Off-farm Employment and Agricultural Education

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Abstract

Developments in modern agriculture have led to doubts regarding the long-term viability of current production systems. The changing structure of the Irish farming sector is part of a European wide trend where the emerging model of agriculture is one comprised of a small number of highly developed commercial farmers and a larger number of rural households who obtain income both on and off the farm. Early studies viewed the take up of off-farm employment as a temporary adjustment process—a way of supplementing farm income when it was low, but that view has been replaced over the last decade by research that notes its persistence over time. The importance of assessing the effect of this trend is manifold. Off-farm employment among farm households affects farm organisation, the future structure of agriculture, public policies to aid farming families, public policies to maintain rural communities and the delivery of educational and training services to the farming sector.

Introduction

The contribution of agriculture to national wealth and viability of rural areas in the Republic of Ireland is immense. When adjustment is made to official statistics for export refunds and import content of agricultural products, Irish agricultural exports account for approximately 30% of all net exports (Sheey & O’Connor, 1999). The agri-food sector, however, is in a state of change. Its contribution to the national economy, while still of considerable importance, continues to decline. In 1999 the agri-food sector employed over 8% of the Irish workforce, down from 11% in 1995 and accounted for £2,322m in terms of Gross Agricultural Product at factor cost down from £2,616m in 1995 (Dept. of Agriculture, 2000). Aggregate income from agriculture was £1,637m in 1999, a reduction of 12.3% over 1998. External pressures on the farm household are expected to persevere. Policy issues such as the further reform of the Common Agricultural Policy (CAP), enlargement of the European Union (EU) and trade agreements, will figure prominently in coming years.

Total economic growth in Ireland has increased substantially in recent years. As this occurs farm labour and management are confronted continually with the necessity to adjust resource use in response to the squeeze between the inelastic demand for the product and rising labour opportunity costs. The push for such adjustments from the farm labour supply side is affected by the nature of farming while the pull from the labour demand side is affected by the nature of the general industrial economy. Part of the adjustment takes the form of migration of labour out of agriculture and part emerges as dual employment.

At production level, many factors shape the future of the Irish agricultural sector. The most fundamental of these is the narrowing of the margin between costs and prices in production—otherwise known as the price-cost squeeze. Numerous other factors also have come to have a profound influence on the production practices of the farm household— including concerns for animal welfare, labour shortages and more recently the Bovine Spongiform Encephalopathy (BSE) crises.

It is not surprising, therefore, that farmers are relying less on their farm incomes. The Household Budget Survey, last conducted in 1994/95 by the Central Statistics Office, shows that 53% of farm household income came from farming, 31% from other employment, 12% from transfers and the remaining 4% from other sources. Looking at National Farm Survey data over the last few years, and the increasing percentages of farm households with off-farm employment (up to 47% of households where operator or spouse had off-farm employment in 1998, from 36% in 1995), leads us to believe that the relative income from farming continues to decline.

Purpose

A changing target population requires that services provided for that population must adapt. The purpose of this paper is to examine how agricultural education and training services should react to rising levels of off-farm employment in the farming population. It will explore various factors that are associated with
the off-farm work activities. Analysis will be
carried out to discover if participation in dual
employment impacts negatively on farm
performance. An approach to describe categories
of farm household and their viability status is
taken. It will show that categories of farm
household and the relative importance of farm
and non-farm income can vary greatly. The
implications of this diversity for the provision of
agricultural education and training services will
be assessed.

Data Source
Teagasc (Ireland's Agriculture and Food
Development Authority) collects the most
comprehensive source of farm level information
in the Republic of Ireland in the National Farm
Survey (NFS). It collects detailed information on
approximately 1000 farm households annually.
This paper presents results, weighted to national
parameters, obtained from analysis of NFS
(1995-1998) data. Exact details on off-farm
income levels are not available from the survey,
but in 1998 details on off-farm occupation,
hours and weeks worked were collected. This
was sufficient to allow estimation of off-farm
income using wage and salary scales. Off-farm
income was estimated for both operator and
spouse. This process enabled the computation of
a figure for household income as the sum of
family farm income and income earned off the
farm by the farm operator and/or spouse.

Methodology
The emerging model of agriculture in
Ireland necessitates a broad definition of what
constitutes a ‘farm’. In the unique case of
farming, the household, its activities and the
farm business are inextricably entwined.

Consequently, this paper will use the ‘farm
household’ as the unit of analysis. It will
examine how the farm business combines with
off-farm employment of both operator and
spouse to produce a viable farm household unit.

Probit maximum likelihood estimation
was used to assign probabilities to factors that
were associated with off-farm employment. This
process provided a measure of the influence of
these variables on the adoption of off-farm
employment. It also examined how much of the
variation between those with and without off-
farm employment could be attributed to these
variables.

The method of categorisation employed
was a cluster analysis. The K-means procedure
was used to identify relatively homogeneous
groups of cases based on selected characteristics,
using an algorithm that can handle large
numbers of cases (Aldenderfer & Blashfield,
1984). Farm household income in each cluster
was then assessed in terms of viability. For the
purpose of this analysis viability was defined in
economic terms as earning a farm household
income equivalent to or above average industrial
earnings in 1998 (£15,550).

Results
Looking at recent trends it is clear that
off-farm employment is a stable and persistent
feature of Irish agriculture (Figure 1). For farm
operators the level of off-farm employment was
26% in 1995 and rose to 30% over the four years
to 1998. For the spouse off-farm employment
growth has been even more dramatic going from
15% of households in 1995 to 23% in 1998.
Looking at the percentage of households with at
least one off-farm income source- there has been
a rise from 36% in 1995 to 47% in 1998.

Figure 1. Off-farm employment status (1995-1998).
The off-farm occupations of operator and spouse in 1998 were examined. The majority of farm operators with off-farm employment were in the agricultural sector (22%), and the construction industry (28%). Average estimated off-farm earnings were £9,900. The occupational profile of the spouse differed to that of the operator where 38% were in professional occupations (mainly teaching and nursing), 26% worked on a clerical capacity and 13% were in the service / food industry. Average estimated off-farm earnings (£10,200) were slightly higher than for the farm operator.

On examination of the literature surrounding the topic of ‘part-time farming’ four factors can be extrapolated as the main influences on the adoption of off-farm employment- namely, personal reasons, household characteristics, farm factors and general economic conditions (Van der Bor et al, 1995). Over the last few years the economic climate has provided better opportunities than ever for those wanting to participate in employment outside of the farm. The following analysis shows the farm and household factors that characterise a farm household with off-farm employment.

Table 1

<table>
<thead>
<tr>
<th>Farm and household characteristics (1998)</th>
<th>Operator (spouse) with off-farm income</th>
<th>Operator (spouse) without off-farm income</th>
</tr>
</thead>
<tbody>
<tr>
<td>Farm Average size</td>
<td>24 ha* (36)*</td>
<td>37 ha* (32)*</td>
</tr>
<tr>
<td>Dairy</td>
<td>7%* (30%)</td>
<td>93%* (33%)</td>
</tr>
<tr>
<td>Cattle</td>
<td>48%* (45)</td>
<td>52%* (50)</td>
</tr>
<tr>
<td>Sheep</td>
<td>40%* (20)</td>
<td>60%* (13)</td>
</tr>
<tr>
<td>Tillage</td>
<td>17%* (6)</td>
<td>83%* (5)</td>
</tr>
<tr>
<td>Household Marital status</td>
<td>76% Married*</td>
<td>70% Married*</td>
</tr>
<tr>
<td>Average age</td>
<td>46* (45)*</td>
<td>54* (51)*</td>
</tr>
<tr>
<td>Ave no. of household members</td>
<td>4.2* (4.7)*</td>
<td>3.6* (3.9)*</td>
</tr>
</tbody>
</table>

A probit model was developed to estimate the effects of the most significant variables on an operators likelihood of having off-farm employment.

Model: Pr(off-farmi=1)= F(βXi), 1,2,…1111
where Xi is a 4 x 1 vector of regressors for the i
farmer
(n=1111)

The probit model is used when the dependent variable is a dummy variable. In this
case the dependent variable is whether the operator has off-farm employment or not. Three regressors were used in this analysis—size of farm, age of operator and the presence of a dairy farm enterprise.

Results showed (Table 2) that as farm size increased by one hectare, the likelihood of an operator having off-farm employment fell by 0.6%. As an operator got older by one year they were 3% less likely to be engaged in off-farm work activities. Dairy farmers had 127% less chance of being involved in off-farm employment. These three variables together were extremely successful (correct in 80% of attempts) in predicting whether the operator had off-farm employment.

### Table 2

<table>
<thead>
<tr>
<th>Regressor</th>
<th>Coefficient</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Size</td>
<td>-0.0066</td>
<td>.001*</td>
</tr>
<tr>
<td>Age</td>
<td>-0.0316</td>
<td>.001*</td>
</tr>
<tr>
<td>Dairy</td>
<td>-1.2683</td>
<td>.001*</td>
</tr>
</tbody>
</table>

Goodness of fit = 0.789

Performance indicators

It is also important to look at variations in performance between those with and without off-farm work activities. As was found in many previous studies this is a complex issue. Bollman (1993) poses the question “If we observe part-time farmers to be inefficient (however defined), which is the chicken and which is the egg? Which came first, the inefficiency or the part-time farming? Do inefficient farmers adjust part of their labour to off-farm work because they recognise their farming activity to be inefficient?” There is little recent work available in Ireland regarding the level of performance on farms where the household has or has not an additional off-farm income source. Work by Lucey and Kaldor (1969) and Mannion (1981) suggest that there is little difference between the level of performance between the two situations while Cawley (1983) highlighted the fact that farmers with off-farm employment had lower levels of investment in the farm when compared to those with no off-farm employment. This she contributed to the variation in farm size between the two groups.

In this analysis three measures of performance were used—output per hectare, family farm income per hectare and total investment in fixed assets per hectare (machinery, buildings, livestock and land improvements). Tests were carried out to examine if there was a significant relationship between operators with and without off-farm employment in terms of the three measures. The results showed that for all performance indicators used, the level of performance was significantly (p < 0.01) better on farms where the operator had no off-farm employment. However, when additional analysis was carried out for the indicators within the different farming systems no significant differences between the two groups were observed for any system. For example, when operators engaged in cattle rearing full time were compared with operators who were engaged in cattle rearing and off-farm employment, no significant difference was found between the two.

As a result of this analysis we know the household and farm level variables that contribute to the participation in off-farm work activities. We also know participation in employment off the farm is not associated with poorer farm performance. The following analysis looks at off-farm employment and its impact on farm household viability.

### Categories of farm household

Using a cluster analysis methodology, it was hypothesised that the data set would ‘break’ naturally as a result of farm level data, household level data and off-farm income levels. The procedure was carried out on the 1998 NFS data set, which contains 1111 cases. Fourteen variables were used in this analysis and they are presented in Appendix 1. This procedure resulted in six distinct clusters being identified (Figure 2). These clusters differ greatly in terms of farm and household characteristics and in the percentage of the population that they represent.
Table 3 shows the most notable characteristics of each cluster. Cluster 1 is a category of dairy farm households with average holdings of 97 hectares, containing 3% of the farming population. Cluster 2, representing 1% of farm households, are mainly involved in tillage and rent-in large areas of land. Cluster 3 contains 23% of the farming populace, the majority of whom operate large/medium (average holdings of 44ha) dairy and cattle enterprises. Another notable characteristic of this cluster is that operators have an average age of 41, younger than those in any other cluster.

Cluster 4, a category of large drystock farm households with average holdings of 78 hectares, and representing 6% of the population. Cluster 5 is the largest category representing 66% of the population. This is a category of farm households with average holdings of 21 hectares involved mainly in drystock enterprises. Operators in this group have an average age of 57- older than those in other clusters. Finally, cluster 6 is a category of farm households whose main enterprise is forestry. This is a small cluster representing 1% of the population.

Table 3

Cluster characteristics

<table>
<thead>
<tr>
<th>Cluster</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>% of dairy farms in cluster</td>
<td>89.9</td>
<td>19.7</td>
<td>62.4</td>
<td>16.2</td>
<td>20.5</td>
<td>36.8</td>
</tr>
<tr>
<td>% of cattle farms in cluster</td>
<td>5.6</td>
<td>24.7</td>
<td>26.8</td>
<td>12.6</td>
<td>61.8</td>
<td>26.8</td>
</tr>
<tr>
<td>% of sheep farms in cluster</td>
<td>-</td>
<td>-</td>
<td>5.6</td>
<td>56.9</td>
<td>13.8</td>
<td>30.1</td>
</tr>
<tr>
<td>% of tillage farms in cluster</td>
<td>4.5</td>
<td>55.6</td>
<td>5.2</td>
<td>14.3</td>
<td>3.9</td>
<td>6.3</td>
</tr>
<tr>
<td>Average acres of forestry</td>
<td>0.9</td>
<td>-</td>
<td>0.7</td>
<td>0.8</td>
<td>0.4</td>
<td>55.7</td>
</tr>
<tr>
<td>Average age</td>
<td>50.6</td>
<td>48.0</td>
<td>40.5</td>
<td>50.6</td>
<td>56.1</td>
<td>47.8</td>
</tr>
<tr>
<td>Average area of land rented</td>
<td>36.3</td>
<td>311.8</td>
<td>20.7</td>
<td>22.8</td>
<td>5.7</td>
<td>8.9</td>
</tr>
<tr>
<td>% of cluster with viable farm income</td>
<td>93</td>
<td>84</td>
<td>52</td>
<td>50</td>
<td>60</td>
<td>38</td>
</tr>
<tr>
<td>% of cluster with viable household income</td>
<td>93</td>
<td>84</td>
<td>76</td>
<td>63</td>
<td>26</td>
<td>65</td>
</tr>
</tbody>
</table>

Note: these are indicative estimates only due to small numbers in some clusters.

Farm household viability

On average, farm income created a viable farm household for 4 clusters (table 3)- large dairy (1), large tillage (2), large/medium dairy and cattle (3) and large drystock (4). These clusters account for 33% of the population. Off-farm income attributable to the operator or spouse significantly increased the overall level of household income for those with large/medium dairy and cattle (3) farms and those with large drystock (4) farms.

The large cluster representing 66% of the farming population did not have a viable farm or household income. A second stage cluster analysis on this category, using a sub-group of the variables (shown by * in appendix) used for the previous analysis, produced three sub-clusters (table 4).
Table 4

Sub-cluster characteristics

<table>
<thead>
<tr>
<th>Sub-cluster</th>
<th>1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Family farm income (£)</td>
<td>6,150</td>
<td>4,432</td>
<td>6,347</td>
</tr>
<tr>
<td>% with off-farm employment</td>
<td>47</td>
<td>100</td>
<td>14</td>
</tr>
<tr>
<td>Age</td>
<td>47</td>
<td>48</td>
<td>67</td>
</tr>
<tr>
<td>% of cluster with viable household income</td>
<td>10</td>
<td>91</td>
<td>9</td>
</tr>
</tbody>
</table>

Sub-cluster 1 (22% of the population) were a non-viable group, where half of these farm households had off-farm earnings. Sub-cluster 2 (14% of the population) was viable as a result of combining farm and non-farm income. This entire sub-cluster had an off-farm income source. Sub-cluster 3 was also non-viable, with very little involvement in off-farm work activities (30%). However, this is most likely explained by the fact that the average age of the operator in this sub-cluster was 67 years. The non-viable sub-clusters (1&3) representing 52% of the population, contained only 5% of viable farm households.

Educational Response

“The conflicts brought about by a rapidly changing world and the rigidities of established and cherished institutions are nowhere more apparent than the dilemmas facing educational institutions” (Van der Bor et al., 1995). The changing structure of the sector necessitates a re-evaluation of the services provided as a result of the changes occurring in the target population. In recognising these developments Teagasc will now implement a new programme- Rural Viability Programme- aimed at 60,000 farm families who are currently earning less than the average industrial wage from farming. “The programme will promote the concept of a multifunctional agriculture and the generation of part of the household income from non-farm activities will be promoted as a positive development for farming” (Carey, 2000). Education will be a vital component in managing this change. “Upskilling and capacity building will be achieved through a combination of adult training courses and one-to-one consultations” (Carey, 2000). It is believed that given the necessary training farmers and their partners will be in an excellent position to avail or continue to avail of the opportunities in the growing economy.

In reality the target category for this programme can be viewed as cluster 5. However, this is a diverse category and was seen to contain three distinct sub-clusters. Firstly, sub-cluster 1 were described as non-viable. This category could be regarded as potentially viable. Education and training for those without off-farm employment (which account for over half of this group) is suggested to enable them to take advantage of increasing opportunities in the general rural economy. Up-skilling for those with off-farm employment is relevant as off-farm earnings for this group are relatively low. Sub-cluster 2 was a viable group who combine farm and off-farm income. An important aspect of educational services for this group would be in farm management, which would ensure they continue to perform as well as their full-time counterparts. For the non-viable sub-cluster 3, off-farm employment as a strategy is not appropriate. Their needs are in terms of ‘education out of farming’ / retirement, and the development of leisure skills.

Conclusion

The root of the decision to combine farming and off-farm employment is often interpreted as farms failure to “make it” in an unfavourable economic climate. However, there is little empirical evidence to prove/ disprove this explanation. Bryden et al (1992) explain that “pluriactivity may be part of a process of entering farming, it may also be part of a process of adjusting out of farming and it is also a characteristic of a broad category of stability.” Whatever the motivation the existence of off-farm income sources has certainly been established as has its significance in supplementing family farm income.

It is clear that distinct categories of farm household have different educational and training needs. It was found that farm households vary greatly in terms of household, farm and off-farm income variables. It has also
been shown that these differences are not related to levels of farm performance. As a result they have different requirements for educational, training and advisory services.

Off-farm income:
Estimated off-farm income of operator*
Estimated off-farm income of spouse*

Farm level characteristics:
Family farm income*
Size of farm (UAA- hectares)
Total borrowings
Land rented minus land let
Area of forestry
Dairy livestock units
Cattle livestock units
Sheep livestock units
Acres of tillage

Household characteristics:
Age of holder*
Number of household members
Number of household members on farm full-time

References
Cawley, M., (1983), Part-time Farming in Rural Development- Evidence from Western Ireland, University College Galway.