SIZE AND NON-SIZE EFFECTS ON THE PROFITABILITY OF FARMS IN ENGLISH LESS FAVOURED AREAS

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Farms from English less favoured areas (LFA) are separated into size quartiles (measured by grazing livestock units (GLU)/farm) and ranked within these size quartiles by Farm Business Income (FBI)/farm to show size and non-size effects respectively. FBI increases with farm size but some small farms are highly profitable and large farms loss making, showing size is not an insurmountable barrier to or guarantee of business profitability. There is more variability in performance among smaller farm, showing they have better non-scale opportunities for improving performance than larger farms. Business growth by increasing herd/flock size leads to an initial fall in profits because revenues fall faster than costs, suggesting growth trajectories need to either (i) expand GLUs quickly or (ii) increase value added per GLU. Benchmarking clubs are considered better than comparative analysis against industry standards because they reveal more process-type details and afford better insights to developing diversification activities: where diversified income streams cannot be developed the future of small upland hill farms appears bleak.

(Key words: English hill farms, business viability, diversification, comparative analysis, benchmarking clubs, unique business signatures).

Introduction

The UK uplands, also known as less favoured areas (LFA), cover about 1.55 million hectares, of which about 17% is farmed. About 67% of LFA is classified as Seriously Disadvantaged Area (SDA), the remainder as Disadvantaged Area (DA). As it is generally recognised that these large upland areas are nationally and internationally important for biodiversity, are of significant landscape, archaeological, recreational, heritage, and natural resource value, and contribute to cultural diversity, the economics of upland farming has important implications for the economic, social and environmental sustainability in these areas (Midmore and Moore-Colyer 2005; IEEP/LUC/GHK 2004). Without some form of agricultural activity these areas may lose this valuable biodiversity and upland landscape which society values, but farming

is difficult because generally poor climate, soil and terrain reduce productivity, and many farm businesses are located at some distance from large urban markets (IEEP/LUC/GHK 2004). In view of this, national governments and the European Union have implemented successive policies to support LFA farms (Wathern *et al.* 1986; DEFRA 2008d) - support that is justified on the basis of the supply of public goods and maintenance of social and cultural capital in the uplands (Midmore *et al.* 2001; IEEP/LUC/GHK 2004; Midmore and Moore-Colyer 2005; Harvey 1994).[1]

For example, in the UK the Hill Livestock Compensatory Allowance was introduced in 1975 as a coupled, headage based scheme, which was replaced by the Hill Farming Allowance (HFA) in 2001 (DEFRA 2006). But farm incomes within LFAs have been on a consistent decline since 2003/04. In that year, Farm Business Income (FBI)[2] was £17,500/farm, by 2006/07 it had fallen to £10,786/farm (32%). Provisional FBI estimates for 2007/08 are £5,900/farm (DEFRA 2008a: their table 2.5). These findings are supported by farm survey data for hill farm livestock enterprises. Analysis by the English Beef and Lamb Executive (EBLEX) estimates average net margin per cow (excluding non-cash costs) for LFA suckler herds in 2005/06 was minus £170.09, and minus £70.69 for the top third herds (EBLEX 2006), there was only a marginal improvement in 2006/07 (minus £151.43 and minus £67.62 respectively (EBLEX 2007)). In these calculations "net margin" excludes non-cash costs such as payments for family labour, rental value for owned land and interest on working capital, so even the best farmers, on average, fail to make a reasonable living; following such a decline in profitability it will be a struggle for many farmers to identify further income raising or cost saving measures (Franks 2006).

[1] For example; "The need for the continued presence of hill farming activities to maintain the upland environment is largely recognized and accepted by both environmentalists and farmers alike" (IEEP/LUC/GHK 2004: Executive Summary, page 3). And, "The main economic rational for public support for hill farming is to ensue the provision of public goods that would otherwise be under provided. The continuation of hill farming, in one shape or another, appears critical to maintaining and enhancing the environmental quality of the uplands" (IEEP/LUC/GHK 2004: p 80).

[2] Farm Business Income (FBI) is defined to represent the return to all unpaid manual labour and management (farmer, spouse, farmer's family and others with an entrepreneurial interest in the farm business) and to all their capital invested in the farm business including land and farm buildings. This is now DEFRA's preferred measure of farm income (DEFRA 2007).

Profitability is a key factor underpinning and driving farm structure and structural change (Lobley and Potter 2004). Because many of the social, environmental and economic consequences are linked to farming structure (Midmore *et al.* 2001; Potter and Lobley 2004; Lobley *et al.* 2005; Burton *et al.* 2006; Buckwell 1989; Potter 1990; Midmore and Moore-Colyer 2005; Lobley and Potter 2004; IEEP/LUC/GHK 2004), analysis of farm business income is an important part of policy analysis.[3] This paper presents a relatively simple but highly effective method for identifying opportunities for and barriers to profitability and business growth which are related to farm size. The following section introduces the data and analytical methodology used. Research findings are then presented. The discussion identifies size and non-size effects on farm profitability.[4] This is followed by a concluding section.

Methodology

Data from sheep and cattle upland farms are taken from the Farm Business Survey (FBS).[5] These livestock farms are classified as LFA farms because 50% or more of their total area is in the LFA. Of the sample, 68% of the 246 farms come from the EU North region, 21% from the EU West and the remainder from the EU East. The sample framework is randomised and stratified using ten robust farm types and seven government office regions, considers part- and full-time farms only, and surveys a total of 1,850 farm businesses. Within each stratum, sampling is with uniform probability: farm size is not explicitly included in the current design (DEFRA 2008c). Farms are retained in the sample for several years with about 10% of the sample

[3] This focus excludes any contribution to the farm household income from off-farm income, allowing the focus of this study to be on the development of agricultural business profitability. It is acknowledged that off-farm incomes can be used to support farming activities and household, and hence can be expected to influence the rate of farm restructuring (Damianos and Skuras 1996; Meert *et al.* 2005; Caraveli 2000; Bateman and Ray 1994).

[4] Size and scale are often used interchangeably in the literature, strictly speaking, a change in scale implies a proportionally equal increase in all inputs, whereas a change in size may involve an increase in only a single input.

[5] Wilson *et al.* (2006) outline the development of the FBS and uses of the data it collects. The FBS forms one part of the UK government's obligations to report to the European Commission on the well-being of the farming sector and farming businesses.

replaced each year – largely through natural wastage. All sampled farms have financial year-ends between 31 December and 5 April 2007.

The data have been raised to represent the total population by assigning each farm a weighting factor based on the ratio of sampled farms to those in the underlying population (as reflected in the June Agricultural Census) within each stratum. Further details of the methodology and sample are reported in Franks *et al.* (2008), where 29 tables present data analysed by EU region, farm type, size (ranked by Standard Labour Units) and performance quartile (Farm Business Income (FBI)/farm). The data reported here are presented differently; farms are separated into size quartiles by GLU/farm and ranked within the quartiles into four sub-groups by FBI/farm. This arrangement allows variations between quartiles to be attributed to size and variations within quartiles to non-size factors, such as management, enterprise mix etc.

Research findings

The trend line in Figure 1 indicates the variation in FBI with farm size. FBI increases with farm size but at a decreasing rate, there is a wide dispersion about the trend line, and farms of all sizes report negative FBIs. That some small farms outperform larger ones suggests that size *per se* is no absolute barrier to profitability. On average, FBI/farm becomes positive at just over 40 GLUs, but as FBI makes no allowance for unpaid family labour and managerial input, an average farm needs to be considerably larger than this to generate a reasonable living. The two groups of observations highlighted are the best and worst performing farms in the smallest quartile; an issue returned to later.

APPROXIMATE POSITION OF FIGURE 1

Figures 2 and 3 are presented to clearly illustrate the method used to categorise farms. Figure 2 shows that GLU/farm varies widely between size quartiles (Q1 (smallest),

Q2, Q3 and Q4 (largest)),[6] this size effect is a direct artefact of the data generation. However, it also shows a similar GLU/farm between sub-groups within the same size quartile, showing that any within quartiles size effect has been largely eliminated. It illustrates two items of interest: (i) there appears to be little difference in size between the best and the quartile average farm in Q1, Q2 and Q3, but in Q4 the best farms are somewhat larger then their quartile average, and (ii) largest farms have, on average, four times as many GLUs as the smallest.

APPROXIMATE POSTION OF FIGURE 2

Figure 3 shows the variation in FBI/farm within and between size quartiles. The only discernable size effect (variation between size quartiles) is the poor performance of the second smallest quartile, but there are clearly defined non-size effects (variation between sub-groups within the same size quartile). This is again a direct artefact of the way the data are arranged. Farms in the smallest size quartile (Q1) recorded the highest and lowest FBI/GLU. The poorest performing farms in each quartile all reported negative incomes, though as size increases the losses reduce, as does the gap between worst and best performers. Figure 3 shows that smaller farms can out-perform larger farms in terms of FBI/GLU.

APPROXIMATE POSITION OF FIGURE 3

Figure 4 shows the variation is Farm Business Output/GLU (FBO/GLU) between and within size categories. FBO/GLU falls with size quartile showing a clear but diminishing size effect; the smallest farms reported nearly £1,000/GLU, about 35% more than farms in the largest size quartile. There are clear non-size effects which reduce with size quartile: the best smallest farms report the largest FBO/GLU and the poorest smallest farms the worst, but within size quartile variation decreases with size quartile (data values for these and other income and cost streams are presented in the Appendix, Tables A and B).

APPROXIMATE POSITION OF FIGURE 4

[6] Farms in the smallest quartile (Q1) were smaller than 44 GLU/farm, Q2 farms were between 44 and 69, Q3 between 69 and 107 and Q4 larger than 107 GLU/farm.

FBO comprises four principle revenue streams; output from agriculture, Single Farm Payment (SFP), diversification income and agri environment payments. The size and non-size effects on these income streams are shown in Figures 5 to 8 and 10. Figure 5 shows no economies of size in 'output from agriculture', but pronounced non-size effects which (again) weaken as size increases only to become a little more prominent among farms in the largest quartile. Again, the largest variation occurs in the smallest size quartile; the best outperform - and the worst underperform - all other sub-groups. The non-size effect is similar to, if a little less pronounced, than for FBO/GLU (Figure 4).

APPROXIMATE POSITON OF FIGURE 5

Figure 6 shows diminishing size effects in SFP/GLU, with the smallest farms having the largest SFP/GLU. It also shows clear non-size effects, which (again) weaken with size. In three size quartiles the best performing farms report the highest SFP/GLU (Q1.4, Q2.4 and Q4.4). The size and weakening non-size effects can be explained by the structure of the English SFP scheme. A dynamic hybrid system is in place; payments are based on a weighted average of the farm's historic payments and regional average payments based on the type of land farmed: the weights for the historic proportion of the payment decline in steps to zero in 2012. There are three land-type categories each attracting a different payment rate. The first €5,000 of these payments is exempt from EU (but not National) modulation. Therefore, higher payments/farm probably reflect a favourable combination of higher historic entitlements, a larger farm area, more farmland in higher paying land-classes (LFA non-moorland rather than moorland)[7], and the relative importance of the size exemption.

APPROXIMATE POSITION OF FIGURE 6

Figure 7 shows the importance of diversified output; where it is important, it makes a very significant contribution. There are clear diminishing size effects and evidence of

[7] Land within the moorland line is mainly SDA but it does include some DA.

non-size effects especially among the best performers of the three smaller size quartiles (Q1.4, Q2.4 and Q3.4).

APPROXIMATE POSITION OF FIGURE 7

Figure 8 shows the importance of income from 'agri-environment payments (excluding HFA)'. There are clear size effects, these payments are more important to smaller farmers. Like other revenue streams, the non-size effects of agri-environment payments weaken as size increases (though to a lesser extent than for other income streams). There are some interesting issues here, which probably reflect a combination of land area farmed, and the opportunity to participate in, and the decision to enrol into an agri-environment programme. Figure 9 shows the average utilisable agricultural area and adjusted utilisable area for each size quartile and performance sub-group. Whilst within each size quartile farms have similar GLU/farm, though land area clearly is more variable: agri-environment payments are likely to be more closely related to land area than GLU and the best performing sub-groups farm larger areas of farmland; larger farms have been observed to be more likely to enrol in agri-environmental schemes (Wilson 1997; Wilson *et al.* 2006; Seibert *et al.* 2006; Brotherton 1991).

APPROXIMATE POSITION OF FIGURE 8

APPROXIMATE POSITION OF FIGURE 9

The HFA/GLU payments are shows in Figure 10. Once again, there are size and non-size effects, both of which (again) reduce with size. These observations can largely be explained by the structure of the HFA payments and land farmed (Figure 9). HFA payments are based on farmed area, are capped and digressive, and offer additional payments for compliance with specified (additional) grazing and cropping requirements. The standard rates per farm in 2006 were £30.82, £16.66 and £11.66 per ha for the first 350 ha of SDA, DA and Common Land/Moorland respectively (DEFRA 2006). On land more than 350 but less than 700 ha, payment rates are halved, land over 700 ha attracts no payment. Smaller farms will therefore have received a higher payment/GLU than larger farms, because the half rate, capping

structure brings proportionally less benefit to larger farms (such an arrangement is clearly a disincentive to expand through land acquisition). As a result of these rules, better performing smaller farms gain most (as they farm larger areas of farm land than poorer performing small farms (Figure 9)), but although as quartile size increase the better performing farm sub-groups farm larger areas of farm land than other sub-groups within their size quartile, there are diminishing benefits of farming larger areas.

APPROXIMATE POSITION OF FIGURE 10

Figure 11 shows clear size and non-size effects of total cost per GLU. Farms in the smallest size quartile incur nearly £800/GLU, those in the largest about £530/GLU (a 33% difference). The non-size effects become more pronounced as size quartile increases; the poorest performing sub-groups always have the highest or second highest total costs/GLU in their size quartile. Farms in the best performing sub-group of the smallest quartile (Q1.4) spend the average for their quartile, but this is much more than any sub-group in the larger size quartiles (with the exception of the poorest performers in quartile 2 (Q2.1)).

APPROXIMATE POSITION OF FIGURE 11

Figure 12 shows livestock variable costs rather than total variable costs as these represent a substantial proportion of all variable costs, and both costs have a very similar pattern between and within size quartiles. There is little difference in average expenditure per GLU between quartiles indicating no size effects. As size increases, better performers tend to spend less per GLU than others within the same size sub-groups; this effect becomes more pronounced with size.

APPROXIMATE POSITION OF FIGURE 12

Text books suggest economies of size are more likely to be observed in fixed than variable costs. Figure 13 confirms this, presenting evidence of pronounced cost economies of size. There are also non-size effects, with better farms within any sub-group tending to spend less on fixed costs/GLU. Within the smallest size quartile

there is no clear trend but the best performers (Q1.4) spend considerably less than the poorest (Q1.1) and less than their size quartile average, but somewhat more than farms in the largest size quartile.

APPROXIMATE POSITION OF FIGURE 13

FBI makes no deductions for unpaid family manual labour and management. Imputed deductions (calculated by the FBS) for family manual labour and management are shown in Figure 14; there is a pronounced size and diminishing non-size effects. The £1,500 or so FBO/GLU earned by the best smallest farmers is sufficient to cover variable, fixed and imputed family labour costs, leaving about £300/GLU; however, they have only some 30 or so GLUs with which to scale-up this return to a farm's reported profit.

APPROXIMATE POSITION OF FIGURE 14

Discussion

The use of traditional farm-type assets has a significant impact on the viability of smaller upland farms (Lobley and Potter 2004; Lobley *et al.* 2005), and this has consequences for the social and environmental sustainability of these regions (Midmore *et al.* 2001; Midmore and Moore-Colyer 2005). The research findings show that, on average, larger farms generate higher FBI/farm than smaller farms, but some smaller farms outperform larger ones (Figures 1, 2 and 3). This suggests size has an important effect but does not totally dominate profitability[8] and that smallness in itself is not an impenetrable barrier to achieving top ranking performance nor is large size a guarantee of profitability. The discussion shows how successful small farms use their agricultural-type resources to compete with larger ones, and assesses, within the confines of the available data, which of two farm business growth trajectories, expansion of flock/herds or developing more value added products from

[8] Though this analysis is of the whole farm business, it is similar to conclusions reached in many analyses of individual farm enterprises (Franks *et al.* 2002; Inputs Task Force 2001).

available farming assets, offers the most likely way of enhancing a farm's long-term viability.

Size and non-size effects and business growth.

The best sub-group of farms in the smallest size quartile (Q1.4) generate more revenue/GLU from (i) agricultural activities, (ii) single farm payments and (iii) HFA than any other sub-group, and their diversification income is match only by other small farms in Q1.3: on the face of it a remarkable achievement. To do this they incur higher total costs than larger farms, but still spend less than the average for their size quartile. They spend about the same as larger farms on livestock variable costs/GLU but more than their size quartile average. As a result, they incur considerably higher fixed costs than almost all larger farms but spend less than similarly sized farms. It is by achieving high revenue/GLU and controlling rather than bearing hard down on variable and fixed costs where the best smaller farms show a particularly expertise.

The analysis reveals four patterns in the research findings,

(1) size and non-size effects in income streams, both of which diminish with size. For example FBO, 'agri-environment payments (excluding HFA)', SFP, diversification income and HFA;
(2) size and non-size effects that increase with size. For example, total and fixed costs;
(3) size effects, but no non-size effects. For example, unpaid farmer and spouse labour; and
(4) no size effects but non-size effects which reduce with size. For example OFA and Livestock VCs.

From the perspective of smaller farms, there are two key observations. Firstly, the initial effect of increasing the size of a smaller farm is to gain in variable and fixed cost economies (total costs fall by £136/GLU) but this is more than off-set by a loss of income/GLU of £254/GLU (See Table Appendix A). Secondly, the range in sub-group performance within size quartile tends to reduce with size, this shows there are more non-size opportunities for increasing profitability among smaller farms; (for example, there is a £410/GLU difference in Output from Agriculture between Q1.1

and Q1.4 but this is only £114/GLU between Q4.1 and Q4.4, see Table Appendix B). Both factors reduce the attractiveness of expansion by small increases in GLU; as doing so means the farm falls foul of this "adverse treadmill" whilst at the same time having fewer opportunities to add value.

Expansion by enlarging a herd/flock inevitably means more land will be required, which must be released either by a reduction in the number of smaller farms or by breaking up larger estates. But the larger estates are those least likely to be split-up because they are likely to be the most profitable. This suggests that for many farms, expansion to increase business viability must be by increasing business turnover without increasing GLUs, i.e. by developing any available non-scale opportunities. To this end, income earned from diversification activities and support payments make especially important contributions: it appears successful smaller farms have developed their diversification activities into their "unique farm signature" with which they have successfully differentiated their business.

Diversification as a survival strategy

The importance of diversified income is shown once again in Figure 15. As a farm increases in size the proportion of total revenue derived from traditional farming activities increase from 42% to about 60%. In contrast, the poorer performers in the three smallest size quartiles are most reliant on traditional farm activities: better performers generate a larger proportion of revenue from support payments (SFP, HFA and agri-environment) and diversification. Size can generate sufficient economics of scale to overcome the lower revenue/GLU on large farms, but over-reliance on producing basic commodities such as beef and lamb, which can be produced more cheaply and efficiently elsewhere,[9] is clearly not an adequate basis for maintaining a viable small hill farm business. Few small upland farms can generate sufficient profit purely from traditional farming activities.

[9] Imports provide stiff competition to home-grown livestock products; the UK is a net importers of beef - 414,000 tonnes in 2006, 49% of UK production (Meat and Livestock Commission 2007: their Figure 1 page 5) and of sheep meat - 46,100 tonnes in 2006, 14% of UK production (Meat and Livestock Commission 2007: their Figure 5 page 22).

APPROXIMATE POSITION OF FIGURE 15

This analysis therefore confirms others showing the importance of diversification income to support the farm business (Bateman and Ray 1994; Potter and Lobley 2004; Meert *et al.* 2005). Several studies have identified barriers to diversification as farm type, farm size, tenure, indebtedness, household type, culture and education (Centre for Rural Research 2002). Table 1 presents selected data from the best (Q1.4) and poorest sub-groups (Q1.1) of smallest size quartile to investigate four of these potential barriers (Figure 1 indicates where these farms are located in the overall distribution).[10] The best performing farms have fewer sheep but similar overall GLU. Sheep need less labour to look after, and have been more profitable over the most recent years, and certainly since the introduction of the Single Farm Payment (Franks *et al.* 2008: p 9, their Figure 4). The best performing farms also farm more land. They also own all their farm land. They own more assets and have fewer liabilities, resulting in a higher net worth. These factors may contribute to their greater ability and willingness to invest in possibly risky diversification opportunities.

Hill farms have the lowest proportion of diversified activities of any farm type (DEFRA 2008b: their table 9, page 9). This probably reflects their comparative disadvantage in resource base and location. The survey does not record the opportunities available to farmers who have not diversified (as is typical of such surveys), so it is not possible to speculate how many non-diversified farms have unused or under-used resources available to them to use to establish diversification enterprises should they wish to do so.

APPROXIMATE POSITION OF TABLE 1

Improving performance of existing enterprises

The EBLEX enterprise data and this analysis highlight the wide range in enterprise performance among upland farms. This might imply scope to increase the profitability of farms by improving the worst performers, and benchmarking and

[10] Details on household type, culture and education are not available from the available survey data.

demonstration farms have been suggested as an appropriate tool to help disseminate best practices to achieve this aim (Policy Commission on the Future of Farming and Food 2002).[11] But benchmarking assumes that best practice is constant and that it can be bodily transferred from one farming context to another. This is over-simplistic because a good business is self-learning and flexible as this allows it to address needs and issues as they occur; best practice is not a particular set of techniques or methods, but the ability to do whatever is most appropriate at any given time. This makes replication difficult and transferability problematic, especially in a weather dependent, seasonal industry, characterised by location specific, heterogeneous businesses which typically face different sets of opportunities and constraints. These factors focus attention on the nitty-gritty details of farming. However,

- The survey provides little information about these important details. For example, there is no information about breeds, autumn feeding to maximise flushing, ram and sheep ratios and feeding routines, use of scanning, managing the feeding plane as lambing approaches, shepherding routines and practices, vaccinations, grassland management, growth monitoring, marketing strategy, and replacement strategy to name but a few of the many variables that will determine outputs and costs of a sheep enterprise.[12]
- Key farm management activities include hiring and firing, lending and borrowing, buying and selling and planning and allocation; detailed information on hiring and firing, and planning and allocation is rarely reported in any farm survey.
- Time series data also adds to the value of an analysis, but 'equivalent' data is only available for 2005/6 (Fogerty and Robbins 2007) and though that has been analysed in a similar way to the 2006/07 report (Franks *et al.* 2008), these reports do not use an identical methodology, nor is the data reported from an identical sample of farms.

[11] Comparative analysis compares individual farm performance against industry standards, benchmarking is an activity which identifies the processes which underpin differences revealed in comparative analysis to show how things are done and which typically provides helpful (if not complete) information from which the financial outcome of adopting similar techniques/approaches can be calculated (Ronan and Cleary 2000).

[12] Some of this information (but not all) would have been gathered by Defra's Special Studies of Farm Enterprise surveys but these are no longer commissioned: their loss is severely felt but they were expensive surveys to commission.

- Timeliness of data is particularly important, but both reports appeared more than a year after the surveyed farms' financial year end.
- This analysis has ranked farms within size quartiles using FBI as the performance measure, clearly this includes diversification income. So whilst the more profitable farms may identify best business management practices, they may not be those which use best practices on traditional agricultural enterprises.[13]

So, for conceptual as well as operational reasons, benchmarking using this data set is unlikely to provide the necessary detailed information to inform operational changes on the farm. Rather, its value is to indicate broader strategic changes, such as the relative importance of different sources of income.

A way forward: developing a 'unique business signature'

Rather than comparing against industry standards, farmers can form benchmarking groups to compare results and exchange nitty-gritty details. This can help overcome poor timeliness and help ensure farmers compare like-with-like (Franks and Haverty 2005). Such groups also reveal details of management attitudes, such as how the best farmers treat their work-life balance, which surveys rarely report. They can also help identify why such-and-such a practice works, why might a practice improve performance on my farm, what are the down-sides of implementing such as change – even for a good idea, can the practice be incorporated as a small scale experiment, how long will it take for the changes to become acceptable to staff and beneficial to the farming system. Such discussions help farmers to manage by judgement and method rather than by numbers and formulae; an important benefit for resource and constraint varying businesses.

Given the importance of diversification among smaller farmers in particular, it is most probable than benchmarking groups would discuss alternative uses of traditional agricultural-type assets. Such co-operation may help develop the networks that are becoming more important for some types of diversification. For example, joint

[13] Nor does it describe and comment on the proportion of the household income earned from traditional farm enterprises, the diversified use of traditional farm-type resources and off-farm income.

marketing arrangements need a certain critical mass to ensure continuity of supplies for some markets and to fully capture available marketing economies of size. A bed and breakfast enterprise for tourists would benefit from other farmers providing distinctive local events, activities, and locally produced and prepared fare. Perhaps counter-intuitively, the success of developing a 'unique business signature' will increasingly depend on neighbours developing together a 'collective business signature' which reinforce and support each another's 'unique business signature'.

Future support policies and business survival

The conclusions arrived at are based on financial performance two years after a major policy change, the introduction of the Single Farm Payment scheme. But farmers and markets are still reacting and adjusting to this policy change. This paper is not able to predict the distributional changes resulting from the Single Farm Payment scheme- which largely depend on each farm's historic entitlements, farmed area and the area in each Regional Area Payment land-category. Moreover, there have also been changes to the HFA since April 2007 (DEFRA and Natural England 2008: paragraph 4.5, pages 33 and 34). From January 2008 land in Disadvantaged Areas is no longer entitled to receive the HFA (because such land attracts a higher Single Farm Payment rate (DEFRA 2008d)). Additional changes to HFA payments are planned. Though HFA payments will continue to be paid until 2009, from 2010 these payments will become fully integrated into Environmental Stewardship through an Uplands Entry Level Stewardship tier – details are still awaited. It is likely these changes, alongside impacts of World Trade Organisation agreements and bans (or lifting of bans) on trade in livestock products, will alter the relative profitability of small and larger farms. Farmers need to be aware that the conclusions derived from this study may not apply once these policy changes have been introduced.

Conclusions

This paper has demonstrated a relatively straightforward but effective method for identifying opportunities and barriers to farm profitability due to farm size. The analysis has revealed characteristics of successful farms of different size, and

considered alternative expansion trajectories. It has focused attention on the use of traditional farming-type assets.

The analysis confirms the competitive advantage generally enjoyed by larger farms. But the data show a wide spread in performance: the poorest performing sub-group in each size quartile recorded a negative FBI/farm and some small farms are among the highest earners, and can be the most efficient and effective utilisers of resources. This suggests that size is beneficial but not in itself sufficient or essential to underpin a successful profitable business and that smallness is not an absolute barrier to developing a profitable, successful business.

Larger farms farm larger land areas and benefit mainly through savings in fixed costs which outweigh poorer revenues per GLU. Successful smaller farms focus on generating high revenues whilst controlling rather than bearing down hard on costs; the importance of diversification income is clear, better performing farms in the three smallest size quartiles are particularly dependent on income from such ventures: this is clearly a part of their business many have already developed as their 'unique business signature'. The survey does not reveal whether similar resources and opportunities are available to farmers who have not diversified: so key questions such as, do such farmers have similar opportunities, and if they do, are they unable or unwilling to fully exploit them, cannot be addressed. Where this source of income cannot be developed the future of small upland farms in particular appears bleak indeed.

A principal source of revenue for English hill farmers is government support: SFP and HFA – together 30% of total revenue - and agri-environment payments. The main economic rational for such payments is for the provision of public goods and ecosystem services that would otherwise be underprovided or destroyed. Each of these payment schemes will change over the coming years. The dynamic adjustments to the English SFP are by now well known, and will continue until 2012 with farmer's historic element gradually replaced by regional average payments. HFA payments will be substantially reformed in 2010 to become an uplands tier of Environmental Stewardships Entry Level. The data presented here suggest that the continuation of these payments appears critical to hill farms large and small, but this paper has not

focused on the important distributional impacts of these changes – that important issue must remain the subject of other studies.

References

Bateman, D. and Ray, C. (1994) Farm Pluriactivity and Rural Policy: Some Evidence from Wales. *Journal of Rural Studies* **10** (1): 1-13.

Brotherton, I. (1991) What limits participation in ESAs? *Journal of Environmental Management* **32**: 241-249.

Buckwell, A. (1989) Economic signals, farmers' responses and environmental change. *Journal of Rural Studies* **5** (2): 149-160.

Burton, R., Mansfield, L., Schwarz, G., Brown, K. and Convery, I. (2006) *Social capital in hill farming.* Aberdeen.

Caraveli, H. (2000) A comparative analysis on intensification and extensification in Mediterranean agriculture: dilemmas for LFAs policy. *Journal of Rural Studies* **16**: 231-242.

Centre for Rural Research (2002) *Farm Diversification Activities: Benchmarking study 2002 Final Report to DEFRA.* University of Plymouth, Plymouth.

Damianos, D. and Skuras, D. (1996) A Farm Business and the Development of Alternative Farm Enterprises: an Empirical Analysis in Greece. *Journal of Rural Studies* **12** (3): 273-283.

DEFRA (2006) *Hill Farm Allowance: Explanatory Booklet 2007.* DEFRA, London.

DEFRA (2007) *Consultation on Measures of Farm Income.* [Online] statistics.defra.gov.uk/esg/asd/fbs/consult.htm.

DEFRA (2008a) *Agriculture in the UK.* London.

DEFRA (2008b) *Farm Diversification - January 2008.* London.

DEFRA (2008c) *Sample Representation and Design.* [Online].

DEFRA (2008d) *Specific funding for the Uplands.* [Online] http://www.defra.gov.uk/rural/uplands/support.htm.

DEFRA and Natural England (2008) *Environmental Stewardship Review of Progress.* London.

EBLEX (2006) Business Pointers for Livestock Enterprises: Cattle and Sheep costings November 2006. *Farmers Weekly*: Supplement; 24th November.

EBLEX (2007) Business Pointers. *Farmers Weekly*: Supplement; 23rd November.

Fogerty, M. and Robbins, K. (2007) *Farm Business Survey 2005/06. Hill Farming in England.*

Franks, J. R. (2006) Farm Futures: some Impacts of the Fischler Reforms on Livestock Farming in the North East of England. *Journal of Farm Management* **12** (10): 627-642.

Franks, J. R., Cain, P. J. and Farrar, J. (2002) Economic Efficiency in Milk Production: Scale and Non-Scale Effects. *Farm Management* **11** (4): 243-267.

Franks, J. R., Harvey, D. and Scott, C. (2008) *Farm Business Survey 2006/07 Hill Farming in England.* Farm Business Unit, SAFD, Newcastle University.

Franks, J. R. and Haverty, M. J. P. (2005) Benchmarking Farm Enterprises. *Farm Management* **12** (3): 143-158.

Harvey, D. (1994) Policy prospects for the hills and uplands. *Livestock Production and Land Use in Hills and Uplands* **No. 18** (Occasional Publications): 7-21.

IEEP/LUC/GHK (2004) *An assessment of the impacts of hill farming in England on the economic, environmental and social sustainability of the uplands and more widely.* DEFRA, London.

Inputs Task Force (2001) *Inputs Task Force Interim Report to UK Agriculture Ministers.*

Lobley, M. and Potter, C. (2004) Agricultural change and restructuring: recent evidence from a survey of agricultural households in England. *Journal of Rural Studies* **20**: 499-510.

Lobley, M., Potter, C., Butler, A., Whitehead, I. and Millard, N. (2005) *The wider social impacts of changes in the structure of agricultural businesses.* University of Exeter, Exeter.

Meat and Livestock Commission (2007) *A pocketful of meat facts 2007.* Milton Keynes.

Meert, H., van Huylenbroeck, G., Vernimmen, T., Bourgeois, M. and van Hecke, E. (2005) Farm household survival strategies and diversification on marginal farms. *Journal of Rural Studies* **21**: 81-97.

Midmore, P. and Moore-Colyer, R. (2005) *Cherished Heartland. Future of the Uplands in Wales.* Institute of Welsh Affairs, Cardiff.

Midmore, P., Sherwood, A.-M. and Roughley, B. (2001) Policy Reform and the Sustainability of Farming in the Uplands of the United Kingdom: Conflicts between Environment and Social Support. *Journal of Environmental Policy and Planning* **3**: 43-63.

Policy Commission on the Future of Farming and Food (2002) *Farming and Food. A sustainable future.* UK Government Cabinet Office, London.

Potter, C. (1990) Conservation under a European farm survival policy. *Journal of Rural Studies* **6** (1): 1-7.

Potter, C. and Lobley, M. (2004) Agricultural Restructuring and State Assistance: Competing or Complementary Rural Policy Paradigms? *Journal of Environmental Policy and Planning* **6** (1): 3-18.

Ronan, G. and Cleary, G. (2000) Best Practice Benchmarking in Australian Agriculture: Issues and Challenges. *Australian Agribusiness Perspectives.*

Seibert, R., Toogod, M. and Knierim, A. (2006) Factors Affecting European Farmers' Participation in Biodiversity Policies. *Sociologia Ruralis* **46**: 318-340.

Wathern, P., Young, S. N., Brown, I. W. and Roberts, D. A. (1986) The EEC less favoured areas directive: Implementation and impact on upland land use in the UK. *Land Use Policy* **3** (3): 205-212.

Wilson, G. (1997) Factors influencing farmer participation in the ESA scheme. *Journal of Environmental Management* **50**: 67-93.

Wilson, P., Seabrook, M. and Price, R. (2006) Developments in National Farm Business Data Sources: Implications and Opportunities. *Journal of Farm Management* **12** (8): 464-476.

Table 1. Comparison between best and poorest performers in smallest size quartile.

	Smallest quartile (Q1)	
	Poorest sub-group (Q1.1)	Best sub-group (Q1.4)
Farm Diversified income (£/GLU)	11	232
Farm type		
Total Cattle LU/farm	11.7	4.1
Total sheep LU/farm	17.3	26.6
Total LU/farm	29.2	31.5
Farm Size		
Total Adjusted Agricultural Area (ha)	50.3	100.8
Farm Tenure		
Area owner occupied (ha)	49.3	128.0
Area tenanted (ha)	6.5	0.0
Percentage owned (%)	88.4	100.0
Farm Indebtedness		
Total Assets/farm (£)	381,551	619,619
Total Debts/farm (£)	31,698	4,981
Total Net Worth/farm (£)	349,853	614,638
Farm Business Income/farm	**-9,066**	**21,898**

Figure 1. Trend and distribution of Farm Business Income, indicating the position of best and poorest performers in the smallest and largest quartile.

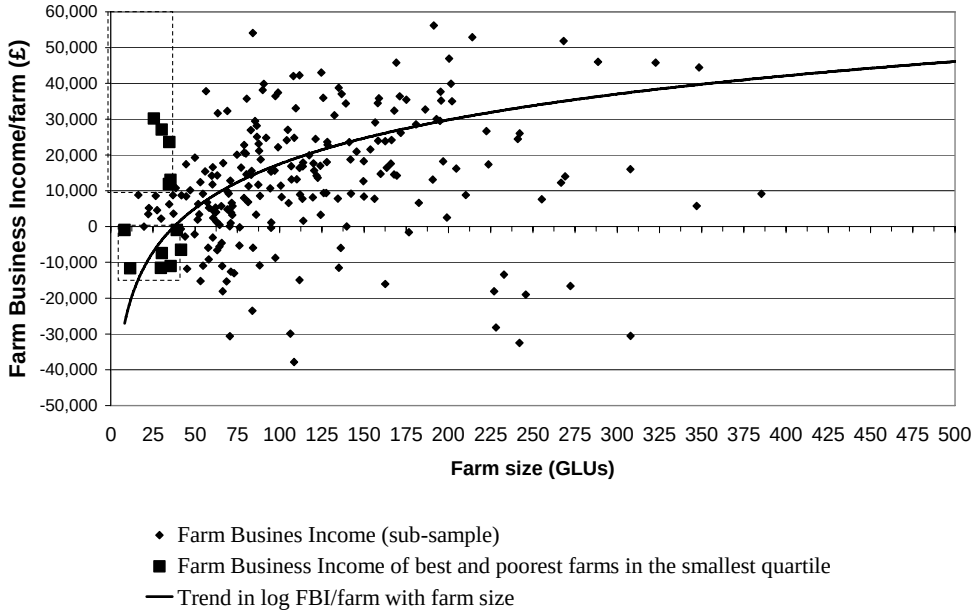


Figure 2. Variation in total GLU/farm between size quartiles and ranked by FBI/farm within size quartiles

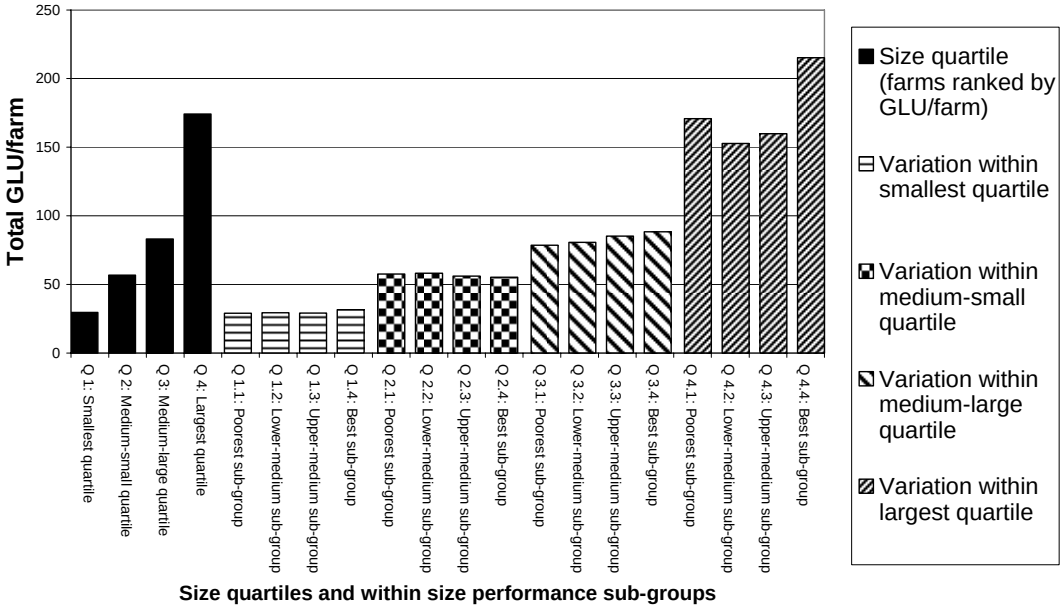


Figure 3. Variation in Farm Business Income per GLU between size quartiles and ranked by FBI/farm within size quartiles.

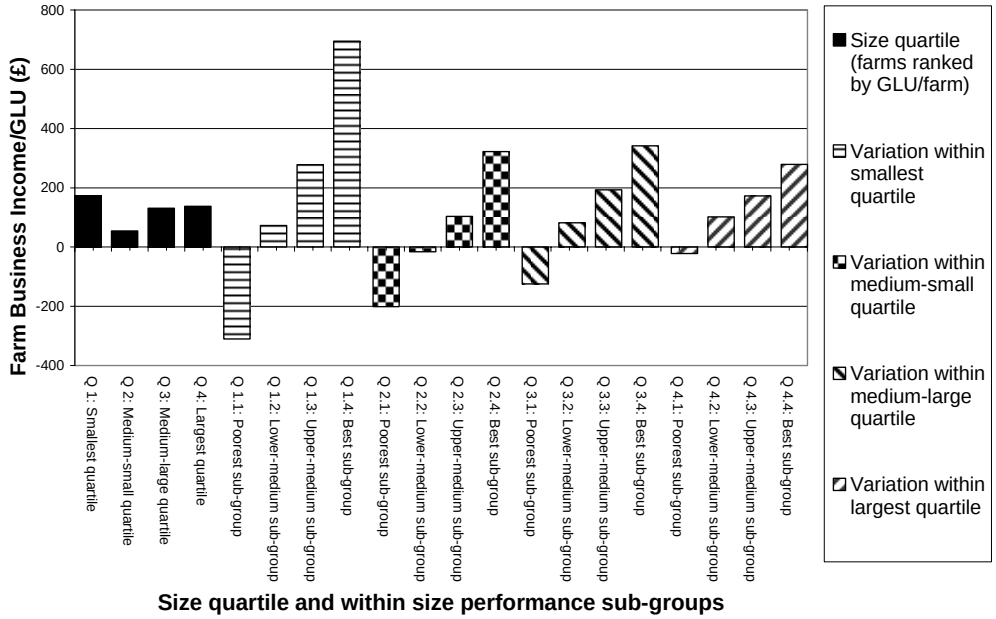


Figure 4. Variation in Farm Business Output per GLU between size quartiles and ranked by FBI/farm within size quartiles.

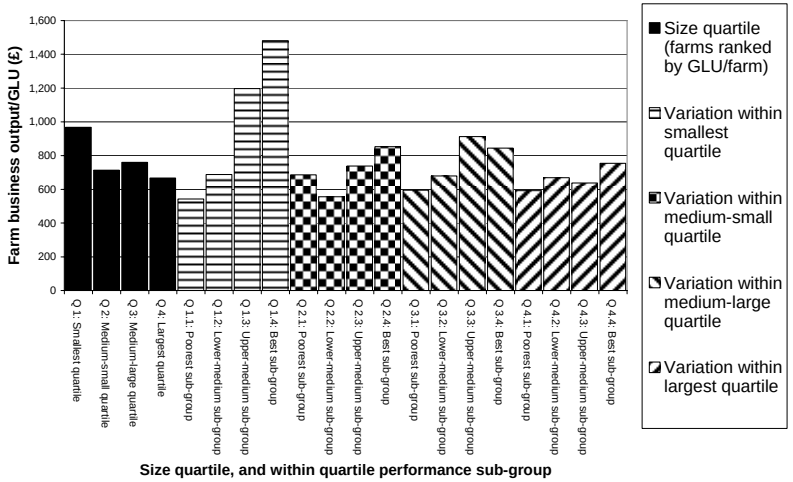


Figure 5. Variation in the output from agriculture/GLU between size quartiles and, ranked by FBI/farm, within size quartiles.

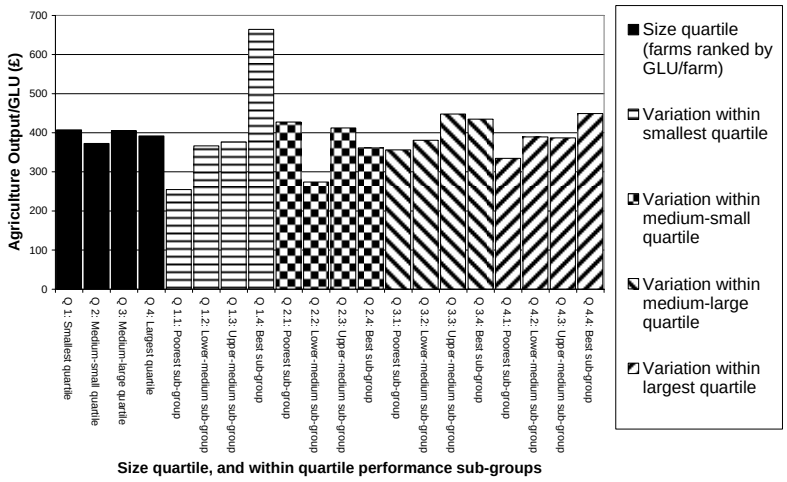


Figure 6. Variation in Single Farm Payment per GLU between size quartiles and, ranked by FBI/farm, within size quartiles.

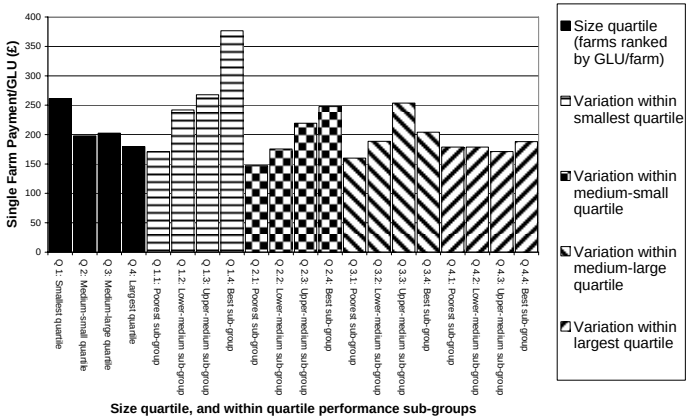


Figure 7. Variation in the value of Diversified Output per GLU between size quartiles and, ranked by FBI/farm, within size quartiles

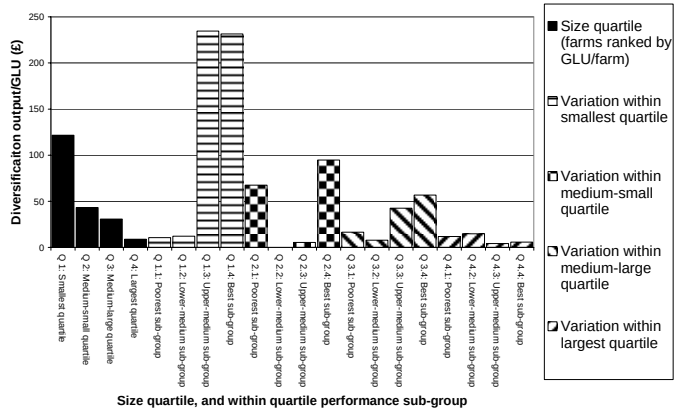


Figure 8. Variation in Agri-environment Payments (excluding Hill Farm Allowance) per GLU between size quartiles and, ranked by FBI/farm, within size quartiles

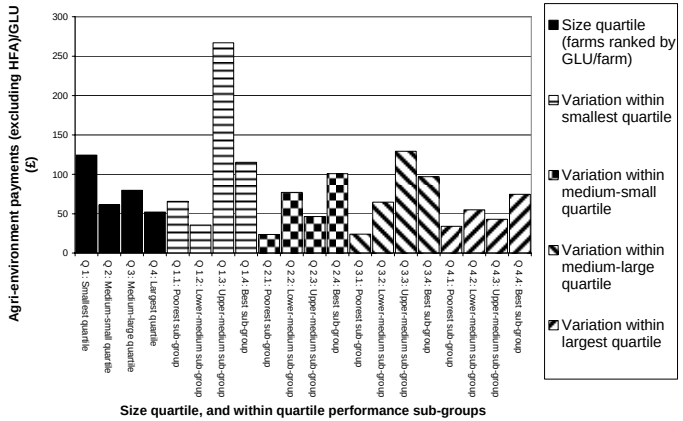


Figure 9. Variation in farm area between size quartiles and, ranked by FBI/farm, within size quartiles

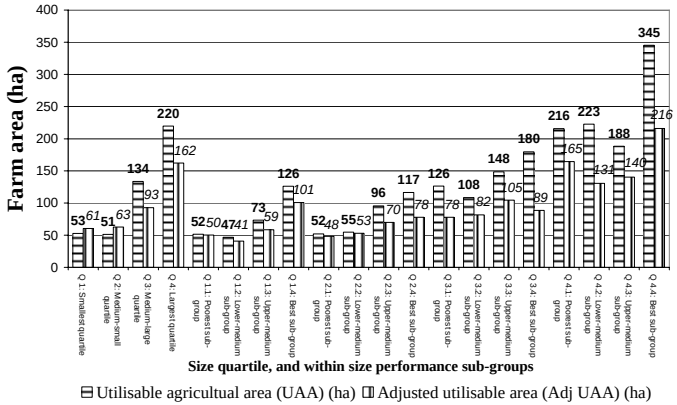


Figure 10. Variation in Hill Farm Allowance (HFA) per GLU between size quartiles, ranked by FBI/farm, within size quartiles.

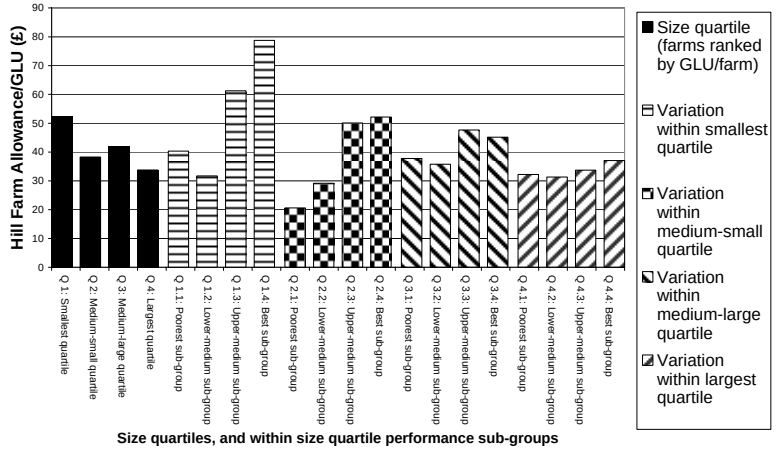


Figure 11. Variation in Total Costs per GLU between size quartiles and, ranked by FBI/farm, within size quartiles.

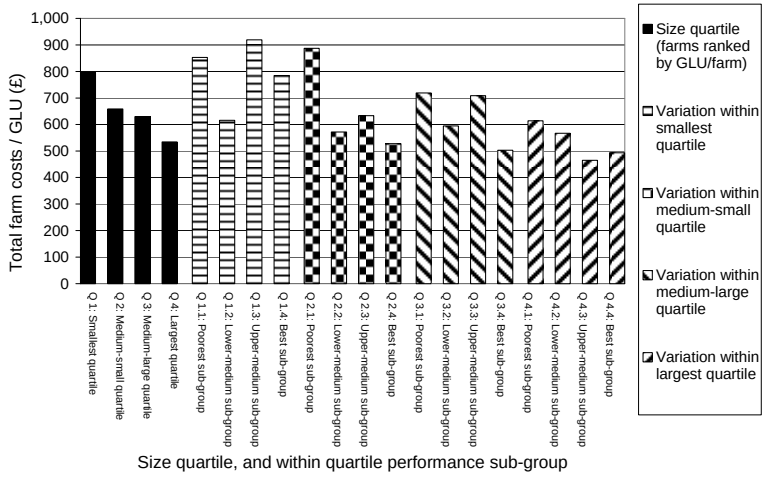


Figure 12. Variation in Livestock Variable Costs per GLU between size quartiles and, ranked by FBI/farm, within size quartiles.

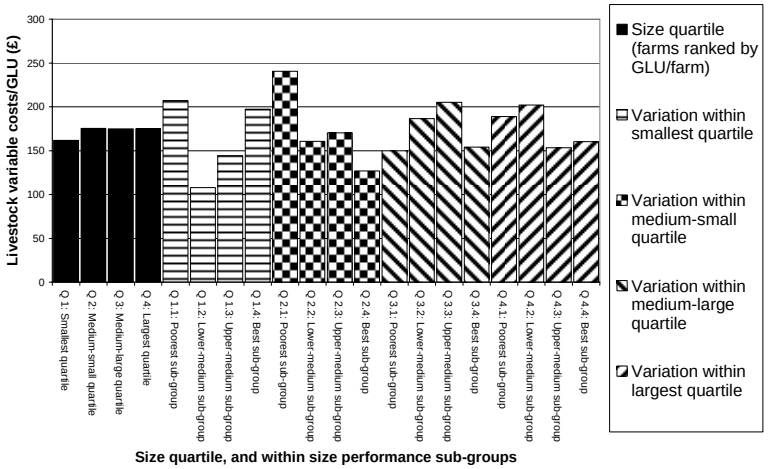


Figure 13. Variation in Farm Business Fixed Costs per GLU between size quartiles and, ranked by FBI/farm, within size quartiles.

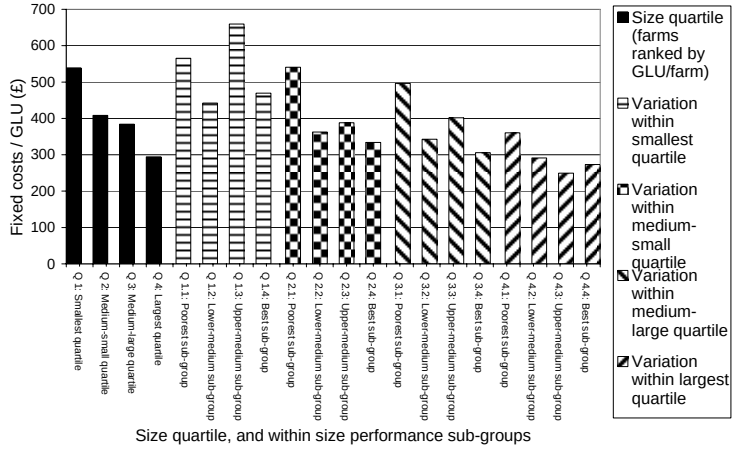


Figure 14. Variation in Unpaid Farmer and Spouse Labour per GLU between size quartiles and, ranked by FBI/farm, within size quartiles.

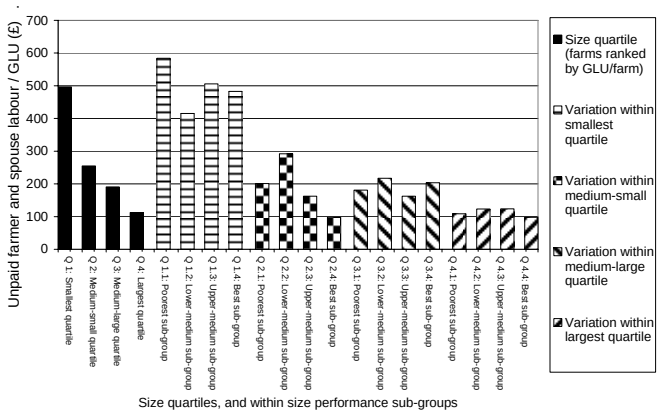
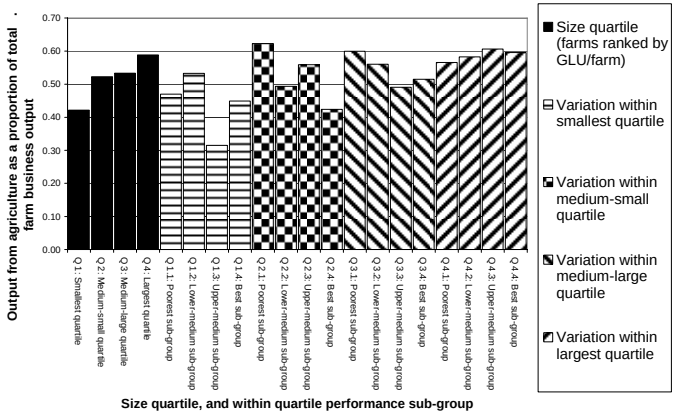


Figure 15. Variation in the proportion of output from agriculture to total farm business output between size quartiles and, ranked by FBI/farm, within size quartiles.



Appendix: Table A. Comparing size and non-size effects: the relative importance of income and costs.

	Q1	Q2	Difference (Q2-Q1)		Q3	Difference (Q3-Q2)		Q4	Difference (Q4-Q3)	
	Average	Average	(£)	%	Average	(£)	%	Average	(£)	%
Farm Output	**1,065**	**778**	-287	*-26.9*	**814**	36	*4.6*	**697**	-117	*-14.3*
Farm Business Output/GLU	**967**	**713**	-254	*-26.3*	**760**	47	*6.7*	**666**	-94	*-12.4*
of which										
Output from agriculture (£/GLU)	408	372	-35	*-8.6*	406	33	*8.9*	392	-14	*-3.4*
SFP/GLU	261	198	-63	*-24.3*	202	5	*2.3*	180	-23	*-11.3*
Diversified output/GLU	122	43	-78	*-64.5*	31	-13	*-29.0*	9	-22	*-70.9*
Agri-environment payments (ex. HFA)/GLU	124	61	-63	*-51.0*	80	19	*30.6*	52	-28	*-34.9*
HFA/GLU	52	38	-14	*-26.9*	42	4	*9.3*	34	-8	*-19.2*
Farm Business Total Costs	**795**	**659**	-136	*-17.1*	**630**	-29	*-4.4*	**534**	-96	*-15.2*
of which										
Farm Business Variable costs/GLU	256	251	-6	*-2.3*	246	-5	*-1.9*	240	-6	*-2.4*
of which										
Agriculture Livestock Costs/GLU	162	175	14	*8.4*	175	-1	*-0.3*	175	0	*0.1*
Farm Business Fixed Costs/GLU	539	408	-130	*-24.2*	384	-24	*-5.9*	294	-90	*-23.4*
Farm Business Income (net margin)	172	54	-118	*-68.6*	131	76	*141.1*	138	7	*5.5*
Unpaid farmer and spouse labour/GLU	496	255	-242	*-48.7*	191	-64	*-25.2*	112	-79	*-41.2*

Appendix: Table B. Comparing size and non-size effects: the relative importance of income and costs.

	Q1.1	Q1.4	Q1.4-Q1.1 (£)	Q1.4-Q1.1 %	Q2.1	Q2.4	Q2.4-Q2.1 (£)	Q2.4-Q2.1 %	Q3.1	Q3.4	Q3.4-Q3.1 (£)	Q3.4-Q3.1 %	Q4:1	Q4.4	Q4.4-Q4.1 (£)	Q4.4-Q4.1 %
Farm Business Output/GLU	**542**	**1,480**	938	*172.9*	**686**	**852**	166	*24.2*	**594**	**845**	251	*42.2*	**592**	**754**	162	*27.3*
of which																
Output from agriculture (£/GLU)	255	665	410	*160.8*	427	361	-66	*-15.5*	356	435	79	*22.1*	335	449	114	*34.1*
SFP/GLU	171	377	206	*120.5*	147	248	101	*68.5*	160	204	44	*27.5*	179	188	9	*5.0*
Diversified output/GLU	11	232	221	*2,076.9*	67	95	27	*40.3*	16	57	40	*244.9*	12	6	-6	*-50.7*
Agri-environment payments (ex. HFA)/GLU	66	115	49	*75.3*	24	101	77	*326.2*	24	97	73	*302.6*	34	75	41	*120.1*
HFA/GLU	40	92	52	*128.3*	21	48	27	*132.2*	37	52	15	*40.0*	33	36	4	*11.4*
Farm Business Total Costs	**853**	**785**	-68	*-8.0*	**887**	**528**	-360	*-40.5*	**719**	**503**	-216	*-30.0*	**614**	**494**	-121	*-19.7*
of which																
Farm Business Variable costs/GLU	288	315	28	*9.7*	347	194	-153	*-44.1*	223	198	-25	*-11.3*	254	220	-33	*-13.1*
of which																
Agriculture Livestock Costs/GLU	207	197	-10	*-4.8*	241	127	-114	*-47.3*	150	154	4	*2.6*	189	160	-29	*-15.2*
Farm Business Fixed Costs/GLU	565	469	-96	*-17.0*	541	334	-207	*-38.2*	496	305	-191	*-38.4*	360	273	-87	*-24.2*
Farm Business Income (net margin)	-311	695	1,006	*-323.8*	-201	322	523	*-260.0*	-125	342	467	*-373.3*	-22	279	301	*-1,356.1*
Unpaid farmer and spouse labour/GLU	584	483	-101	*-17.3*	201	98	-103	*-51.3*	181	204	23	*12.5*	109	98	-11	*-9.8*