsidies had varied sufficiently, and at different times, it would be possible to estimate reliable statistical relationships between the different subsidies and land prices and afforestation.

Unfortunately, we do not have such data available. To begin with, our land price data extends only from 1978 to 1996. Although Kelly estimated agricultural land prices for a number of years prior to this, his earlier methodology differed sufficiently from the later work to rule out combining the series. Also, as he did not collect forestry land price information, we are again restricted to the years 1978 to 1996.

Our next difficulty relates to the fact that one of the schemes in which we have a particular interest, REPS, was only introduced in 1994. Clearly, the limited time period of its existence reduces our ability to reliably estimate its effect on land prices. This could be overcome if we had more detailed information on a large number of individual transactions and in particular if we knew whether REPS was being claimed in respect of each parcel traded. However, our data do not include such details. As other "accompanying measures" were also introduced at the same time as REPS, it is impossible to estimate reliably the net effects of all the accompanying measures separately.

As a result of these data limitations, the statistical exercises which we have undertaken must be viewed with great caution. We report on the results of these exercises partly because they are the most reliable statistical estimates possible, given the data available and also because some interesting results emerge in spite of the data limitations. However, in the sub-section which follows, we take a different approach to the issue which in many ways allows for a more convincing discussion.

Statistical Modelling

The dependent variables that we are interested in are as follows: the rate of afforestation, the price of forestry land and the price of agricultural land.[14] In the case of each, we take the annual national values from 1978 to 1996 which come partly from O'Connor and Conlon (1993), partly from previous chapters and, in the case of afforestation, from the Department of Agriculture and Food (1997).[15] We then relate them in a time-series regression framework to measures of the size of subsidies.

As for forestry subsidies, for the years 1978 to 1991, we take the discounted value of payments per hectare reported in O'Connor and Conlon (1993). For later years, we calculate the equivalent values by taking the values of grants and premia from brochures produced by the Forest Service and applying the 5 per cent discount factor used by O'Connor and Conlon. Our measure of agricultural subsides is EU spending on agriculture in Ireland, taken from the Department of Agriculture and Food (1997). While this does not capture movements in domestic spending, it should capture general movements in subsidies. We subtract REPS spending from our agricultural subsidies measure and enter REPS as a separate variable by including the area under REPS in each of the years 1994 to 1996.[16] In some models we omit REPS as a separate variable and instead include a dummy variable to capture the combined effects of the "accompanying measures". In some cases we also added forestry land prices and agricultural land prices as explanatory variables. This causes severe statistical problems due to the two-way causation between prices and areas traded. Our data is too limited to overcome this but, as with all the results, they are as good as can be achieved given the data. All nominal variables are, of course, expressed in real terms.

[14] An additional possible option would have been to look at the area of forestry and agricultural land traded but there are difficulties in respect of both. In the case of forestry, we do not have complete data on all transactions and so do not know the total area traded for forestry purposes. In the case of agricultural land, the amount traded in any year is such a small proportion of the total that it is somewhat meaningless as a dependent variable.

[15] We take the rate of afforestation to be a better indicator of activity in this area than our figures on land traded. As it was not possible for us to identify all forestry transactions, it is likely that the area traded figures would understate the true extent of activity.

[16] This information was provided to us directly by the Department of Agriculture and Food.

We now present the results that emerged from our regression analyses. In our first regression, the dependent variable was the annual rate of public afforestation; the independent variables were the values of the forestry premia in each year, the levels of agriculture subsidies, the area of land under REPS and the price of forestry land.[17] The coefficients and t-values are shown in Table 5.1.

Table 5.1: Regression Estimates for Public Afforestation

	Coefficient	t-value
Constant	8.27	28.33
Forestry premia	.11	.60
Agricultural subsidies	-0.28	-1.31
Area under REPS	-0.02	-2.26
Forestry land price	.64	1.86
	N = 17	Adj R^2 = .28

Note: Dependent variable – annual public afforestation.

Before discussing these results, we want to stress again that care must be taken not to lend this too much weight because of the limited data available to us. With this in mind, we can see from the table that the effect estimated with most statistical significance is the negative effect of REPS on the rate of public afforestation.[18] Agricultural subsidies are also shown to reduce public afforestation, although the estimate is statistically indistinguishable from zero. The price of forestry land is seen to be positively related to public afforestation. This effect is more likely to be the result of public afforestation bidding up the price of forestry land, thereby reminding us of the desirability of modelling this market taking account of the endogeneity of price. As mentioned above, this is not possible with the data available. While the forestry premia are estimated to have a positive effect, the estimate is weakest of all in statistical terms. This leaves us with the overall conclusion that agricultural subsidies in general have had a greater impact on the rate of public afforestation than forestry premia.

In a subsequent regression, we estimated a similar model but this time we included a dummy variable representing the "accompanying measures" instead of the REPS variable. The coefficient on the "accompanying measures" dummy variable is –0.251, with a t-value of -1.8, which implies that the estimate is at least marginally significant. The pattern of the other coefficients is similar to that shown above in terms of signs and significance, so

[17] In general, the logarithms of the values are used, the exceptions being where dummy variables are included.

[18] When we estimate a coefficient, we need to have some idea of precisely how we are estimating the value. In particular, we need to know if the coefficient is likely to be different from zero because a coefficient with a value of zero implies there is no relationship between the variables of interest. The t-value is a measure of precision. If its absolute value is greater than 2 we can say with a 95 per cent degree of confidence that our estimate is different from zero. If the absolute value is greater than 1.65, our confidence level is about 90 per cent.

again, we appear to have tentative evidence on the relatively greater impact of agriculture subsidies on public afforestation than the forestry premia.

In our next regression, the dependent variable is the annual rate of private afforestation. Our independent variables are the forestry premia values, agricultural subsidies (recall that these are net of REPS), the price of forestry land and the "accompanying measures" dummy variable. The coefficients and t-values are shown in Table 5.2.

Table 5.2: Regression Estimates for Private Afforestation

	Coefficient	t-value
Constant	8.56	6.50
Forestry premia	0.02	-0.02
Agricultural subsidies	1.23	1.27
Forestry land prices	2.24	1.43
Accompanying measures	-0.97	-1.62
	N = 17	Adj R^2 = .28

Note: Dependent variable = annual private afforestation.

If we look at the table in terms of what is statistically significant, even if this is only marginally so, we see that the variable whose coefficient is most likely to be truly different from zero is "accompanying measures". As in the case of public afforestation, the "accompanying measures" appear to reduce private afforestation. As we said, this result is on the margins of significance; the coefficient is significant at the 13 per cent level which is outside standard boundaries. The complete non-significance of the forestry premia allows us to say something more definite, i.e. statistically the forestry premia are not found to be producing increases in private afforestation.

If we look behind the regression results at the data, we can get a better understanding of the two main results, namely the apparent negative effect of the accompanying measures (including REPS) on afforestation and the apparent lack of any effect of the forestry premia on the same variable. In the case of public afforestation, the annual rates have been declining since 1991, going from 7,565 hectares in that year to 6,367 hectares in 1995 and 4,426 hectares in 1996. As the premia grew more generous around this time, the regressions were unlikely to find a positive relationship between public afforestation and forestry premia. On the other hand, as the accompanying measures were introduced around 1994, we can see how a significant negative relationship between public afforestation and the measures would result. For private afforestation, the 1991 figure was 19,147; this rose to 23,710 in 1995 but fell again to 20,981 in 1996. The increasing generosity of the forestry premia did not coincide with increased private afforestation, hence the lack of any statistically significant relationship. The arrival of the "accompanying measure" in 1994 and the private afforestation downturn in 1996 probably explain the negative relationship observed between the two, although again the relationship is not statistically significant.

We went on to estimate a regression in which the dependent variable is the national average price of forestry land. The independent variables are the value of the forestry premia, the level of agricultural subsidies and the "accompanying measures" dummy variable. Apart from the constant, the agricultural subsidies have the only statistically significant coefficient; the coefficient is .584 with a t-value of 3.436. This would indicate that agricultural subsidies have the effect of increasing the price of forestry land. As the forestry premia coefficient was not significantly different from zero, we can again tentatively conclude that the effect of the forestry premia on the market for forestry land is less than that of agricultural subsidies.

The dependent variable in our final regression is the price of agricultural land. The independent variables are the value of the forestry premia, agricultural subsidies, the "accompanying measures" and the area of agricultural land traded. When this regression is run, the only significant variable is that of the "accompanying measures"; the value is .380 with a t-value of 2.184. The coefficient on the forestry premia variable is not significant, so again we fail to find an effect of these premia on the land market. That the coefficient of the agricultural subsidies variable was also insignificant is surprising and serves to remind us of the tentative nature of this analysis.

From this analysis we can draw the following conclusions, albeit with a considerable degree of caution. The forestry premia do not appear to have had a statistically significant impact on rates of afforestation or on the prices of agricultural and forestry land. Although we have not attempted to estimate the effect of the premia on the amount of land used for agricultural purposes or on the amount of agricultural land traded, it seems reasonable to say that if no effect on the forestry market is found, no such effect is likely in the agricultural market. We have, however, found evidence of an impact of REPS, the "accompanying measures" together and agricultural subsidies in general on both the agriculture and forestry markets.

REPS Take-up and Afforestation Compared

Throughout the statistical analysis we have warned against relying on our statistical estimates in drawing conclusions about the issues under discussion. In an effort to arrive at conclusions about which we can be more confident, we will look at the issue from a different perspective. Remembering that our core interest is on the relative effect on the agricultural and forestry land markets of the forestry premia and agricultural subsidies, we consider the following data to be revealing.

Starting with the year in which REPS were introduced, the trends in the number of hectares on which REPS applies and the number of hectares of afforestation are shown in Table 5.3.

Table 5.3: Additional Hectares under REPS and Forestry, 1994-1997

Year	Additional REPS hectares	Afforestation in hectares
1994	19,074	19,459
1995	336,236	23,710
1996	417,504	20,981
1997	282,009	11,434

These numbers show quite clearly that in spite of the relative generosity of the forestry premia when compared to the REPS payments (approx. £200 compared to £125), the latter scheme has proved to be vastly more popular. Given these numbers, it seems reasonable to conclude that the scheme with the greater impact on either the market for forestry or agricultural land is REPS. Referring back to Chapter 1, it will be recalled that the annual afforestation target for the years 1997-2000 is 25,000 hectares per annum. This implies that the uptake of the forestry premia has been low not only relative to REPS, but relative to the targets set out. In many ways, the real question is why such a generous scheme is not having more of an effect. In our concluding chapter, we discuss some possible reasons for this outcome.

6. CONCLUSION

This report has dual objectives: to present trends in the price of both forestry and agricultural land and to analyse the impact various grants and premia had on the price of agricultural and forestry land and on the rate of afforestation.

To satisfy the first objective of the report, we relied upon data provided to us by the Valuation Office. Chapters 3 and 4 outline the trends in the years 1990-1997. By using the soil-mapping technique, designed by Kelly, we were able to produce series by soil class. We find that the price of both agricultural and forestry land has risen rapidly in recent years. The nominal price of an average hectare of agricultural land in 1992 was £3,743 while in 1996 it was £5,402 representing an increase of 44 per cent over the four-year period. During the same four-year period the average price of one hectare of forestry land rose from £1,472 to £2,011 representing an increase of 37 per cent.[19]

In order to satisfy the second objective of assessing the relative impact of forestry and agricultural subsidies, we began by taking a theoretical perspective. In Chapter 2, we demonstrated how land-related subsidies tend to increase the average price of land and to divert land use towards the subsidised activity. Both forestry and agricultural subsidies tend to increase land prices, whether the land is intended for agricultural or forestry use. The relative size of the effect depends on the relative size of the subsidies available and on the relative take-up of those subsidies. Forestry premia will tend to increase afforestation, while agricultural subsides will tend to keep land in agricultural use, thereby acting to reduce afforestation. Which subsidies dominate again depends on the relative size of the subsidies and on the relative up-take.[20]

In order to look empirically at the relative effects issue, we first tried to make use of the available data to us in a set of regression analyses. We emphasised in Chapter 5 that the weakness of the data made it difficult to be overly confident about the results. With this in mind, we failed to find evidence that the forestry premia are associated with higher land prices, either agricultural or forestry. We did, however, find evidence to suggest that the

[19] The consumer price index over the same period rose by 8.1 per cent.

[20] Throughout this discussion, we are writing as if the only thing that matters in decisions of land use is subsidies and clearly this is not the case; the value of the output is also crucial. Our discussion is best thought of in terms of the extent to which subsides act as the marginal influence on land-use decisions.

accompanying measures generally and REPS in particular are reducing afforestation rates. Agricultural subsidies are also found to be increasing the price of forestry land while the "accompanying measures" have been associated with an increase in the price of agricultural land in recent years.

Given the weakness of the data, we did not want to rely on these statistical results. We have already noted that the relative impacts of subsidies will be partly related to the degree of take-up. With this in mind, we looked at recent figures on the take-up of REPS and compared this with recent figures on afforestation. The relative figures are striking. In spite of higher per hectare payments for forestry, the number of new hectares under REPS in 1997 was nearly 25 times higher than the level of afforestation. Given this imbalance, it is inconceivable that the forestry premia are having more of an impact in the land market than REPS, let alone all the other subsidies combined.

While private afforestation appeared to be on the rise in the mid-1990s, the relatively low level of afforestation in more recent years gives rise to the following issues: why are the targets not being met, even with the generous premia?

In looking at this issue, we can say that for some reason the forestry premia do not seem to be reflected in an increased MRP, at least from the perspective of farmers. Frawley (1998) provides a number reasons as to why this might be the case. Viewing the issue from a human capital perspective, he notes that forestry and agriculture are "radically different enterprises both in terms of their management and husbandry requirements and their cultural setting". The knowledge and skills needed in forestry do not exist on many Irish farms and so this may act as one barrier to the take-up of forestry. Another issue raised by Frawley is the very long time horizon required when deciding to plant land. Not only is the main return on the initial planting over 20 years away, but once planted the land cannot be readily returned to agricultural use.

What may be even more significant are the attitudes of farmers and non-farmers to forestry generally. The views of one group of farmers in a region with no forestry tradition are summarised by Kearney et al. (1993) as follows: "Afforestation is inimical to the development of agriculture and could cause depopulation and isolation". Frawley also quotes evidence that an attitude exists which sees afforestation as being inappropriate for good land.

While these barriers may be preventing the growth in afforestation, one has to ask why there was a growth in private afforestation in the mid-1990s. It is possible that the growth in that period was made up of parcels of land whose owners were the most willing to convert to forestry. The pool which is willing to convert to forestry may now be drying up. In addition, REPS is now providing a popular alternative. One final issue that should be mentioned is the effect of both REPS and the extensification premium, described in Chapter 1. As both schemes require stocking levels below a threshold, farmers have an incentive to

use all forage area for livestock, thereby reducing any surplus that might be used in forestry. In total, the barriers to forestry, be they attitudinal or structurally created, appear to be operating to limit afforestation.

While these observations apply to farmers, we should also mention the decline in public afforestation. In 1991 and 1992, public afforestation was running at around 7,700 hectares per annum; this fell to 6,622 hectares in 1994, to 4,426 hectares in 1995 and to 851 hectares in 1997. We can only speculate that this is related to the increase in the price of forestry land which we have documented above and which we believe to be related to agricultural subsidies. Similar constraints presumably apply to the private forestry companies.

How then is forestry to be encouraged? Referring back to our diagrams in Chapter 2, two alternatives are immediately apparent. The forestry premia could be increased again or agricultural subsidies could be cut. The recent conclusion to the CAP reform negotiations would indicate that agricultural subsidies will not be cut back significantly, at least before 2006 so the latter option is not open and may not be desirable anyway. As regards increasing the generosity of the forestry premia, it would seem that the increase would have to be very large if farmers in particular are to be encouraged into forestry. It may be that the only way forward is for some imaginative combination of REPS and forestry premia to be found, as a combined scheme to protect farm incomes and to protect, and enhance, the rural environment.

APPENDICES

Appendix 1: Land Price Series: Average Price per Hectare for Agricultural Land (£IR)

	Kelly	O'Connor and Conlon	CSO
1978	3,160		
1979	4,122		
1980	3,380		
1981	3,281		
1982	3,188		
1983	3,338		
1984	3,020		
1985	3,094		
1986	3,039		
1987	2,886		
1988		3,012	
1989		3,607	
1990		3,709	
1991		3,634	3,743
1992			3,750
1993			3,912
1994			4,711
1995			5,114
1996			6,029

Source: Various CSO releases, O'Connor, Conlon (1993) and Dr Kelly (An Foras Talúntais), various years.

Appendix 2: County, Provincial and National Agricultural Land Prices, Number of Transactions and Standard Deviations, 1990

County and province	Number of transactions	Price £/ha	Standard deviation £/ha
Carlow	44	4,570	1,437
Kildare	115	5,139	2,815
Kilkenny	99	3,732	1,747
Laois	99	4,006	1,735
Longford	53	4,073	2,352
Louth	57	3,848	1,820
Meath	166	4,381	1,732
Offaly	94	3,143	1,720
Westmeath	92	3,013	1,043
Wexford	114	4,027	1,544
Wicklow	74	4,307	2,402
Leinster	**1,007**	**4,048**	**2,020**
Clare	111	2,872	1,706
Cork	236	4,549	2,712
Kerry	89	3,388	2,521
Limerick	123	4,414	2,086
Tipperary	198	3,942	1,739
Waterford	59	4,201	2,676
Munster	**816**	**4,045**	**2,362**
Galway	151	3,123	1,843
Leitrim	50	2,139	1,161
Mayo	134	3,023	1,614
Roscommon	151	2,644	1,070
Sligo	66	3,026	2,174
Connacht	**552**	**2,881**	**1,639**
Cavan	110	2,875	1,185
Donegal	122	2,859	2,299
Monaghan	87	4,002	1,848
Ulster	**319**	**3,145**	**1,926**
STATE	**2,694**	**3,777**	**2,132**

Appendix 3: County, Provincial and National Agricultural Land Prices, Number of Transactions and Standard Deviations, 1991

County and province	Number of Transactions	Price £/ha	Standard deviation £/ha
Carlow	47	5,458	2,993
Kildare	83	5,080	2,685
Kilkenny	155	4,303	2,040
Laois	70	3,890	1,615
Longford	61	2,943	1,201
Louth	47	5,883	2,223
Meath	263	5,040	2,502
Offaly	83	3,222	1,747
Westmeath	115	2,662	1,965
Wexford	197	4,649	1,790
Wicklow	74	4,201	2,279
Leinster	**1,195**	**4,330**	**2,345**
Clare	114	3,019	1,856
Cork	276	4,617	2,627
Kerry	100	3,684	2,289
Limerick	132	4,398	2,046
Tipperary	228	4,619	2,830
Waterford	75	4,749	1,640
Munster	**925**	**4,325**	**2,471**
Galway	204	3,480	1,554
Leitrim	53	2,278	1,640
Mayo	124	3,311	1,736
Roscommon	140	2,996	1,453
Sligo	85	3,522	2,773
Connacht	**606**	**3,221**	**1,830**
Cavan	102	3,087	1,407
Donegal	117	2,834	1,433
Monaghan	95	3,728	1,718
Ulster	**314**	**3,156**	**1,546**
STATE	**3,040**	**4,079**	**2,317**

Appendix 4: County, Provincial and National Agricultural Land Prices, Number of Transactions and Standard Deviations, 1992

County and province	Number of Transactions	Price £/ha	Standard deviation £/ha
Carlow	16	3,764	1,983
Kildare	46	6,010	3,170
Kilkenny	63	3,929	1,645
Laois	62	3,744	1,527
Longford	26	3,019	1,529
Louth	23	5,040	2,446
Meath	101	4,999	3,139
Offaly	60	2,779	1,196
Westmeath	71	2,718	1,053
Wexford	90	4,242	1,957
Wicklow	40	4,583	2,314
Leinster	**598**	**4,189**	**2,497**
Clare	70	2,086	1,430
Cork	171	4,063	2,195
Kerry	71	2,636	2,031
Limerick	73	4,337	2,125
Tipperary	126	3,841	1,840
Waterford	27	3,400	916
Munster	**538**	**3,526**	**2,086**
Galway	92	3,469	2,141
Leitrim	32	2,077	1,374
Mayo	65	3,312	1,512
Roscommon	61	2,817	1,740
Sligo	38	3,939	3,832
Connacht	**288**	**3,210**	**2,262**
Cavan	67	3,381	1,765
Donegal	67	2,758	2,254
Monaghan	51	3,842	2,394
Ulster	**185**	**3,285**	**2,221**
STATE	**1,609**	**3,743**	**2,334**

Appendix 5: County, Provincial and National Agricultural Land Prices, Number of Transactions and Standard Deviations, 1993

County and province	Number of Transactions	Price £/ha	Standard deviation £/ha
Carlow	6	4,326	716
Kildare	33	3,689	1,566
Kilkenny	23	4,927	2,231
Laois	32	3,462	1,772
Longford	11	1,773	793
Louth	13	5,267	3,205
Meath	59	5,062	2,555
Offaly	19	3,791	2,070
Westmeath	21	3,688	1,343
Wexford	45	4,953	3,226
Wicklow	36	4,685	2,285
Leinster	**298**	**4,384**	**2,390**
Clare	49	3,077	1,551
Cork	101	4,032	2,019
Kerry	25	3,920	4,047
Limerick	43	4,527	2,431
Tipperary	86	4,008	1,631
Waterford	23	4,482	2,073
Munster	**327**	**3,982**	**2,209**
Galway	48	3,135	2,416
Leitrim	18	2,229	993
Mayo	37	2,567	2,237
Roscommon	26	2,949	1,536
Sligo	20	2,721	1,112
Connacht	**149**	**2,771**	**2,061**
Cavan	22	3,432	1,376
Donegal	22	3,396	2,905
Monaghan	21	3,889	2,539
Ulster	**65**	**3,576**	**2,457**
STATE	**839**	**3,935**	**2,342**

Appendix 6: County, Provincial and National Agricultural Land Prices, Number of Transactions and Standard Deviations, 1994

County and province	Number of Transactions	Price £/ha	Standard deviation £/ha
Carlow	23	5,090	2,512
Kildare	32	4,759	2,107
Kilkenny	43	3,944	1,244
Laois	51	4,162	1,793
Longford	15	3,381	1,538
Louth	11	6,029	2,610
Meath	90	5,256	2,277
Offaly	39	2,628	1,233
Westmeath	62	3,403	1,969
Wexford	57	5,315	2,619
Wicklow	22	5,955	3,324
Leinster	**445**	**4,461**	**2,392**
Clare	42	3,022	1,674
Cork	92	4,622	2,167
Kerry	34	3,907	2,422
Limerick	42	5,248	2,080
Tipperary	99	4,246	2,058
Waterford	23	5,205	2,725
Munster	**332**	**4,433**	**2,221**
Galway	41	3,713	2,135
Leitrim	18	1,972	1,334
Mayo	40	3,898	2,248
Roscommon	52	2,869	1,261
Sligo	33	3,672	2,175
Connacht	**184**	**3,338**	**2,014**
Cavan	49	3,265	1,733
Donegal	33	3,626	2,013
Monaghan	13	5,519	2,896
Ulster	**95**	**3,624**	**2,080**
STATE	**1,056**	**4,247**	**2,306**

Appendix 7: County, Provincial and National Agricultural Land Prices, Number of Transactions and Standard Deviations, 1995

County and province	Number of Transactions	Price £/ha	Standard deviation £/ha
Carlow	32	5,818	2,617
Kildare	79	5,748	4,065
Kilkenny	90	5,780	3,203
Laois	66	4,412	2,502
Longford	52	3,501	1,615
Louth	23	6,462	3,321
Meath	150	5,862	2,916
Offaly	47	3,974	1,211
Westmeath	92	3,907	2,412
Wexford	104	5,966	2,233
Wicklow	38	4,523	3,218
Leinster	**773**	**5,161**	**2,972**
Clare	70	3,302	2,594
Cork	91	4,733	2,358
Kerry	60	2,790	2,105
Limerick	94	5,029	2,407
Tipperary	168	5,357	2,713
Waterford	24	4,707	2,472
Munster	**507**	**4,547**	**2,665**
Galway	116	4,554	2,678
Leitrim	70	2,218	976
Mayo	98	3,292	2,264
Roscommon	110	3,322	1,502
Sligo	65	3,390	2,727
Connacht	**459**	**3,505**	**2,280**
Cavan	111	3,615	2,113
Donegal	88	2,696	2,303
Monaghan	60	5,998	2,594
Ulster	**259**	**3,795**	**2,618**
STATE	**1,998**	**4,538**	**2,814**

Appendix 8: County, Provincial and National Agricultural Land Prices, Number of Transactions and Standard Deviations, 1997*

County and province	Number of Transactions	Price £/ha	Standard Deviation £/ha
Carlow	2	4,365	4,334
Kildare	9	9,897	5,480
Kilkenny	17	6,277	3,244
Laois	26	4,333	1,731
Longford	19	3,515	1,856
Louth	12	10,809	4,758
Meath	53	7,438	3,161
Offaly	27	5,174	3,483
Westmeath	39	4,998	2,500
Wexford	31	7,227	3,100
Wicklow	19	8,243	4,342
Leinster	**254**	**6,313**	**3,621**
Clare	25	3,974	2,252
Cork	17	6,477	4,988
Kerry	8	4,087	2,778
Limerick	18	6,598	3,401
Tipperary	27	7,412	3,807
Waterford	7	7,583	2,926
Munster	**102**	**6,127**	**3,931**
Galway	67	3,508	3,363
Leitrim	36	3,147	2,272
Mayo	39	3,329	2,492
Roscommon	53	4,491	2,162
Sligo	27	4,885	2,354
Connacht	**222**	**3,767**	**2,827**
Cavan	29	4,099	2,677
Donegal	54	4,555	3,832
Monaghan	36	6,242	3,055
Ulster	**119**	**4,849**	**3,531**
STATE	**697**	**5,361**	**3,640**

* Preliminary Estimate.

Appendix 9: Percentage of Land in Each Use Range Class in Each Province

	Percentage Use range class					
Province	1 Wide	2 Moderately Wide	3 Somewhat limited	4 Limited	5 Very limited	6 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	22.0	25.5	3.1

Appendix 10: Area of Land on which Table 8 Figures are Based (Hectares).

Transaction size	2-10	10-20	20-30	30+
	1990			
Use range 1	2,825	3,103	1,986	2,918
Use range 2	1,351	1,270	868	1,295
Use range 3	2,031	1,720	1,120	1,300
Use range 4	2,477	2,339	1,034	1,597
Use range 5+6	919	834	373	320
	1991			
Use range 1	2,042	2,424	1,069	2,235
Use range 2	991	809	605	469
Use range 3	1357	1,326	643	923
Use range 4	1,560	1,745	805	1,156
Use range 5+6	753	845	460	490
	1992			
Use range 1	986	1,300	707	1,413
Use range 2	414	587	252	573
Use range 3	731	597	310	565
Use range 4	855	724	451	549
Use range 5+6	328	434	272	349
	1993			
Use range 1	416	884	374	959
Use range 2	202	317	337	636
Use range 3	286	286	333	375
Use range 4	334	686	275	555
Use range 5+6	152	212	99	204
	1994			
Use range 1	545	796	459	2,371
Use range 2	331	448	287	822
Use range 3	366	489	236	913
Use range 4	527	652	574	444
Use range 5+6	226	330	28	688
	1995			
Use range 1	1,292	1,622	1,130	1,819
Use range 2	599	986	632	1,283
Use range 3	1021	1,216	511	916
Use range 4	1,542	1,602	968	1,008
Use range 5+6	654	663	405	590
	1996			
Use range 1	657	1,287	726	1,355
Use range 2	367	745	391	798
Use range 3	652	878	505	394
Use range 4	1,042	1,336	687	492
Use range 5+6	276	467	346	253
	1997*			
Use range 1	357	413	302	273
Use range 2	289	391	162	114
Use range 3	482	401	238	41
Use range 4	599	692	334	269
Use range 5+6	144	205	98	236

Source: Valuations Office Data.

* Preliminary estimates.

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