

The role of subsidy payments in the uptake of forestry by the typical cattle farmer in Ireland from 1984 to 2012

Mary Ryan^{a*}, Michele McCormack^a, Cathal O'Donoghue^a
and Vincent Upton^a

Abstract

Since the 1980's, forestry has been growing as a land use in Ireland due largely to financial incentives offered to farmers to convert land from agriculture to forestry. Cattle farmers are the group that may financially benefit most from planting and have been found to be more interested in establishing forests. This makes cattle systems the most relevant alternative land use to compare with forestry. Previous examinations of afforestation trends have recognised the importance of competing subsidies on understanding the relatively low uptake of forestry supports but no detailed examination of this issue has been undertaken to date. The primary goal of this study was to review, quantify and compare annual cattle and forestry subsidies for a typical farm over the period 1984 to 2012. Eligibility and payment changes were examined for both forestry and agricultural subsidies over this period and form the basis of a subsidy model. The relative effect of forestry and agricultural subsidies on income is modelled for a "typical" farm using a hypothetical model, which facilitates direct comparison on an area basis. The results show that the loss of agricultural supports could have been substantial for a typical cattle farm for most of the period examined. This novel finding may assist in understanding afforestation rates to date.

Keywords: *Farmer afforestation, cattle subsidies, direct payments.*

Introduction

While the first afforestation incentives were introduced by the Irish government in 1922 it was not until the 1980's that there was an appreciable increase in planting on private land. Prior to this, landowners were unfamiliar with forestry and deterrents included "the competition for the scarce land resource, small farm size and the uncertainty around the long-term nature of forestry" (Gillmor 1992). However from the 1980's onwards, developments in national and EU forest policies incentivised farmer planting, leading to an increase from 100,774 ha in 1981 to 360,834 ha of privately owned forests by 2012 (Forest Service 2013). Over this period, the afforestation programme in Ireland changed from being almost exclusively carried out by professional foresters in the State sector on public land to being carried out by new types of forest owners. Initially planting on private land was undertaken largely by forest contracting companies and investment institutions however farm afforestation grew quickly and the majority of private planting is now undertaken by farmers (Forest Service 2013). Figure 1

^aRural Economy and Development Programme, Teagasc, Athenry, Co. Galway.

^{*}Corresponding author: mary.ryan@teagasc.ie

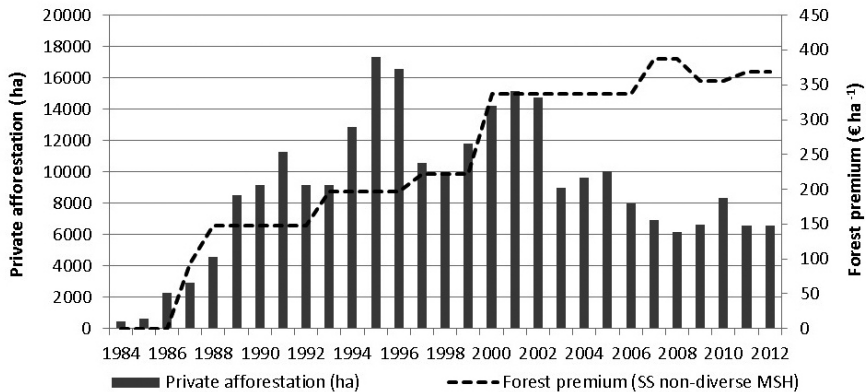


Figure 1: Annual private afforestation (ha) and forest premium payments (€ ha⁻¹) for Sitka spruce non-diverse conifer plantations from 1984 to 2012. Source: Forest Service (2013).

shows the slow rate of growth in annual private afforestation in the 1980's with an almost exponential growth in the early 1990's, before slowing down again from 2000 onwards. The recent decline has generated much interest as it occurred against the back-drop of a series of increases in forestry subsidies¹. This seemingly contradictory trend has prompted a number of Irish studies that have examined the factors that led to the decline in annual private afforestation.

Previous studies

The attitudes and behaviours of landowners in relation to forestry are analysed in surveys conducted by Kelleher (1986) and Ní Dhubháin and Gardiner (1994), finding that the vast majority of farmers would only consider planting land that is “good for nothing else”. Frawley (1998) reasons that, although farmers have economic goals when considering forestry, strong beliefs about the appropriate use of farmland can act as a barrier to afforestation. A recent study by Duesberg et al. (2013) suggests that this is still the case: while farmers in the study would plant marginal land, they would be opposed to planting “good” land that could be used for food production.

From an economic perspective, McKillop and Kula (1988) and McCarthy et al. (2003) found that the profitability of agriculture and forestry were significant factors in determining afforestation rates. In an analysis of farm forestry versus other farm enterprises, Behan (2002) finds that the uptake of afforestation lagged behind what would be expected on the basis of the relative economic returns between agriculture and forestry, but noted that “the long term and irreversible nature of the afforestation decision make it difficult to compare forestry returns with annual agricultural returns”. To compare like-with-like, Breen et al. (2010) included agricultural income foregone

¹ Establishment grant and annual premium payments.

as an opportunity cost for each year of the forestry rotation in modelling forestry returns and showed that forestry was most financially attractive on cattle farms. This concurs with Teagasc National Farm Survey (NFS²) survey data which showed that of the farmers who intended to plant, almost 50% were livestock farmers (cattle rearing and cattle other systems) on relatively large farms (Ryan et al. 2008). Upton et al. (2013) also examined the net returns to forestry taking account of the opportunity cost of lost agricultural market margin across different soil types over the period 1995-2009. Again cattle enterprises were found to benefit most financially from converting to forestry and forestry also appeared to have become more competitive over time. However, the authors noted that due to data limitations the loss of all available agricultural subsidies was not included in their calculations.

Although standard economic measures examine profitability over a full rotation, the role of subsidies has been recognised as central to understanding afforestation rates. While reporting on a drop in annual planting in 1992, duQuesne Ltd. (1993) concluded that the gains from increased forestry subsidies were eroded by the availability of animal subsidies, which encouraged farmers to increase their stock numbers. Collier et al. (2002) found that the majority of farmers retained their land in agriculture to avail of agricultural subsidies, particularly since the reform of the Common Agricultural Policy (CAP) in 1992. McCarthy et al. (2003) reported that the rate of afforestation was sensitive to both forestry and agricultural subsidies, particularly to the Rural Environment Protection Scheme (REPS), which was introduced in 1994. The duQuesne (1993) report also noted that the value of the final timber crop was not often taken into account in the afforestation decision-making process and that “changes (or even anticipated changes) in subsidies have an immediate and demonstrable effect on the uptake of the forestry support measures”. It is evident from NFS annual reports that the reliance of farmers on agricultural subsidies has increased significantly since the early 1990’s particularly in the cattle rearing (suckler cow) system where subsidies can comprise a larger proportion of farm income than that achieved from the marketplace (Connolly et al. 2009). These studies point to the fact that short-term subsidy payments are very important to farmers and may be a greater influencing factor in the afforestation decision than the longer-term market returns. Despite their importance, a detailed modelling of the loss of agricultural subsidies once land is afforested has not been previously undertaken. This may be due to the significant complexity of agricultural subsidy payments.

This paper describes a longitudinal comparison of forestry and cattle subsidies over the period 1984 to 2012. The first section describes the development of forestry and agricultural policies with particular emphasis on annual payments and eligibility in the pre and post CAP reform periods. The development of a subsidies model, which

² Appendix 1 contains a list of the abbreviations used in this paper.

accounts for the requirements and restrictions of subsidy payments, is then outlined. Employing this model, annual forestry and cattle subsidies are calculated and compared utilising a hypothetical “typical” farm framework, which allows for the isolation of the cattle and forestry subsidies available to a cattle farmer in each year of the period. The results are discussed in relation to afforestation targets and evolving forestry policy.

Forestry and agricultural policies and subsidies: pre CAP reform

The purpose of this section is to describe the changing policy context in relation to both forestry and agriculture over time, with particular reference to eligibility restrictions for cattle subsidies in relation to animal stocking rates and Less Favoured Areas (LFA), which are the parameters most likely to have an impact on the relativity of forestry and agricultural payments. A summary of forestry (conifer and broadleaf) and cattle payments is presented in Table 1.

Less Favoured Area (Disadvantaged Area) payments for agricultural land

The origin of Ireland’s current agriculture schemes and payments dates back to accession to the EEC in 1973. The Less Favoured Areas payment was introduced in 1975 in the form of headage payments (payments per head of livestock). This was the first direct payment scheme, the main objective being farm income support in “disadvantaged” or “handicapped” areas to halt the depopulation of rural areas. These LFAs were classified as More Severely Handicapped (MSH), Less Severely Handicapped (LSH) or Mountain Grazing. When first introduced in 1975, 58% of agricultural land was classified as LFA. Subsequent revisions increased the area designated as MSH and LSH to 75%, leaving just 25% of farmland in the non-LFA category (DAFM 2013). Payments were allocated on the basis of the number of eligible livestock units (LU) in the herd with the highest payments available in MSH areas.

Western Package Scheme for Forestry

The 10-year Programme for Western Development was introduced in April 1981 with the aim of promoting forestry in the 12 western counties. The programme which became known as the “Western Package” was later made available to land-owners in LFA’s in all counties. A grant of up to £800 ha⁻¹ (€3,033 in 2013 Euro value)³ was available to cover 85% of establishment costs for farmers and 70% for non-farmers. This led to a new phenomenon in Irish afforestation. Co-operatives, pension funds and private investors who were not deterred by the up-front cost, began to buy and afforest land in areas where agricultural productivity was marginal but forest productivity was high. In the first six years of the Western Package scheme, almost 6,500 ha were grant-aided in western counties (Forest Service 2013). Concurrent with the Western

³For ease of comparison across time, forestry and agricultural subsidy values are also presented in brackets in 2013 Euro equivalents using the Consumer Price Index (CPI).

Table 1: Summary of historic conifer (Sitka spruce) and broadleaf (ash) forest premium payments alongside agricultural payments and subsidies^a.

Year	Forestry		Agriculture	
	Scheme	Forest premium (farmer)	Scheme	Subsidy payments
1931	State scheme, all eligible			
1975			Disadvantaged Area Payments	Headage (payment per head of cattle)
1981	Western Package Grant Farmers: 85% Others: 70%		More Severely Handicapped (MSH) area payments:	8 or less cattle: £32 per head (€121) 9-30 cattle: £28 per head (€106)
1987	Farm Forestry Scheme-max £24,000 per farm	Forestry headage: £74 ha ⁻¹ (€177) 15 yrs		Max headage payments (livestock + forestry): £3,762 yr ⁻¹
1989	OPF/Forest Premium scheme Max: £6,000	£116 ha ⁻¹ (€261) Conifer (Con) (15 yrs) Broadleaf (20 yrs)		Off-farm income threshold for forestry and agricultural subsidies: £11,000 yr ⁻¹
1992	Revised scheme	As above + £50 ha ⁻¹ (€102) – part-time		Off-farm income threshold increased to £13,900 yr ⁻¹
1993	Afforestation Grant & Premium Scheme Grant: 100% Premium: 20 yrs	Con non-diverse (MSH) ^b : £155 ha ⁻¹ (€313) 75-100% ash (non-LFA) ^c : £300 ha ⁻¹ (€606)	CAP Reform Suckler cow : Beef 10 month: Beef 22 month: Extensification: Slaughter premium:	 £79 per head (€159) £53 per head (€107) £53 per head (€107) £26 per head (€53) £53 per steer (€107)
1994			Rural Environment Protection Scheme (REPS)	1-20 ha: £120 ha ⁻¹ (€236)

1998	Revised CAP scheme 13.5% increase	Con n/d (MSH): £175 ha ⁻¹ (€318) Ash (100%) (non-LFA): £315 ha ⁻¹ (€572)		
2000	Rural Development Programme, no LFA supplement	Con n/d: €336 (€450) ha ⁻¹ Ash: €442 (€592) ha ⁻¹		
2001			Disadvantaged Area Scheme (DAS)	Area based compensatory allowances
2005			Single Farm Payment	Average of payments for 2000/2001/2002
2007	FEPS (if in REPS) 15% premium increase	€150 - €200 ha ⁻¹ (€155 - €206) for 5 yrs Con n/d: €387 ha ⁻¹ (€399) Ash: €508 ha ⁻¹ (€523)		
2008			Suckler Cow Welfare (SCW)	€80 (€79) per cow
2009	8% reduction	Con n/d: €356 ha ⁻¹ (€370) Ash: €467 ha ⁻¹ (€486)	REPS 4	1-20 ha: €234 (€243) ha ⁻¹
2011	New planting only	Con n/d: €369 ha ⁻¹ (€376) Ash: €481 ha ⁻¹ (€491)		

^a Amounts in brackets represent 2013 Euro values relevant to the year in question (converted using the consumer price index).

^b Premium payment for new planting comprised of "non-diverse" (n/d) conifer (con) (i.e. Sitka spruce) in MSH areas.

^c Premium payment for new planting comprised of minimum 75% ash in non-LFAs.

Package scheme, a State scheme initiated in 1931 continued to be available to farmers and non-farmers. However, the lower grants led to little uptake of this scheme, which was followed by the part EU-funded Farm Forestry Scheme in 1987, under which planting grants were increased.

Forestry Headage

A promotional campaign was launched in 1985 to increase awareness of forestry, which was followed by the introduction of the Farm Compensatory Allowances (headage) Scheme in 1987, which allowed farmers and farmer Co-ops in receipt of livestock headage payments in Less Favoured Areas to claim a forestry headage payment of £74.13 (€177) ha⁻¹ for 15 years after planting. This partially addressed the loss of agricultural income for the initial period of forest development and made forestry more attractive, however forestry headage was conditional on a reduction in stock numbers and this may have acted as a disincentive for intensive farmers.

Operational Programme for Forestry

In 1988, Power et al. reported that family farm income was less than £5,000 on two-thirds of farms reflecting government concerns around the preservation of the family farm (Government of Ireland 1991). With this in mind, the Operational Programme for Forestry (OPF) launched in 1989 under the National Development Plan, continued to favour planting by farmers who could claim 85% of costs, (non-farmers could claim 70%), but the up-front cost may still have been a disincentive. The OPF further incentivised farmer afforestation by introducing a Forest Premium Scheme to compensate farmers for loss of agricultural income with annual payments ranging from £50 (€102) ha⁻¹ for conifers up to £116 (€261) ha⁻¹ for broadleaves (although the first premium was not paid until the first anniversary of planting). This scheme included a stipulation that off-farm income could not exceed £11,000 per annum, precluding households from availing of premiums if the spouse's income was above this threshold. Nevertheless, a major shift in planting from the public to the private sector occurred in response to the introduction of this scheme. By 1989, the level of private planting exceeded State planting for the first time (Forest Service 2013).

Revised Scheme

In advance of the 1992 CAP reforms, speculation that payments would be increased and eligibility relaxed led to a decline in the number of grant applications. Under a revised scheme announced in 1992, grant payments were increased and the off-farm income limit was increased to £13,900. For the first time, part-time farmers or farmers with off-farm income (above the threshold) could avail of a forestry premium, albeit at a lower rate.

The reform of the Common Agricultural Policy

In the previous decade, agriculture had undergone major change but the reform of the CAP promised even more change for Irish farmers and speculation continued concerning the impacts of CAP reform on the afforestation programme. Under the MacSharry Reform of the CAP, which was agreed in May 1992, prices and market supports for beef were significantly reduced. However increased direct payments were made available to beef farmers on the basis of stocking rate reductions. Farmers in LFA's could avail of these new payments while also continuing to avail of the LFA payments. Extensification payments were available to farmers with a livestock density below 1.4 LU⁴ ha⁻¹. In 1993, O'Connor and Kearney estimated that 71% of the grassland area of the state was stocked at less than the threshold stocking rate of 1.4 LU ha⁻¹. This meant that many farmers had the option to increase stocking to 1.4 LU ha⁻¹ to maximise their payments rather than afforest surplus areas.

Review of the uptake of afforestation

In advance of the implementation of the new afforestation scheme under the MacSharry CAP reforms, the Forest Service commissioned an evaluation of the forestry measures in Ireland in effecting change in land-use from agriculture to forestry between 1981 and the end of 1992. The evaluation reported the "almost exponential increase" of a net extra 90,000 ha of agricultural land (predominantly cattle and sheep grazing) that had been afforested (duQuesne Ltd. 1993). However, the report concluded that the positive impact of the forestry measures was being eroded by the availability of CAP and related support measures for conventional agricultural enterprises, particularly headage payments. The duQuesne report includes a recommendation that the premium payment should be increased considerably to make it competitive with agricultural payments. While the afforestation rate had increased year-on-year, the total area of 33,500 ha planted under the OPF had fallen well short of the target of 77,500 ha (Government of Ireland 1991), although the 1920's government target of one million acres (404,686 ha) of forest cover was finally reached in 1993.

Forestry and agricultural policies and subsidies: post-CAP reform

In May 1994, the Afforestation Grant Scheme and Forest Premium Scheme were introduced under Council Regulation 2080/92, but eligibility for payment under this scheme was back-dated to include new forests planted from 1993 onwards. Both grant and premium payments were significantly increased and for the first time, this scheme provided a grant to cover 100% of the forest establishment costs (within limits). Differential forest premium payments were introduced for LFA designations, i.e. higher forest premium payments were available for planting more productive land in

⁴Eligible LUs: Adult bovines over two years (except dairy cows) represent 1.0 LU; dairy cows, 0.8 LU; other bovines 6-24 months, 0.6 LU.

non-LFA areas (£220 (€444) ha⁻¹) for non-diverse conifers, while the lowest payments were available on less productive MSH areas (£155 (€313) ha⁻¹). Eligibility criteria for farmers availing of these higher premium payments also became more restrictive. However the premium increases, the 20-year payment time-frame, the tax-free status of the payments and the lack of up-front cost to the farmer, all contributed to a dramatic increase in annual private afforestation, which peaked at 17,343 ha in 1995.

Rural Environmental Protection Scheme (REPS)

On the agricultural front, REPS was launched in 1994. The scheme provided supplementary income for farmers for a period of five years in return for undertaking environmental measures. The REPS scheme was of huge importance to rural Ireland and peaked with over 60,000 farmer participants, with average annual payments of approximately €5,000 (DAFM 2014a). However, it was not possible to avail of REPS and forestry payments on the same land and this acted as a disincentive to afforestation for many farmers (McCarthy et al. 2003). Similarly, participation in the Early Retirement Scheme (ERS) precluded farmers from availing of afforestation premiums as retired farmers were no longer allowed to undertake farming activity and were thus not eligible for the farmer rate of premium for new planting.

National Forestry Forum

In 1996, a forum of forestry stakeholders was convened to make recommendations to Government on the future direction for the sector. The report of the forum identified the forest premium payment as the most significant factor affecting the rate of farm afforestation, with the caveat that the uptake is “dependent on the agricultural subsidies and market prices available to farmers” (National Farm Forestry Forum 1996). The forum also recommended the development of a strategy for the sector, which would take on board the increase in afforestation by farmers.

A Strategic Plan for Forestry

This led to the publication of “Growing for the Future” (DAFF 1996), a Government strategy for the development of the forestry sector in Ireland. The afforestation strategy set a target to increase forest cover from 6% to 17% of the land area by 2030 in order to reach a scale of timber production large enough to support the growing timber-processing sector. The strategy aimed to increase afforestation to 25,000 ha per annum until 2000 and 20,000 ha per annum from 2001 to 2030. At the time, these ambitious targets did not seem implausible as annual private afforestation had reached a peak of 17,343 ha in 1995 and only dropped marginally in 1996. However, annual private afforestation had dropped to just over 10,000 ha by 1997.

To encourage additional afforestation, a 13.5% increase across all categories of forestry subsidies was announced in late 1997. The farmer rate of premium then

ranged from £175 (€318) ha⁻¹ for non-diverse conifers in MSH areas to £340 (€617) ha⁻¹ for broadleaf forests in non-LFA's. For the first time, the issue of the small scale of farm forests was addressed by applying supplementary payments on forests over 6 and 12 ha respectively.

From October 1998 onwards, the premium was paid in the year of planting and in the spring of each year thereafter. This was a positive development, as previously, farmers didn't receive the first premium payment on planted land until the end of the first year. The next change in forestry payments was introduced for the 2000 planting season with grant rates increasing to a single rate of premium regardless of LFA category. The largest increases were applied to MSH land, which increased by £90 (€163) ha⁻¹ whereas non-LFA payments increased by £15 (€27) ha⁻¹. Additionally, all land afforested since January 1993 was eligible for the new increased rates of payment. Annual private afforestation increased to 15,147 ha in 2002 before dropping back to 8,969 ha by 2003.

Decoupled payments

In a further reform of CAP, LFA payments were decoupled from production in 2001, and were replaced by a flat rate per hectare, known as area-based compensatory allowances. The distinction between MSH and LSH was continued and the highest Disadvantaged Area Scheme (DAS) payment was available in MSH areas. The Single Farm Payment (SFP) was introduced in 2005 to further decouple agricultural payments from production and was based on the average historic livestock payments and the average land area farmed in the years 2000, 2001 and 2002. Eligibility for payment is contingent on maintaining the land in "good agricultural and environmental condition" but does not require the farmer to continue to carry livestock. The average SFP for cattle farmers since 2005 was approximately €315 ha⁻¹ (DAFM 2014a). While the SFP was not payable on afforested land, it was possible to plant up to 50% of the farm holding and "consolidate" the Single Payment onto the remaining land without losing SFP but the land base eligible for future agricultural payments was reduced by the afforested area. In 2008, a regulation change obviated the need for consolidation as afforested land became eligible for payment. Thus from 2009 onwards, farmers already in receipt of SFP could continue to claim payment on afforested land without reducing the SFP eligible area. It was expected that this would lead to a considerable increase in farm afforestation, but this was not the case. Anecdotally, the fear of losing future SFP has been a factor in the reluctance of farmers to permanently commit land to forestry due to fears that a reduction in agricultural area could endanger future area based payments.

The Suckler Cow Welfare (SCW) payment introduced in 2008 was a coupled payment paid on a per head basis. The scheme lasted until 2012 but payments were

halved due to the large numbers of farmers wishing to join the scheme. The range of cattle subsidies over the period led to a large increase in suckler cow numbers of 162% to approximately 1.12 million cows between 1987 and 1998. The number of cows varied slightly in the interim but remained largely unchanged at 1.13 million cows in 2012 (McCormack and O'Donoghue 2014).

Decrease in forest premium

The upward trend in forestry subsidies continued through 2005 when forestry grant rates were increased with larger proportional increases for broadleaf categories. In 2007, grants were increased marginally and an increase of 15% was applied to forest premium payments. In an attempt to combat the competition between REPS and afforestation, the Forest Environment Protection Scheme (FEPS) was introduced in 2007, which allowed farmers currently participating in REPS to avail of annual payments (in addition to the forest premium) to establish more environmentally focused forests. However, since the closure of the REPS 4 scheme in July 2009, farmers are no longer eligible to apply for FEPS.

Reduction in forest premium

Due to budgetary constraints, forestry subsidies were reduced by 8% across all premium payment categories in 2009, raising concerns about the long-term security of what had been thought of as “guaranteed” payments. This was expected to lead to an immediate drop in the afforestation level however, afforestation increased in 2010 by almost 700 ha. This may be accounted for by the fact that 2009 was one of the worst farming years on record (Connolly et al. 2010) as average Family Farm Income declined by 30% in 2009, on top of a 13.7% decline in 2008 income figures. However, there was a rise in farm incomes in 2010 and again in 2011, when farm incomes reached the second highest level since 2005. These high farm incomes are likely to have had an adverse impact on afforestation as despite an increase in payments for afforestation from 2011 onwards, planting levels fell to just over 6,500 ha in 2011 and 2012 (Forest Service 2013).

Revised targets

In recognition of the falling afforestation rate, the target was reduced to 14,700 ha yr⁻¹ in 2011 (DPER 2011). However, in 2014, a review of Ireland's forest policy set new targets of 10,000 ha yr⁻¹ to 2015 and 15,000 ha yr⁻¹ to 2046 (DAFM 2014b). Over the period of this study, there were many policy changes in both forestry and agriculture, which may have resulted in both incentives and disincentives for farmers to consider forestry. The summary of payments presented in Table 1 illustrates some of the complexity in terms of the relative eligibility and payment criteria.

Methodology

Farm forestry and cattle enterprises are difficult to compare as afforestation grants and premiums are paid on a per hectare basis, whereas many of the payments to cattle farmers are allocated on the basis of cattle numbers and stocking density. This section describes the methodology used to disentangle the complexity of forestry and cattle subsidies available to farmers over the study period in order to analyse the relativity of cattle and forestry subsidies on an area basis. The analysis utilised was based on the “Typical Farm” methodology developed as part of The International Farm Comparison Network (IFCN). The IFCN typical farm model is a unique methodology that is used to compare farms in a single year across a range of countries, which provides a realistic database of different farm types in several different regions (Deblitz 2005). A hypothetical cattle farm is generated to be representative of Irish cattle farms in terms of size, livestock systems, labour organisation and production technology used. Typically, the IFCN methodology compares farms in a given year across a range of countries, however this analysis uses a time series of data on agricultural and forestry subsidies within a single country across a range of years. Models based on hypothetical data offer useful insights, despite their simplicity. The purpose of the IFCN is to facilitate the identification of the impact of changes in a single component of farm income by removing the diversity of other farm characteristics. Thus, the relativity of the subsidies that prevailed in each of the years can be compared on a per hectare basis and reasons advanced to explain how this may have affected the afforestation decision.

Structure of the Typical Farm Model

The literature on the changes in agricultural and forestry subsidies in the preceding section forms the basis of a model in which each agricultural and forestry subsidy is defined by the parameters for eligibility for agricultural and forestry schemes. The Teagasc (Agriculture and Food Development Authority) Typical Farm Model (TTFM) is constructed using actual NFS data from 1995, from which a stylised farm scenario is developed. The TTFM characterises a typical farm for the main agricultural systems (dairy, cattle, sheep and tillage) and for three classes of economic performance (top, middle, bottom) based on gross margin⁵ per hectare. As cattle farmers are the most likely to consider afforestation (Ryan et al. 2008, Breen et al. 2010), this analysis is based on a typical middle performing, cattle rearing system where calves are reared and fattened until they are ready for slaughter. This hypothetical farm has 34 ha of land with suckler cows, 10-month and 22-month steers, heifers and a bull. The parameters used to generate annual subsidies per hectare are stocking rate and land

⁵Gross margin (GM) is defined as gross outputs minus direct costs, such as fertilisers and feed stuffs, and is a common measure of the profitability of agricultural enterprises.

area. The relevant livestock payments that applied in each year were calculated for each LFA designation. They were also calculated for a low (0.7 LU ha^{-1}) stocking rate; a medium (1.39 LU ha^{-1}) stocking rate which maximises headage payments up to the extensification threshold of 1.4 LU ha^{-1} ; and a high (1.75 LU ha^{-1}) stocking rate at which farmers have higher headage payments but are not eligible for extensification payments. The subsidies modelled include livestock headage payments, Less Favoured Area payments, extensification payments, Rural Environment Protection Scheme, Single Farm Payment and Suckler Cow Welfare payments. The payments for REPS and SFP were calculated from 1994 and 2005 onwards respectively on an area basis. In this way, the impact of different stocking rates and LFA designations on the level of subsidies per hectare received on a typical farm can be evaluated.

For the purpose of illustrating the relativity of cattle and forestry payments, we focus on the forestry headage and premium payments for the widely planted conifer “non-diverse” (n/d) and “diverse 20%” Sitka spruce (*Picea sitchensis* (Bong.) Carr.) categories on enclosed land. The “ash (*Fraxinus excelsior* L.) 40-100% and 75-100%” broadleaf categories were selected as the most widely planted broadleaf species over the period⁶. For simplicity this analysis is conducted on a per hectare basis, therefore the forestry subsidy figures for one hectare are used.

Results

The influence of (a) LFA designation and (b) stocking density on cattle payments was examined. It is evident that over the time period evaluated, the largest payment increases corresponded with the CAP reforms in 1992 and 2000. The SFP scheme was based on the average livestock headage and area-based payments made to farmers in 2000, 2001 and 2002 (which were lower than 2003 and 2004), resulting in a decrease in cattle payments in 2005. However, subsidy payments on the typical farm increased in 2008 with the introduction of the Suckler Cow Welfare Scheme.

The impact of LFA designation on cattle subsidies, keeping the stocking rate constant at 1.39 LU ha^{-1} is shown in Figure 2. The payments available to farmers in non-LFA areas were lower than in LFA's although there is very little difference between the payments available to farmers in MSH and LSH areas. As 75% of land in Ireland is designated as LFA (MSH and LSH), the relevant payments in MSH areas only were evaluated, thus simplifying the comparison of cattle with forestry payments.

Payments for low, medium and high stocking rates on the typical farm were examined keeping LFA designation constant at MSH (Figure 3). A large differential between payments for the low stocking rate (0.7 LU ha^{-1}) and the medium to high

⁶ Ash is no longer planted due to the incidence of ash dieback disease (*Chalara fraxinea*). In recent years, broadleaf afforestation has accounted for approximately 30% of annual afforestation (Forest Service 2013).

stocking rates (1.39 and 1.75 ha^{-1}) emerged. The payments for the lower stocking rate are considerably lower than the medium and high stocking rates across the period. Above a stocking rate of 1.4 LU ha^{-1} payments no longer include extensification and increasing cattle numbers above this stocking rate provided only marginal subsidy gains. The average stocking rate on cattle farms between 1993 and 2012 was 1.06 LU ha^{-1} (NFS various years). Therefore, only the 0.7 and 1.39 LU ha^{-1} stocking rates were compared in this study.

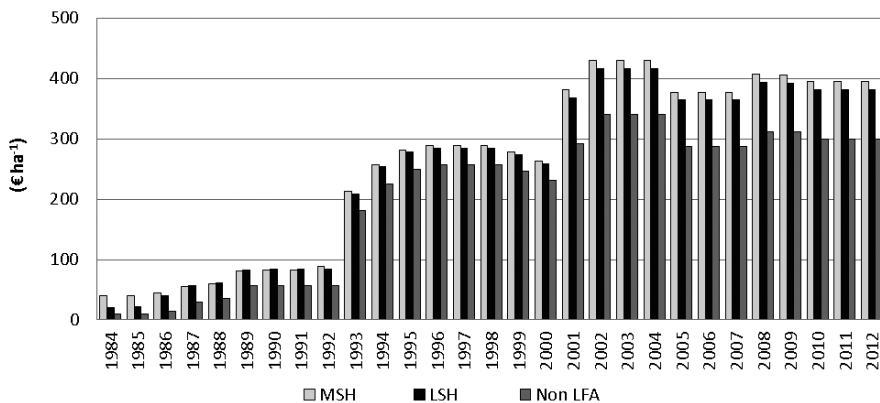


Figure 2: Subsidies available (€ ha⁻¹) to suckler cattle farms at medium stocking density in MSH, LSH and non-LFAs from 1984 to 2012. (Based on TTFM outputs.)

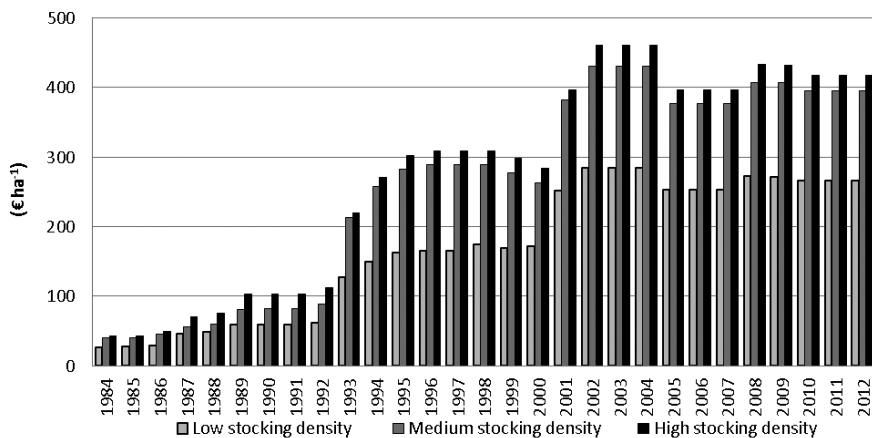


Figure 3: Subsidy payments (€ ha⁻¹) available to suckler cattle farms at low, medium and high stocking densities in MSH areas from 1984 to 2012. (Based on TTFM outputs.)

Cattle payments for the low and medium stocking rates (0.7 and 1.39 LU ha⁻¹) were compared against the payment for a crop of pure Sitka spruce non-diverse (Figure 4). It is only in the initial Western Package and OPF schemes that forestry premium payments were higher than cattle subsidies, regardless of stocking rate or LFA designation. From the 1993 MacSharry CAP reform onwards, cattle subsidies were higher than conifer (Sitka spruce) premiums for medium-stocked farms. Only the lower-stocked extensive suckler farms could have increased their subsidy payments by planting trees on their land.

The influence of participation in REPS was also examined. The addition of REPS payments to the cattle subsidies was examined for both the low and medium stocking rates in MSH areas (Figure 5). These are compared with the higher conifer payments available for a Sitka spruce crop, which included 20% of another species (Sitka spruce 20% diverse) and broadleaf (ash) premium payments. It is evident that the inclusion of REPS payments from 1994 onwards pushed the cattle payments up to the level of the higher conifer (Sitka spruce 20% diverse) payments, except for a short period in 2000 when LFA payments were decoupled from production. From 2002 onwards, cattle subsidies for REPS farms were higher than the conifer payments, particularly for the more intensive medium stocked farms. The payments for ash were higher than the low stocking rate cattle payments in the earlier years but are comparable in later years. From 2002 onwards, the cattle payments for medium stocked REPS farms were significantly higher than either the conifer or broadleaf payments. The relative payments for cattle and forestry in LSH and non-LFA's (not shown here), also displayed similar trends but at slightly lower payment rates.

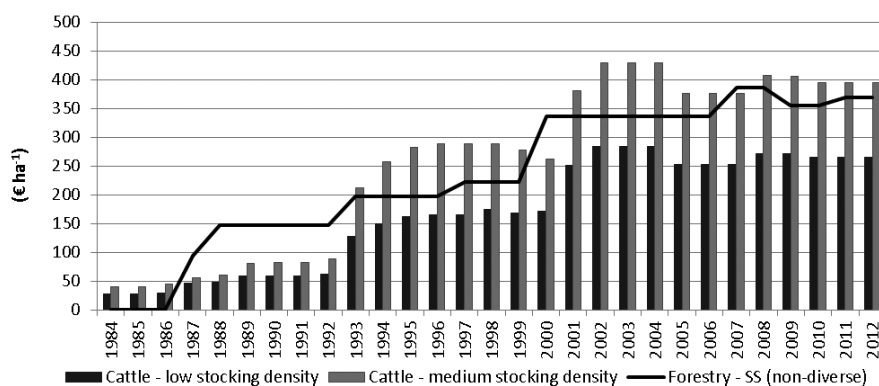


Figure 4: Payments available in MSH areas from 1984 to 2012 (€ ha⁻¹) for suckler cattle farms at low and medium stocking densities and for Sitka spruce non-diverse conifer afforestation. (Based on TTFM output.)

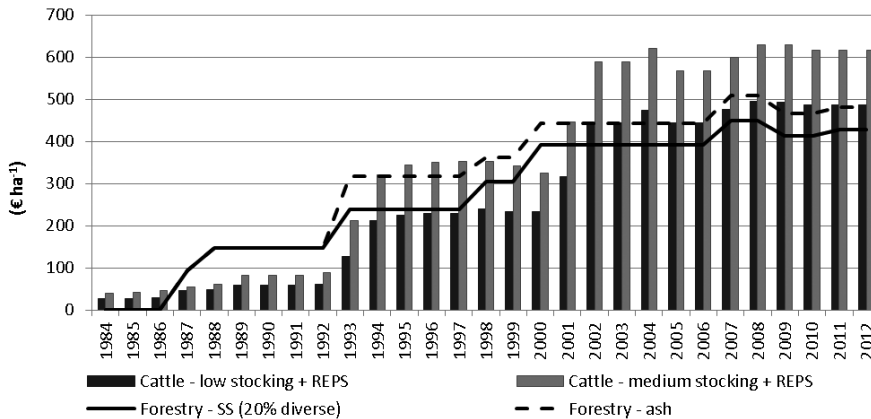


Figure 5: Payments available in MSH areas from 1984 to 2012 (€ ha⁻¹) for suckler cattle farms participating in REPS schemes at low and medium stocking densities and for Sitka spruce non-diverse conifer and broadleaf (ash) afforestation. (Based on TTFM output.)

In summary, the main results were:

- While several increases were applied to the level of forest premium payments, these tended to coincide with increases in agricultural payments which dampened their net effect;
- For most of the period in question, cattle subsidies exceeded conifer payments in MSH and LSH areas at medium to high stocking rates;
- The more intensive farms stocked at medium- and high-stocking densities had higher payments than extensive farms;
- The tiered forestry subsidies in LFA's kept the forestry subsidies above the cattle subsidies between 1994 and 1999, but were reduced to a flat rate in 2000;
- While forestry subsidies were higher than agricultural subsidies from 1987 to 1993, the available grants only covered 85% of the establishment costs;
- For cattle farms participating in REPS, cattle subsidies were higher than forestry subsidies for medium stocked farms in MSH and LSH areas, which represent 75% of total agricultural area.

Discussion

It is evident that for much of the period reviewed, cattle subsidies were higher than forestry subsidies, particularly in MSH areas and for more intensive farms. This finding is consistent with a recent analysis of the characteristics of NFS farms with and without forestry, which concludes that farms with higher stocking densities are less likely to consider converting land to forestry (Howley et al. 2012). In essence, the opportunity cost of undertaking forestry is higher for intensive farms than for less intensive farms, in terms of the income foregone from agricultural subsidies.

However, farming at high stocking densities requires “good” land which is unlikely to be considered for forestry. Less intensive farms are more likely to have been in receipt of REPS payments (DAFM 2014a), which would have added to their opportunity cost. Other studies have also found that agricultural subsidies play an important part in the afforestation decision Barrett and Trace 1999, (Collier et al. 2002, McCarthy et al. 2003). This is echoed by O’Connor and Kearney (1993), who concluded that “other things being equal, the expected returns from forestry must show a premium over the returns from land before landholders will seriously consider the forestry option”.

Financial analyses of planting conducted in Ireland to date have indicated that forestry outperforms cattle and sheep systems over the period of one rotation (Breen et al. 2010, Upton et al. 2013). However these studies focused on the market component of income and did not include detailed analysis of the relevant subsidies. The analysis in this study focused only on the forestry and cattle subsidies available to a cattle farmer in each year of the examined period and did not take into account the market income from cattle or timber sales or the income tax exemption for forestry premium payments. This analysis shows that the combination of cattle subsidies, LFA payments and agri-environment payments (REPS), exceeded the forestry payments available to many cattle farmers over the period. REPS schemes have been recognised as a significant competitor with afforestation schemes (McCarthy et al. 2003). REPS is now closed however, and 20,000 farmers are currently availing of Agri-Environment Options Schemes (AEOS) at an average payment of €3,200 per applicant (DAFM 2014a). From late 2014 onwards, farmers will have the opportunity to enter the new Green Low carbon Agri-environment Scheme (GLAS) under which the payment will be €5,000 per applicant for a maximum of 50,000 applicants (DAFM 2014a).

It is well recognised that financial analysis alone may not explain planting patterns. This study did not take into account the fact that the permanency of the afforestation decision is a barrier to many farmers (McDonagh et al. 2010). The expectation of future (direct) payments has been recognised as affecting land use decisions as farmers position themselves to ensure they are able to avail of future payments (Coble et al. 2008, O Donoghue and Whitaker 2010). This flexibility is not available to farmers who afforest land. This is again evident in a behavioural model of the characteristics of NFS farms with and without forests between 1984 and 2012 (Ryan et al. 2014). The model results showed that the preference of these farmers for agriculture or forestry is heavily influenced by the perceived fall in wealth due to the decline in self-reported land value as a result of the inflexibility of forestry as a land use.

Duesberg et al. (2013) concluded that the reason why forestry is not an option for some farmers is that “it simply isn’t farming”. This desire to continue farming is not a uniquely Irish phenomenon. Gorton et al. (2008) examined farmer attitudes in

EU countries and concluded that even post-decoupling of payments from production, farmers retain their productivist objectives and prefer to utilise their land by farming it.

Conclusions

A detailed examination of the cattle and forestry subsidies available to farmers who may have considered forestry over the time period has not previously been undertaken in the Irish literature. Previous studies (duQuesne 1993, Collier et al. 2002, McCarthy et al. 2003) explicitly comment on the sensitivity of farmers to the level of agricultural and forestry subsidies. The results of this analysis highlight the potentially significant opportunity cost of the agricultural subsidies lost by cattle farmers converting to forestry. Stocking density, LFA status and participation in REPS all contribute to the magnitude of the loss of these cattle subsidies. In general over the entire period, the subsidies available to farmers considering afforestation have been less attractive financially than for remaining in cattle farming, in particular for intensive farms with higher animal stocking rates and for more extensive farms participating in REPS. While there was a significant increase in forestry subsidies up to 2009, when these are examined in conjunction with concurrent increases in cattle payments, the increases in forestry subsidies in general did not exceed those available for cattle farming.

Overall, it is evident that the increases in forestry payments only served to maintain the relativity with cattle payments rather than providing forestry with a financial advantage over cattle farming during that period. The slower than expected uptake of afforestation in Ireland may not be surprising in this context.

References

- Barrett, A. and Trace, F. 1999. The impact of agricultural and forestry subsidies on land prices and land uses in Ireland. *Policy Research Series, 35*. The Economic and Social Research Institute, Dublin.
- Behan, J. 2002. Returns from farm forestry vs. other farm enterprises. Paper presented at the *IFA Farm Forestry Conference*, 8th November 2002, Limerick, Ireland.
- Breen, J., Clancy, D., Ryan, M. and Wallace, M. 2010. Irish land use change and the decision to afforest: an economic analysis. *Irish Forestry* 67: 6-20.
- Coble, K.H., Miller, J.C. and Hudson, M.D. 2008. Decoupled farm payments and expectations for base updating. *Review of Agricultural Economics* 30(1): 27–42.
- Collier, P., Dorgan, J. and Bell, P. 2002. *Factors Influencing Farmer Participation in Forestry*, COFORD. Dublin.
- Connolly, L., Kinsella, A., Quinlan, J. and Moran, B. 2009. *National Farm Survey 2008*, Teagasc. Oak Park.
- Connolly, L., Quinlan, J., Moran, B. and Kinsella, A. 2010. *National Farm Survey 2009*, Teagasc. Oak Park.

- DAFF. 1996. *Growing for the Future. A Strategic Plan for the Development of the Forestry Sector in Ireland*. Department of Agriculture, Food and Fisheries, Dublin.
- DAFM. 2013. Available from <http://www.agriculture.gov.ie/farmerschemespayments/singlepayment/schemedisadvantagedareas/schemebeefdataprogrammebdp/categoriesofdisadvantagedareas> [Accessed June 2014].
- DAFM. 2014a. *Agri-Environment Schemes – RDP 2014-2020*. Presentation by Liam Fahy, senior inspector Department of Agriculture Food and the Marine. March 2014.
- DAFM. 2014b. *Forests, Products and People. Ireland's Forest Policy – a Renewed Vision*. Department of Agriculture Food and the Marine. Dublin.
- Deblitz, C. 2005. *The International Farm Comparison Network (IFCN): bridging the gap between farmers, science and policy*. Federal Agricultural Research Centre (FAL). Available at <http://www.macaulay.ac.uk/elpen/work2/cdsab> [Accessed August 2014].
- DPER. 2011. *Programme for Government*. Available from <http://www.per.gov.ie/wp-content/uploads/ProgrammeforGovernmentFinal.pdf> [Accessed February 2014]. Department of Public Expenditure and Reform. Dublin.
- Duesberg, S., O'Connor, D. and Ní Dhúháin, Á. 2013. To plant or not to plant—Irish farmers' goals and values with regard to afforestation. *Land Use Policy* 32: 155–164.
- duQuesne Ltd. 1993. *EC Funds and Irish Forestry*. Thematic evaluation of EC co-financed forestry measures in Ireland. duQuesne Ltd. Economic and Environmental Consultants. Dublin.
- Forest Service, 2013. *Annual Statistics*. Department of Agriculture, Food and the Marine. Dublin.
- Frawley, J.P. 1998. Farmers' attitudes towards forestry as a farm enterprise in Ireland. In *Forestry in the Context of Rural Development*, Ed. Wiersum, F.K., Proceedings of the Final Scientific COST Action E3, Villa Real, Portugal.
- Gillmor, D.A. 1992. The upsurge in private afforestation in the Republic of Ireland. *Irish Geography* 25: 89-97.
- Gorton, M., Douarin, E., Davidova, S. and Latruffe, L. 2008. Attitudes to agricultural policy and farming futures in the context of the 2003 CAP reform: A comparison of farmers in selected established and new Member States. *Journal of Rural Studies* 24: 322-336.
- Government of Ireland 1991. *Forestry Operational Programme 1989-1993*. Government of Ireland, Dublin.
- Howley, P., Hynes, S. and O'Donoghue, C. 2012. Explaining the non-economic behaviour of farm foresters: The effect of productivist and lifestyle motivations. *Rural Economy and Development Programme Working Paper Series* 12-WP-RE-03, Teagasc.

- Kelleher, C. 1986. Forestry for farmers. In *The Changing CAP and its Implications*. An Foras Taluntais, Dublin. pp 188-213.
- McCarthy, S., Matthews, A. and Riordan, B. 2003. Economic determinants of private afforestation in the Republic of Ireland. *Land Use Policy* 20: 51-59.
- McCormack, M. and O'Donoghue, C. 2014. Policy incentives as behavioural drivers of beef enterprises in Ireland: Where are the kinks? Paper presented at *European Association of Agricultural Economists*. Ljubljana, Slovenia. 25-28th August 2014.
- McDonagh, J., Farrell, M., Mahon, M. and Ryan, M. 2010. Missed opportunity or cautionary steps? Farmers, forestry and rural development in Ireland. *European Countryside* 4: 236-251.
- McKillop, D. and Kula, E. 1988. A planting function for private afforestation in N. Ireland. *Journal of Agricultural Economics* 39: 133-141.
- National Farm Forestry Forum. 1996. *Report of the National Farm Forestry Forum*. Department of Agriculture, Food and Forestry, Dublin.
- Ní Dhubháin, Á. and Gardiner, J. 1994. Farmers' attitudes to forestry. *Irish Forestry* 51: 19-26.
- O'Connor, R. and Kearney, B. 1993. Economic issues in Irish forestry. *Journal of the Statistical and Social Inquiry Society of Ireland* XXVI Part V: 179-209.
- O Donoghue, E.J. and Whitaker, J.B. 2010. Do direct payments distort producers' decisions? An examination of the farm security and rural investment act of 2002. *Applied Economic Perspectives and Policy* 32(1): 170-193.
- Power, R., Connolly, L. and Roche, M. 1988. *National Farm Survey 1987*. Teagasc, Dublin.
- Ryan, M., Kinsella, A. and Cushion, M. 2008. An assessment of farmer intentions to plant a forest. *Agricultural Research Forum 2008*. Teagasc.
- Ryan, M., O'Donoghue, C. and Upton, V. 2014. Land use change from agriculture to forestry: a structural model of the income and leisure choices of farmers. Paper presented at *European Association of Agricultural Economists*. Ljubljana, Slovenia. 25-28th August 2014.
- Teagasc. 1984 to 2008. *Management Data for Farm Planning*. Teagasc, Dublin.
- Upton, V., Ryan, M., Farrelly, N. and O'Donoghue, C. 2013. The potential economic returns of converting agricultural land to forestry: an analysis of system and soil effects from 1995 to 2009. *Irish Forestry* 70: 61-74.

Appendix 1**Table 2:** *List of abbreviations used throughout the text.*

Abbreviation	Explanation
AEOS	Agri-Environment Options Scheme
CAP	Common Agricultural Policy
Con	Conifer
CPI	Consumer Price Index
DAS	Disadvantaged Area Scheme
ERS	Early Retirement from farming Scheme
FEPS	Forest Environment Protection Scheme
GLAS	Green Low-Carbon Agri-Environment Scheme
IFCN	International Farm Comparison Network
LFA	Less Favoured Areas (includes MSH and LSH)
LSH	Less Severely Handicapped area
LU	Livestock units (see footnote 3)
MSH	More Severely Handicapped area
N/d	Non-diverse conifer planting category (e.g. Sitka spruce)
NFS	National Farm Survey
OPF	Operational Programme for Forestry
REPS	Rural Environment Protection Scheme (REPS1-4)
SFP	Single Farm Payment
SCW	Suckler Cow Welfare Scheme
SS	Sitka spruce
TTFM	Teagasc Typical Farm Model
