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We estimate the structural effects, costs and potential efficiency gains that might arise from the introduction of an Early Retirement Scheme for farmers in Northern Ireland using data from the Farm Business Survey and a separate survey of 350 farmers aged between 50 and 65. Modelling results suggest that farm scale is a significant determinant of profit per hectare but that operator age is not. The economic gains from releasing land through a Scheme were conditional on transfers bringing about significant farm expansion and changes in land use. When these conditions were satisfied pensions payments of only about one-third the statutory maximum could be justified. Survey responses indicated that participation in the Scheme would bring forward farmers' retirement age by an average of four years. Moreover, 'deadweight' payments would equate to about 23 per cent of potential total expenditure. Overall, the economic case for the introduction of an Early Retirement Scheme to Northern Ireland is judged to be weak.

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## Introduction

Financial support for EU farmers seeking early retirement from agriculture is a discretionary element of CAP rural development policy and some EU member states, most notably France, Ireland and Greece have chosen to implement the measure. The policy objectives of the EU Early Retirement measure, as well as rules governing the operation of the Scheme, are set out in Chapter IV of Council Regulation (EC) 1257/1999 and in Section 4 of a supplementary Commission Regulation (EC) 1750 1999:

- To provide an income for elderly farmers who decide to stop farming
- To encourage the replacement of such elderly farmers by farmers able to improve, where necessary, the economic viability of the remaining agricultural holdings
- To reassign agricultural land to non-agricultural uses where it cannot be farmed under satisfactory conditions of economic viability.

The focus of this paper is restricted to mainly economic aspects of the measure especially in relation to structural adjustment and whether the removal of older farmers from the industry would be likely to produce benefits that exceed the additional costs incurred. We explore these issues, which have not been rigorously addressed in the literature to date (Caskie *et al*. 2002), using data from farms in Northern Ireland. After briefly reviewing the provisions of the EU's Early Retirement Scheme we examine qualitative evidence from a survey of farmers' attitudes and opinions concerning retirement. In order to quantify the possible benefits of a Scheme we then analyse data from the Farm Business Survey to determine the likely effects of changes in farm size and operator age on performance. We conclude that the economic arguments for introducing an Early Retirement Scheme are relatively weak.

## Implications of Delayed Farmer Retirement

If older farmers delay their retirement, then the opportunities for family successors or for other new entrants may be reduced. Errington and Tranter (1991) referred to a 'reluctance to retire' and the 'inheritance dilemma'. Gasson, Errington and Tranter (1998) identified the desire to remain in some way involved in the business, leading to a high level of potential semi-retirees. For a family successor, handover may be delayed to such an extent that the business eventually transferred is depleted or the transfer occurs too late for the recipient to achieve their ambitions for the farm (McCrostie Little and Taylor 1998). Vidal and Marquer (2002) found that the average physical and economic sizes of holdings run by young farmers were greater than those of other holdings and were also increasing more rapidly. Aside from its impact on potential new entrants, a low rate of exit from farming may reflect some underlying distress for the individuals concerned. This may be the case particularly where there is a lack of affordable and suitable housing for retiring tenant farmers (Lobley *et al*. 2002).

**The EU Farmer Early Retirement Scheme**

Briefly, the regulation provides for assistance of up to €15,000 (approximately £9,500) per farmer per year. Payments can be made for a maximum of 15 years but in any case shall not continue beyond the applicants 75th birthday or exceed €150,000 in total value. Where payments extend beyond the normal state retirement age, the recipient shall only receive the difference between the state pension and the early retirement pension, as a supplement to the former. The applicant must also meet the following conditions:

- be not less than 55 years of age and no more than 65 years when they enter the Scheme,
- have practiced farming for the last 10 years,
- stop all paid and unpaid commercial farming indefinitely (participating farmers may retain up to 1 hectare and the use of farm buildings for non-commercial farming).

The land previously farmed by the participating farmers can be released for either continued agricultural use or non-agricultural uses such as forestry of the creation of a nature reserve.

The limited evidence on Early Retirement Schemes within Europe to date suggests that they have been used to achieve both social and structural objectives. Scheme designs have varied and depended largely on national objectives and the existing pattern and structure of agriculture in each country. In most cases rigorous evaluations of the Schemes were not carried out and so it is difficult to say if they represented good value for money. Experience with the first French Early Retirement Scheme (1992-94) highlighted the difficulties inherent in achieving multiple policy objectives (Allaire and Dauce, 1996; Brangeon *et al*., 1996). The second French scheme (1995-1997) had only short-term effects in that some farmers brought forward their retirement decision but this was followed by a period when the number retiring was below trend (Dauce *et al*., 1998). Similar results were found for a scheme introduced in the Republic of Ireland, as well as the fact that larger farms, dairy farms and farms located in traditionally more prosperous farming regions, were over-represented (Murphy, S. 1997).

**Farmer Survey**

A telephone survey of 351 farmers (response rate 56 per cent.) aged between 50 and 65 was undertaken to ascertain opinions, concerns and priorities on retirement and the possible introduction of an Early Retirement Scheme to assist structural adjustment in agriculture. A stratified random sample—according to farm size, type and location—was drawn from participants in the EU Structural Survey for Northern Ireland.

*Retirement plans and financial provisions*. Approximately half the respondents indicated that they expected to fully retire from farming at some stage, while a further one-third expect to semi-retire[2]. Subsequent analysis revealed that farmers with 'small' or 'medium/large' farms were more likely to indicate an intention to retire than those with 'very small' farms. The likelihood of not retiring from farming was greatest for farmers with cattle and sheep farms. Respondents with a spouse were

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[2] Reported survey results are statistically significant at $P<0.05$ level.

more likely to report an intention to retire fully, while those without a spouse intended to semi-retire or not retire at all. When farmers had an identified successor, they were more likely to indicate an intention to semi-retire or fully retire.

Almost 60 per cent of all farmers, but mostly older respondents, indicated that retiring in the next three years was something that they had given serious consideration—in order of importance, poor health and low incomes were found to have a significant bearing on this intention. The majority (87 per cent) intended to finance their retirement from more than one source (Figure 1).

Almost 58 per cent of farmers surveyed indicated that they have made some contribution to a self-employed/private pension scheme. Despite this, 54 per cent of the 287 farmers who said they expect to semi-retire or fully retire anticipated a household income of less than £10,000 per annum. Only 18 per cent of farmers without a spouse anticipated an annual income in excess of £10,000, compared to 30 per cent for farmers with a spouse. Respondents with 'medium/large' farms anticipated higher annual household income in retirement than those with 'very small' or 'small' farms. Farmers with off-farm income also anticipated higher levels of household income those without off-farm income.

**Figure 1. Sources of anticipated finance for retirement**
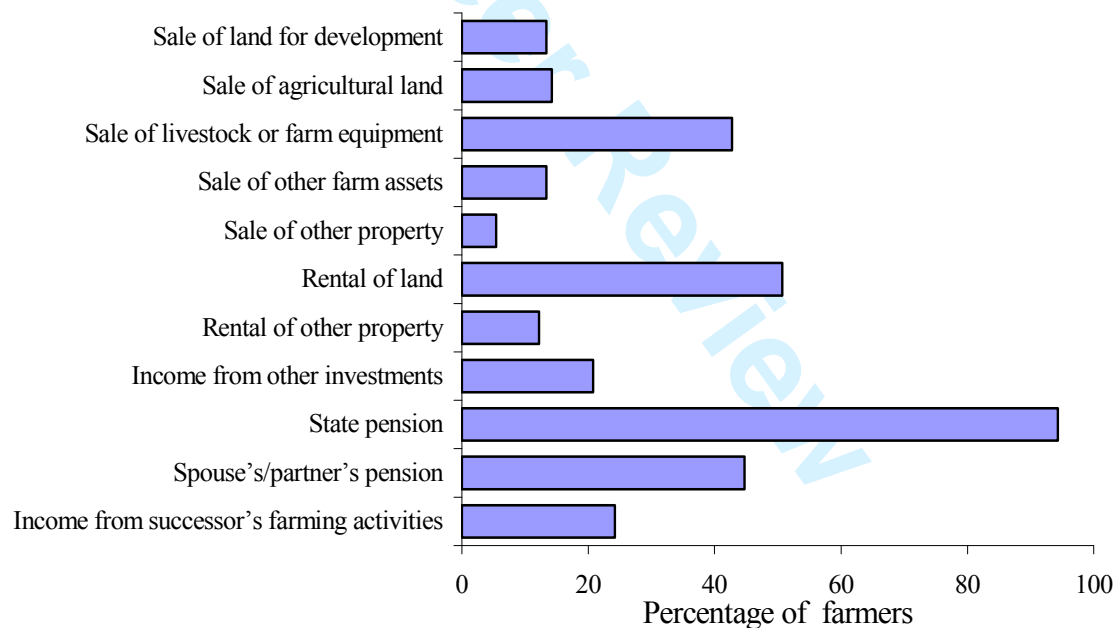


*Willingness to participate in an Early Retirement Scheme.* Some 270 (77 per cent) respondents said they would participate in an Early Retirement Scheme—financial considerations were uppermost. Health factors were very important or important in the decision to participate for 92 per cent whilst relieving themselves from the responsibility of running a farm business (75 per cent) and farm work (70 per cent) were also very important or important in choosing to participate. Succession issues also seemed to be influential in deciding to participate in the Scheme. The full range of factors is summarised in Table 1.

Of the 291 farmers with children, 80 per cent claimed they would participate compared to 63 per cent of those without children.  Where the successor was known, 83 per cent of farmers said they would enter the Scheme, compared with 69 per cent for those with no successor.  Martial status also had an important bearing on intentions—78 per cent of married respondents responded positively compared to 63 per cent of single respondents.

**Table 1: Factors influencing participation in an Early Retirement Scheme**

|  | Very important | Important | Unimportant | Very unimportant | Don't know |
|---|---|---|---|---|---|
| Health considerations | 224 | 99 | 25 | 1 | 2 |
| Value of the annual pension | 229 | 97 | 16 | 2 | 7 |
| Number of years eligible for payment | 181 | 123 | 28 | 4 | 15 |
| Availability of non-farm employment | 32 | 94 | 147 | 64 | 14 |
| Desire to be free of the responsibility of running a farm business | 125 | 138 | 66 | 10 | 12 |
| Desire to be free from work | 118 | 127 | 77 | 20 | 9 |
| Housing arrangements for self and/or successor | 96 | 130 | 83 | 25 | 17 |
| Desire to establish successor on the farm | 121 | 137 | 73 | 10 | 10 |

Source: Farmer Retirement Survey

**Structural Adjustment Issues**

The main 'problems' associated with the structure of the region's agriculture are the relatively small scale of the majority of farm businesses and, more tentatively, the high average age of the farming population. Of the approximately 30,000 farm businesses, 54 per cent are officially classed as 'very small'. This poses difficulties in generating sufficient income to support farm families and although many farmers have other sources of earned income, household earnings are often low and under-employment remains a real problem (Davis *et al*., 1997). There is evidence that low profits lead to under-investment in fixed assets and over time a rundown in the capital base of smaller farms (Wallace, 1998). This further erodes the medium to long-term

capacity of these farms to generate profits. Inevitably farmers are exiting the industry. However, while the total number of farmers has been decreasing (1 per cent per year), the rate of adjustment has been insufficient to reduce the proportion of farms in the 'very small' category, and the low-income problem persists.

The majority of the region's farmers are aged 50 years and over, while fewer than 10 per cent are less than 35 years. This is a common and long-standing feature of agriculture in the region and across Europe, which may have implications for the management and profitability of farms. Research suggests that a farmer's goals are likely to be influenced by his, and his household's, life cycle stage (Gasson and Errington, 1993; Potter and Lobley, 1996). When young, a farmer may place a high priority on goals such as farm expansion and income maximisation, but later in life will favour risk reduction and security. Arguably, a farming population with a preponderance of older farmers will generate lower profits (and incomes) than would otherwise be the case.

Business size and age are linked, as nearly 30 per cent of farmers with 'very small' farm businesses in Northern Ireland are aged 65 years and over, compared with only 13 per cent in the 'medium/large' category. It may be hypothesised, therefore, that reducing the number of older farmers, especially those with smaller farm businesses, would have positive effects on structural problems and farm performance.

**Operator Age, Farm Size and Performance**

We analysed Farm Business Survey (FBS) data to examine two questions relevant to the potential benefits of an Early Retirement Scheme:
- Are larger farms significantly different from smaller ones in terms of financial performance?
- Are younger farm operators significantly different from older ones in terms of financial performance?

*Farm Size and Financial Performance.* Analysis of FBS data indicates that there are significant differences in financial performance associated with size within farming (Tables 2 and 3). In the case of dairy farms the average Family Farm Income per adjusted hectare farmed ranged from £271 for 'small' dairy farms compared to £613 for the 'large' category (significant at $P<0.05$ level). Most of the difference in performance was due to higher levels of output per hectare on larger dairy farms ($P<0.01$).

## Table 2: Dairy farm performance by size of holding

| EU Farm Size Category | Small 8-39.9 ESU (n = 62) | Medium 40-99.9 ESU (n = 69) | Large > 100ESU (n = 15) | Chi-Sq Test for sig. difference between Size groups |
|---|---|---|---|---|
| **Average Age (years)** | **54** (± 11.3) | **55** (±11.4) | **57** (± 8.5) | **NS** |
| **Adj. Area Farmed (ha)** | **35.6** (± 11.5) | **59.9** (± 20.9) | **106.5** (± 28.7) | *** |
| **Total Farm Output per hectare (£)** | **1,371** (± 515) | **1,836** (± 601) | **2,073** (± 541) | ** |
| **Total Costs per hectare (£)** | **1,100** (± 408) | **1,350** (± 460) | **1,460** (± 403) | **NS** |
| **Family Farm Income per hectare (£)** | **271** (± 283) | **468** (± 305) | **613** (± 242) | *** |
| *Quartiles of Family Farm Income per ha:* | | | | |
| **Bottom 25%** | **110** | **264** | **412** | - |
| **Top 25%** | **451** | **698** | **877** | - |

Source: Analysis of Farm Business Survey (NI), 2001
Note: (1) Figures in parentheses are standard deviations. (2) Total costs per hectare are the summation of fixed and variable costs per hectare; imputed costs for owned land and unpaid family labour have not been included.

The picture for beef and sheep farms was similar to that for dairying although the performance differentials were statistically less significant. Average Family Farm Income was £57 per hectare farmed for the 'very small' category compared to £185 for the 'medium' sized farms ($P<0.1$). Larger beef farms produced significantly higher output per hectare ($P<0.1$).

## Table 3: Beef and sheep farms performance by size of holding

| EU Farm Size Category | Very Small < 8 ESU (n = 21) | Small 8-39.9 ESU (n = 130) | Medium 40-99.9 ESU (n = 19) | Chi-Sq Test for sig. difference between size groups |
|---|---|---|---|---|
| **Average Age (years)** | **64** (± 11.2) | **53** (± 12.3) | **55** (± 16.3) | **NS** |
| **Adj. Area Farmed (ha)** | **20.2** (± 7.7) | **55.8** (± 25.3) | **124.0** (± 35.0) | *** |
| **Total Farm Output per hectare(£)** | **855** (± 470) | **789** (± 291) | **916** (± 324) | * |
| **Total Costs per hectare (£)** | **798** (± 340) | **669** (± 288) | **731** (± 288) | **NS** |
| **Family Farm Income per hectare (£)** | **57** (± 310) | **120** (± 168) | **185** (± 121) | * |
| *Quartiles of Family Farm Income per ha:* | | | | |
| **Bottom 25%** | **-110** | **108** | **89** | - |
| **Top 25%** | **212** | **226** | **270** | - |

Source: Analysis of Farm Business Survey, 2001.
Note: (1) Figures in parentheses are standard deviations. (2) Total costs per hectare are the summation of fixed and variable costs per hectare; imputed costs for owned land and unpaid family labour have not been included.

*Age of Operator and Financial Performance.* The sample was split into 'younger' farmers (<55 years) and 'older' farmers (55 or more years). The age of the farm operator did not to have a statistically significant effect on performance. On both dairy farms (Table 4) and beef/sheep farms (Table 5) older farmers actually had significantly higher levels of output per hectare but also significantly higher total costs per hectare. The net effect was that Family Farm Income per hectare farmed was not significantly different between younger and older farmers.

### Table 4: Dairy farm performance by age of farm operator

| Operator Age (years) | under 55 (n = 69) | 55 or over (n = 80) | t-Test for sig. difference between groups |
|---|---|---|---|
| **Average Age (years)** | **45** (± 6.4) | **63** (± 5.9) | - |
| **Farm Size (ESUs)** | **52.9** (± 31.0) | **57.6** (± 36.6) | **NS** |
| **Adj. Area Farmed (ha)** | **53.2** (± 24.5) | **56.7** (± 36.9) | **NS** |
| **Total Farm Output per hectare (£)** | **1,471** (± 559) | **1,791** (± 653) | *** |
| **Total Costs per hectare (£)** | **1,122** (± 342) | **1,369** (± 460) | *** |
| **Family Farm Income per hectare (£)** | **349** (± 392) | **422** (± 305) | **NS** |
| ***Quartiles of Family Farm Income per ha:*** | | | |
| **Bottom 25%** | **163** | **241** | - |
| **Top 25%** | **561** | **630** | - |

Source: Analysis of Farm Business Survey, 2001.
Note: (1) Figures in parentheses are standard deviations. (2) Total costs per hectare are the summation of fixed and variable costs per hectare; imputed costs for owned land and unpaid family labour have not been included.

### Table 5: Beef and sheep farm performance by age of farm operator

| Operator Age (years) | under 55 (n = 81) | 55 or over (n = 93) | t-Test for sig. difference between groups |
|---|---|---|---|
| **Average Age (years)** | **44** (± 8.0) | **64** (± 8.5) | - |
| **Farm Size (ESUs)** | **28.1** (± 27.1) | **22.3** (± 20.1) | **NS** |
| **Adj. Area Farmed (ha)** | **71.7** (± 56.2) | **54.1** (± 36.2) | ** |
| **Total Farm Output per hectare (£)** | **757** (± 279) | **900** (± 475) | ** |
| **Total Costs per hectare (£)** | **616** (± 230) | **788** (± 408) | *** |
| **Family Farm Income per hectare (£)** | **141** (± 158) | **112** (± 222) | **NS** |
| ***Quartiles of Family Farm Income per ha:*** | | | |
| **Bottom 25%** | **35** | **5** | - |
| **Top 25%** | **241** | **226** | - |

Source: Analysis of Farm Business Survey, 2001.
Note: (1) Figures in parentheses are standard deviations. (2) Total costs per hectare are the summation of fixed and variable costs per hectare; imputed costs for owned land and unpaid family labour have not been included.

*Modelling of Age and Scale Effects*.  To understand better the relationships between farm performance, age and scale of holding a number of regression equations were estimated using Ordinary Least Squares (OLS) on FBS data for all dairy and beef/sheep farms in the sample.  Successive equations explaining farm profitability featured alternative selections of dependent and independent variables but it was found that the most robust equation was:

$$\textit{Profadjha} = f(\textit{age, output, ftype, conprop})$$

| Where, | *Profadjha* | Family Farm Income per adjusted ha farmed (£) |
|---|---|---|
| | *Age* | Farmer age in years |
| | *Output* | Value of farm output (£) - Measure of "scale" |
| | *Ftype* | Dummy variable for farm type |
| | | *Ftype* = 0 if dairying; *Ftype* = 1 if beef/sheep |
| | *Conprop* | Proportion of area farmed rented in conacre |

The high level of unexplained variation (Table 6) is not untypical of this type of estimation involving cross-sectional data characterised by high variation across observations.

The model indicated that *Age* was not significantly related to Family Farm Income per hectare farmed.  The 'scale' variable, *Output*, was positive and statistically significant (P<0.01) indicating that larger farms generated higher profits per hectare; an increase in scale leading to an increase in farm output of £10,000 was associated with an increase in Family Farm Income of £19.70 per hectare farmed.  The coefficient of the farm type dummy variable (*Ftype)* was statistically significant (P<0.01) and suggested that the profitability of beef farms was on average £208 per hectare less than that for dairy farms.  Finally, the variable *Conprop,* reflecting the proportion of land area farmed under annual rental contracts, was statistically significant (P<0.01); indicating that expected Family Farm Income using entirely short-term rented land was £252 per hectare less than when all farmed area was owned.

**Table 6: Factors influencing farm performance**

Dependent Variable: PROFADJHA
Method: Least Squares
Observations: 318
White Heteroskedasticity-Consistent Standard Errors & Covariance

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| CONSTANT | 262.8309 | 72.38319 | 3.631104 | 0.0003 |
| AGE | 0.481734 | 1.228744 | 0.392054 | 0.6953 |
| OUTPUT | 0.001970 | 0.000326 | 6.050194 | 0.0000 |
| FTYPE | -207.7678 | 29.88261 | -6.952799 | 0.0000 |
| CONPROP | -251.9535 | 56.08133 | -4.492646 | 0.0000 |
| R-squared | 0.407793 | Mean dependent var | 260.1001 | |
| Adjusted R-squared | 0.400225 | S.D. dependent var | 285.3315 | |
| S.E. of regression | 220.9755 | Akaike info criterion | 13.64958 | |
| Sum squared resid | 15283840 | Schwarz criterion | 13.70873 | |
| Log likelihood | -2165.283 | F-statistic | 53.88281 | |
| Durbin-Watson stat | 1.824094 | Prob(F-statistic) | 0.000000 | |

## Discussion and Conclusions

There is clear evidence of significant ongoing structural change occurring in the Northern Ireland farm sector. Despite this a large proportion of farms remain relatively small and unprofitable. The attraction of the Early Retirement Scheme is its potential to accelerate structural adjustment by facilitating the transfer of resources from older farmers to younger farmers who are expanding their businesses, through the offer of subsidies that supplement the market value received for resources released. Thus, if age or business size is correlated to financial performance, potential benefits may accrue from a reduction in the number of (older) farmers and some increase in the average size of remaining farm businesses.

Considering age first, research suggests the existence of differences in life cycle goals for different age groups. Younger people have a longer planning horizon and tend to invest more heavily than farmers in comparable older age groups. It might be anticipated that this would yield benefits in the form of productivity improvements and profitability; the available evidence, however, does not show any significant differences in farmer performance related to age. Our analysis of Farm Business Data showed no link between performance and age. We cannot, therefore, anticipate any significant improvements in profitability from a policy that simply replaces farmers aged 55 to 65 by younger people.

Turning to the benefits from farm expansion, the case here rests on the relationship between size and performance. In addition, changes in land use also offer the possibility of substituting relatively low with relatively high profit enterprises. Our analysis indicated that substantially higher levels of output and income per hectare were associated with increases in farm size. Income increases were most noticeable when moving from the smallest beef or dairy farm categories to medium size units of either type. Further increases in farm size yielded more modest performance improvements. Likewise a change from beef and sheep production to dairy farming showed significant income gains per hectare. An accurate assessment of the potential gains to be made from transfers that involve a change in land use and farm expansion is difficult to make because it depends on assumptions about relative farm sizes and enterprise types and, crucially, on the number of cases where retirement would lead to

the land released being used for expansion. EU regulations on the Early Retirement measure do not require that those taking over released land expand the holding. In fact, the potential for an Early Retirement Scheme to release land for farm expansion in the case of Northern Ireland may be quite limited. Our farmer survey revealed that of whose willing to participate in an Early Retirement Scheme, most intended to transfer their holdings to a son or daughter, who would be setting-up independently in farming for the first time. No farm enlargement would occur.  We estimate that only 30 per cent of participating farmers would make land available for farm expansion. These were predominately smaller farm operators, so the proportion of land released for farm expansion would be lower, at approximately 20 per cent of the total area covered by a Scheme.

Nevertheless, it is possible to illustrate the potential benefits arising from the transfer of an individual farm as a result of participating in an Early Retirement Scheme. We can take an example where the farm to be transferred is of a type and size with low profits per hectare and the transferee is of a type and size with higher profits per hectare. Substantial divergence is found between 'very small' beef and sheep farms (the commonest type and size of farm), and a weighted average of 'small', 'medium' and 'large' dairy farms (the farm type with the highest profits).  Using the regression equation and data from the farmer survey, the additional Family Farm Income per hectare achievable under this scenario was approximately £150 per ha, generating a total increase in farm income of approximately £3,000 per year. This then is an indicator of the maximum annual pension that could be justified for 'very small' beef and sheep farmers under an Early Retirement Scheme based on benefits arising from size and land use effects. As this category of farmer could be considered the prime target group for such a policy, (a disproportionately high number are aged over 55) it might be argued that a flat rate pension of £3,000 per year would represent the optimal policy design.

It is difficult to predict if a pension of this size would prove attractive to farmers in the target group. When a more generous package was introduced in the Republic of Ireland only 22 per cent of those eligible participated, amongst whom individuals with larger farm businesses were over-represented. A pension of £3,000 would be well below the upper limit set by the EU Regulation of approximately £9,500 per farmer per annum and total payments per farmer over the life of the Scheme of £95,000. It would, however, be in-line with the more modest flat rate payment now operating in France (£3,500 per farmer per year).

A further issue concerns possible deadweight losses: the extent to which an Early Retirement Scheme would compensate participants for something they intended to do anyway. Survey responses on planned retirement age in the absence of a scheme, indicated that the deadweight quotient was about 23 per cent. Deadweight, in this context, is defined as pension payments made after the date at which recipients intended to retire in the absence of a Scheme. This assumed that farmers entered a scheme at the youngest eligible age and received a flat rate payment that ceased at age 65.Surveyed farmers stated that participation in a scheme – were it available at the time of the survey - would have brought forward their retirement by an average of four years. This illustrates the essentially short-term effect of the Early Retirement Scheme and is in line with findings in the Republic of Ireland and France. That is, the

same structural adjustment would quite quickly occur in the absence of any policy intervention.

Overall, under the conditions outlined above, the economic case for the introduction of an Early Retirement Scheme appears weak. Under certain assumptions, the benefits of releasing land are real but relatively modest. The maximum payment to 'very small' beef and sheep farmers that might be justified on efficiency grounds is of the order of £3,000 per annum. Moreover, realising these benefits depends crucially on farm expansion and change in farm use to secure better performance. Without farm enlargement current structures are largely preserved and the main effect is the transfer of resources from one generation to the next, albeit a few years earlier than would otherwise have been the case. No age related benefits could be detected. The positive effects, therefore, are essentially short-term and the policy would be very likely to incur a significant proportion of deadweight loss.

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13