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Title : Is there a future for small farms in developed countries? Evidence from the French case*.

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Abstract

This research aims to identify the specific characteristics of small farms in developed countries and the factors which influence their survival and growth. Using the case of France, we employ statistical and econometric analysis of data from the Farm Structure Survey (N=70,000) for the period 2000-2007. The principal findings suggest that small farms are no more likely than other farms to employ “alternative” strategies to the predominant model of increasing farm size, nor are they more likely to diversify on-farm activities or operate under quality-labelled production systems, with the notable exception of organic agriculture. However, where small farms do adopt or practice these activities, they are seen to have a favourable effect in ensuring their survival and growth. In contrast, we are unable to conclude that pluriactivity of farm households has a positive impact on the survival of small enterprises. The effect of geographic location on small farms is largely expressed in their concentration in mountainous or disadvantaged regions. Overall, the trajectory of small farms is marked by farm exit, principally as the result of farmers retiring at the end of their careers. The small farm sector is also revitalised by both larger farms declining and thus being reclassified as small farms, as well as the progressive entry into agriculture of small farm holders whose income was previously derived largely off-farm.

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1. OVERVIEW

1.1 A common question for agriculture

A common characteristic of small farms in all countries can be found in their endowment in terms of their factors of production, including the relative abundance of family work compared with other factors such as land, physical capital and salaried work. This common specificity has several different implications for the viability, durability and economic efficiency of small farms, depending on the economic situation of agriculture at the national or regional level (developing countries, economies in transition, developed countries). In developing countries where agriculture is the principal economic activity, and where employment opportunities outside agriculture are limited, the relative efficiency of small farms is linked to the abundance of low-cost family labour (Hazell, 2005). Certain economists further argue that family work is of a higher quality than salaried work, even in the presence of incentives, because of the increased responsibility of family members to their work (Allen and Lueck, 1998). These reasons would explain the persistence of small farms alongside larger agricultural enterprises in which labour is essentially provided by a salaried workforce.

In developed countries, there is no distinction between agricultural structures – small family farms versus large agricultural enterprises with a salaried workforce. The majority of agricultural exploitations are characterized more or less by a family logic. The smallest employ only family labour, while in the largest there exists both family labour and salaried labour, however, the latter seldom occurs. The argument for the better quality of family labour in relation to salaried labour can certainly be invoked in this context but with less force than in the case of developing countries (Hallam *et al.*, 1996). However, it is possible that this is less pronounced in developing countries where small and large enterprises are much more heterogeneous.

The concentration of agricultural production amongst increasingly few enterprises is a characteristic of advanced agriculture and constitutes a further distinctive element between agriculture in developed and developing countries. The production model which assures the efficiency of large enterprises, both familial and semi-salaried, in developed countries rests in part on increasing farm size and more importantly on the continued economic growth of the enterprise, particularly in the contemporary setting. In France, from 2000 to 2007, the average size of “professional” exploitations increased from 64.5 hectares to 78 hectares, with an average increase of 2 hectares per year. This is of particular importance due to the dual monopoly on land in this country. On the one hand, there are no unexploited lands, or reserves of land, to be brought into production. Second, rigid ownership structures limit access to land already in production. As a result, the problem of access to land is imperative to understanding the difficulties faced by small farms.

In developed countries, for any given productive sector, productivity gains rest in part on the growth of the farm either by area or stock numbers per annual work unit (AWU). This goes hand in hand with investment in equipment and materials, a necessary condition for a worker to manage increasing areas or stock numbers. As such, the intensity of capitalistic growth is closely linked to growth in farm size.

Small enterprises are restricted from following this development model as they can rarely compete with larger enterprises to buy or lease lands freed up by farmers who stop farming. Equally, their revenue does not permit further investment in equipment and material at the same rate as larger enterprises. Their level of production in relation to larger enterprises is diminished as a result, and they are progressively and regularly eliminated from the agricultural sector. This being the case, the threshold of size or economic viability below which exploitations struggle to survive continues to rise.

In this context, how do we explain the continued survival of small farms?

1.2 The relative sustainability of small farms in developed countries

Two factors help to explain the continued survival of small farms:

1.2.1 On the one hand, the efficiency and survival of small farms seems to be closely linked to economic strategies which allow them to compensate for their low levels of land and capital by developing the value of work by family members, rather than employing the methods of large scale agricultural production. In the context of developed countries, this covers three strategies in particular:

- Increasing numbers of urban dwellers visiting rural areas provides an opportunity for the diversification of the rural economy through the development of on-farm activities that are complementary to agricultural production, including the production and sale of farm products, crafts and farm tourism (Capt, 1994).
- The increasing demand for differentiated food products in developed countries provides opportunities to develop higher value products by using organic farming techniques and certification as well as producing products under different quality control and labelling frameworks.
- A diversified economic system allows farm families to take up off-farm employment opportunities. This may include part-time non-agricultural, salaried work for the farmer and other family members or salaried work outside agriculture for the spouse or another member of the family. The contribution of an exterior source of revenue allows the household to remain in agriculture and function principally as an agricultural household. However, this has been the subject of debate. Some studies have concluded that pluriactivity has a positive effect in allowing farm households to consolidate their enterprise (Kimhi, 2000), while others have suggested this is simply part of the process of their demise.

All three of these strategies allow small-farm families to benefit from the value of their labour through means other than following the strategy of larger farms which, in France since 2000, has relied very strongly on increasing farm size.

These strategies all offer small farms in developed countries the possibility of accessing both urban consumer populations and employment available within urban areas. We hypothesize that the implementation of these strategies is influenced by the geographic location of the enterprise, in as much as it provides access to consumers or to employment outside of agriculture.

Using the case of France, we propose to evaluate to what extent these “alternative” strategies are specifically employed by small farms and whether they are a factor in the survival or growth of these farms. To achieve this, we address the following points:

- A comparative analysis of small French farms and other agricultural enterprises to establish differences in the Type of Farming of an agricultural holding (TF), the geographic location of enterprises and the implementation of the three strategies outlined above (on-farm diversification, quality agricultural production, pluriactive farming families).
- An analysis of the evolution of small French farms since 2000. We attempt to demonstrate which factors differentiate small farms which survive and develop, from those that regress or disappear.

1.2.2 Alongside the implementation of alternative economic strategies, the survival of small farms in developed countries can also be explained by access to land in regions where the competition for such resources is diminished. This includes mountainous or disadvantaged land, unwanted by large enterprises. In such cases, the persistence of small farms, larger in size than elsewhere but in less productive regions, requires government support. This support includes specific financial assistance from government to compensate for natural production disadvantages and to allow farmers to attain a level of productivity which could not be otherwise achieved. In France, as elsewhere in western Europe, such a public undertaking has been in existence for a number of years, under the auspices of the rural development policies enshrined in the ‘second pillar’ of the Common Agricultural Policy (CAP). It is further justified by the social function of maintaining agricultural activity in those regions which would otherwise risk the loss of a significant part of their population base. The ability of small farms in developed countries to make use of such redistributive policies provides another possible reason for their continued durability and survival.

In our study, the recognition of local specificity allows us to appreciate to what extent small farms are better able to survive in regions of relatively lower demand for available land by larger farms. Logically, this concerns largely those regions where the contribution of small farms to the regional agricultural economy is significant.

2. METHODS AND DATA SOURCES

Our work employs statistical and econometric analysis of individual data from the French Farm Structure Survey. This survey is a sample of 70,000 farms representative of French agriculture derived from the *Renseignement Agricole* (RA, agricultural census) of 2000. In the Farm Structure Survey, these 70,000 have been surveyed every three years since 2000, the most recent having been conducted at the end of 2007. Our analysis covers the period 2000-2007.

The population we study is that of agricultural enterprises. Included within our definition are all enterprises where at least one person declared at the time of the survey their principal occupation (i.e. representing more than half of equivalent full-time work) as that of farmer. In the RA and Farm Structure Survey, the concept of agricultural enterprise is more broad, including all exploitations larger than one hectare of Utilized Agricultural Area (UAA) or 0.2 hectares dedicated to farming. As

a result, this includes those enterprises where the principal sources of revenue are not derived from agriculture. These enterprises comprise principally retired people (agricultural or other) and salaried enterprises – workers for the most part – who complement their salary through a secondary, agricultural activity.

We use the concept of Standard Gross Margin (SGM), a standard statistical measure used in agricultural economics within the European Union, to distinguish between small farms and medium or large enterprises. Traditionally, the total farmed area of an enterprise (expressed as UAA) was used to define the economic size of an enterprise. However, as the output per hectare varies considerably in relation to the type of crop or animal farmed, it is inadequate in these circumstances. The SGM, closer to a measure of added value, represents the balance between the standard value of output and the standard value of certain direct costs associated with production. It is calculated by multiplying the area cropped, or the type of animal farmed, by a standard coefficient calculated by product and region of production (Butault and Delame, 2005) and expressed as European Size Unit (ESU). Taking the example of wheat, in France an ESU would correspond to approximately 1.5 hectares of wheat. As is the case for poverty, any definition of the threshold for small farms is relative and will vary over time (Jegouzo, 1998). For our study period, we have fixed it at 40 ESU which represents, by way of example, 60 hectares of wheat, or 35 milking cows. This definition accounts for just over a third (37%) of agricultural exploitations in France today which occupy 16.5% of total agricultural area, employ 22% of agricultural labour and produce one tenth of the SGM for France (see Table 1).

The threshold of 40 ESU corresponds approximately to the economic dimension beneath which, in France today, the majority of exploitations owned by older farmers are not bequeathed to or inherited by a successor following the retirement of the head of the enterprise: 55% of enterprises where the farmer is more than 50 years old in 2000 had left farming in 2007 (enterprises disappeared or became micro-enterprises operated by retirees, see Table 2). With these processes in mind, for certain parts of our analysis we have divided our sample of small farms into two categories: very small farms of less than 16 ESU, and other small farms between 16 and 40 ESU.

Table 1: Number and relative economic size of different categories of agricultural enterprises in France in 2000 and 2007

| | 2000 | | | | | 2007 | | | | |
|---|-----------------------|---------------------|-------------------------|-------------------------|-------------------------|-----------------------|---------------------|-------------------------|-------------------------|-------------------------|
| | Number of enterprises | Percentage of farms | Percentage of total SGM | Percentage of total AWU | Percentage of total UAA | Number of enterprises | Percentage of farms | Percentage of total SGM | Percentage of total AWU | Percentage of total UAA |
| Very small farms < 16 ESU | 70255 | 16,9% | 2,0% | 9,3% | 4,4% | 44754 | 13,6% | 1,4% | 7,4% | 3,6% |
| Small farms (16-40 ESU) | 115017 | 27,7% | 11,2% | 18,2% | 16,6% | 77430 | 23,5% | 7,9% | 14,4% | 13,0% |
| Medium and large farms (> 40 ESU) | 230008 | 55,4% | 77,6% | 60,1% | 70,3% | 207363 | 62,9% | 80,8% | 65,6% | 74,3% |
| Total farms | 415280 | 100,0% | 90,9% | 87,5% | 91,4% | 329547 | 100,0% | 90,1% | 87,4% | 90,9% |
| Small non-agricultural enterprises (< 16 ESU) | 215682 | | 2,6% | 7,4% | 4,2% | 134008 | | 1,8% | 5,7% | 3,3% |
| Others non agricultural enterprises (>= 16 ESU) | 29707 | | 6,5% | 5,1% | 4,4% | 31252 | | 8,1% | 6,9% | 5,8% |
| Total non agricultural enterprises | 245389 | | 9,1% | 12,5% | 8,6% | 165259 | | 9,9% | 12,6% | 9,1% |
| All enterprises | 660668 | | 100,0% | 100,0% | 100,0% | 494806 | | 100,0% | 100,0% | 100,0% |

Source: Agreste RA 2000 and Farm Structure Survey; analysis INRA-MOISA Montpellier

3. SPECIFICITIES OF SMALL FARMS IN RELATION TO OTHER FARMS

3.1. Regional and sectoral differences in relation to size

Small farms, as we have defined them, differ from other agricultural exploitations in their sectoral and geographical organization (Table 2). Sheep and goat farms (Type of farming (TF)¹ 44) are over-represented, as are beef farms. In contrast, small farms are much less present in the cereal and arable crop sectors (TF 11 and 12, respectively), wine (TF 37 and 38), and recently dairy (TF 41) where three quarters of farms today are 40 ESU or over.

¹ Type of Farming is a European Community concept which represents the production system of a holding, characterised by the relative contribution of different enterprises to the holdings total standard gross margin (SGM).

Table 2: Characteristics of agricultural enterprises in relation to economic size in 2007

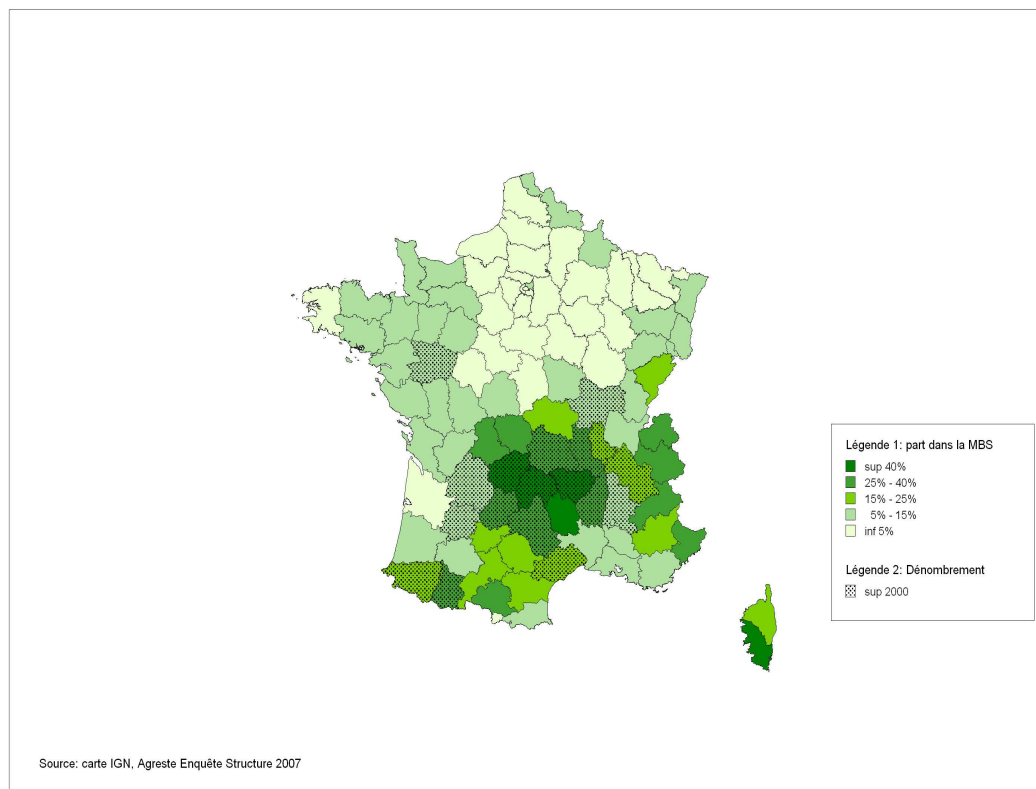
| | very small farms ESU < 16 | small farms ESU16- 40 | medium and large farms ESU >=40 | All |
|-------------------------|---------------------------------|--------------------------|---------------------------------------|--------|
| Diversification | | | | |
| no | 30844 | 58578 | 147657 | 237079 |
| | 13,01 | 24,71 | 62,28 | 100,00 |
| yes | 13910 | 18852 | 59706 | 92469 |
| | 15,04 | 20,39 | 64,57 | 100,00 |
| Quality label | | | | |
| no | 38695 | 55270 | 130425 | 224390 |
| | 17,24 | 24,63 | 58,12 | 100,00 |
| yes | 6059 | 22160 | 76939 | 105157 |
| | 5,76 | 21,07 | 73,17 | 100,00 |
| Organic Agriculture | | | | |
| no | 42792 | 74422 | 203002 | 320216 |
| | 13,36 | 23,24 | 63,40 | 100,00 |
| yes | 1962 | 3008 | 4362 | 9332 |
| | 21,02 | 32,23 | 46,74 | 100,00 |
| Off-farm Work | | | | |
| no | 26852 | 45837 | 102106 | 174795 |
| | 15,36 | 26,22 | 58,41 | 100,00 |
| yes | 17902 | 31593 | 105257 | 154752 |
| | 11,57 | 20,42 | 68,02 | 100,00 |
| Type of Farming (TF) | | | | |
| cereals | 6165 | 12413 | 54815 | 73393 |
| | 8,40 | 16,91 | 74,69 | 100,00 |
| market gardening / arbo | 2795 | 4668 | 10593 | 18056 |
| | 15,48 | 25,85 | 58,67 | 100,00 |
| viticulture | 2257 | 6936 | 28804 | 37996 |
| | 5,94 | 18,25 | 75,81 | 100,00 |
| dairy farming | 2275 | 14829 | 43942 | 61046 |
| | 3,73 | 24,29 | 71,98 | 100,00 |
| beef farming | 11492 | 18311 | 13191 | 42993 |
| | 26,73 | 42,59 | 30,68 | 100,00 |
| others livestock | 10864 | 7394 | 7035 | 25293 |
| | 42,95 | 29,23 | 27,81 | 100,00 |
| mixed forms | 8906 | 12880 | 48984 | 70770 |
| | 12,58 | 18,20 | 69,22 | 100,00 |
| Geographic Location | | | | |
| urban | 4113 | 5568 | 13688 | 23369 |
| | 17,6 | 23,8 | 58,6 | 100,0 |
| peri-urban | 13932 | 21105 | 75259 | 110296 |
| | 12,6 | 19,1 | 68,2 | 100,0 |
| rural | 3181 | 4702 | 11445 | 19328 |
| | 16,5 | 24,3 | 59,2 | 100,0 |
| others | 23528 | 46055 | 106971 | 176554 |
| | 13,3 | 26,1 | 60,6 | 100,0 |
| All | 44754 | 77430 | 207363 | 329547 |
| | 13,58 | 23,50 | 62,92 | 100,00 |

Source: Agreste RA 2000 and Farm Structure Survey; analysis INRA-MOISA Montpellier

Small farms do not differ significantly from other agricultural enterprises in their geographic location, particularly in relation to their proximity to urban areas. They are relatively over-represented in the urban periphery, slightly less present in the rural/urban divide, and slightly more in the remote rural. However, differences in the distribution of exploitations of one size or another are not pronounced at this scale. On the other hand, the geographical distribution by region differs greatly according to the economic size of the enterprise. Their contribution to the regional agricultural economy, represented by the SGM of small enterprises as a percentage of the total

SGM, varies across departments from less than 2% to 50% (see Map 1). Concentrated in around 20 departments largely in the south of the country, their distribution forms an arc extending from the Pyrenees to the Alps and includes all of the Massif Central. This largely covers those mountainous and disadvantaged areas which are the principal beneficiaries of assistance under the ‘second pillar’ of the CAP.

Map 1: Small farms contribution to the regional economy as a percentage of SGM in 2007



3.2 Small farms do not differ significantly in their economic strategies

Just over a quarter of French agricultural enterprises have diversified their on-farm activity (direct-selling of produce, farm tourism...). This situation changed little between 2000 and 2007, increasing from 27% to 28% over this period. As a whole, small farms are no more diversified than other enterprises, and have overall been less likely to head in this direction compared to larger enterprises since 2000. However, for those small farms which have diversified, their activities in this regard constitute a more significant part of their activities than for large enterprises, representing respectively 11.42%, 7.9% and 4.13% of turnover, for enterprises of under 16 ESU, between 16 and 40 ESU and greater than 40 ESU. The smaller the enterprise the less likely they are to produce quality-labelled products (*appellation d'origine*, other geographic indications and quality labels), barely 16% for enterprises of less than 16 ESU compared to more than 40% for enterprises of greater than 40 ESU. On the other hand, small farms are more likely to practice organic agriculture. However, while the number of farmers practicing organic production has increased markedly over the last seven years it remains marginal, concerning barely 10,000, mainly small, enterprises.

This accounts for only 4% of all farms and 2% of farms greater than 40 ESU. There is little difference in the contribution of income from off-farm activities between small and large farms. In just over half of all farms, no off-farm income is generated by primary or secondary level labour.

This initial statistical analysis highlights the specific alternative economic strategies employed by small farms to resist falling victim to the effects of the concentration of landholdings. With the exception of organic farming, which only represents a very small number enterprises, on-farm diversification, the production of quality-labelled products and the contribution of off-farm income are all as common, indeed more so, among medium to large family or semi-salaried enterprises than among small farms. Second, and as outlined above, the geographic organization of small farms does not seem on first analysis to support the hypothesis that proximity to urban areas (and as such to both consumers and employment opportunities) is a favourable condition for small farms. On the other hand, the number of small farms and their contribution to the economy in mountainous and disadvantaged regions suggests that such farms tend to occupy areas where there is less competition for land resources and more land available as the result of farm exit. However, we are unable at this stage of the analysis to evaluate to what extent specific public funds play a role in these trends.

4. THE TRAJECTORIES OF SMALL FARMS (2000-2007)

4.1. The decline in farming and the partial renewal of small farms

Between 2000 and 2007 the number of small farms has decreased by 37%. In comparison, the decline for farms larger than 40 ESU was 9%. For the most part, the decrease in the number of small farms was due to the retirement of farmers. In total, 70% of farm exits involved farmers who were 50 years or older in 2000. More than half of this group had left farming by 2007. Before analyzing the factors influencing the persistence of small farms, it is first necessary to underline the fact that the dominant trajectory of small farms involves their demise following the retirement of the head of the enterprise. Among those that remain around 10% have passed the threshold of 40 ESU, largely those which were close to this threshold in 2000. Despite the high level of farm exit, the decrease in the number of small farms was in part due to the elevation of small farms into this category. On the one hand, in 2000 a small percentage (6%) of medium to large sized enterprises fell under the 40 ESU level. On the other hand, those workers employed principally outside of agriculture while maintaining a small farm became farmers by primary occupation in 2007, in some cases abandoning their off-farm work totally and in other cases maintaining it. In sum, the number of small farms in France declined by a third between 2000 and 2007, but a quarter of the number of small farms were not classified as such in 2000.

Table 3: Evolution of small farm classifications in France: 2000 and 2007

| | | Total Small and very small farms (< 40 ESU) in 2007 | | | |
|---|---|---|-------|---------|-------|
| very small and small farms (< 40 ESU) in 2000 | - very small and small farms in 2007 | 92 958 | 50,2% | 92 958 | 76,1% |
| | - medium and large farms (>= 40 ESU) | 17 158 | 9,3% | | |
| | - non agricultural enterprises (> 16 ESU) | 6 979 | 3,8% | | |
| | - others non agricultural enterprises | 26 632 | 14,4% | | |
| | - disappeared | 41 544 | 22,4% | | |
| Total small and very small farms in 2000 | | 185 271 | | | |
| Others agricultural enterprises becoming small and very small farms in 2007 | - non agricultural in 2000 | | | 14 506 | 11,9% |
| | - medium and large agricultural enterprises in 2000 | | | 14 719 | 12,0% |
| | Total small and very small farms in 2007 | | | 122 183 | |

Source: Agreste RA 2000 and Farm Structure Survey; analysis INRA-MOISA Montpellier

4.2 Regional and sectoral trajectories

The rate of small farm exits is slightly higher closer to urban areas. This decreases as the distance from the urban area increases (-42% in urban centres, -39% in the peri-urban fringe, -35% in the remote rural). However, the principal feature of small farm location relates to their concentration in those areas where they were more prominent in the agricultural economy in 2000 (-29% in the 20 departments where the economic prominence is strongest; -41% in all other departments). As noted above, this includes principally mountainous and agriculturally disadvantaged regions. These geographical specificities can lead one to think that there is no favourable effect of urban proximity on the persistence of small farms, however, their localization in areas where small agriculture is prominent would have a positive effect on these areas (see Table 4). Of course, a simple statistical analysis does not allow us to validate this hypothesis, in so much as the characteristics of small farms (in particular the age of the head of the enterprise) differs from one spatial category to the next. As such, it is necessary to consider all variables (see the econometric analysis below). As it is, the question of small farms seems to be different between those disadvantaged regions where small scale agriculture is dominant and other areas. In the former, a relative stability predominates: there are less farm exits than elsewhere but also few farms exhibiting strong growth and very few new farms being established, either through the professionalisation of pluriactive farmers or a reduction in the size of larger enterprises. Other regions are characterised by a greater turn over of farms, a high incidence of farm exits, a slightly higher number of farms experiencing growth, and above all high numbers of farm entrants, as much due to the professionalisation of pluriactive farmers, as to the decline of larger enterprises.

Table 4: Evolution of small farm classifications for 20 departments where small scale agriculture is pronounced: 2000 and 2007

| | | top 20 'départements**' for contribution of small and very small farms to 'départemental' economy | | | |
|---|---|---|-------|--------|-------|
| very small and small farms (< 40 ESU) in 2000 | - very small and small farms in 2007 | 36697 | 61,8% | 36 697 | 85,5% |
| | - meduim and large farms (>= 40 ESU) | 4595 | 7,7% | | |
| | - non agricultural enterprises (> 16 ESU) | 999 | 1,7% | | |
| | - others non agricultural enterprises | 7400 | 12,5% | | |
| | - disappeared | 9717 | 16,4% | | |
| Total small and very small farms in 2000 | | 59 408 | | | |
| Others agricultural enterprises becoming small and very small farms in 2007 | - non agricultural in 2000 | | | 3399 | 7,9% |
| | - meduim and large agricultural enterprises in 2000 | | | 2802 | 6,5% |
| | Total small and very small farms in 2007 | | | 42 898 | |

* 'département' is a French geographic administrative unit

Source: Agreste RA 2000 and Farm Structure Survey; analysis INRA-MOISA Montpellier

There appears little contrast in the trajectories of small farms across industries. The rate of farm exit is slightly lower in the livestock farming TF (beef cattle, dairy cattle, sheep and goats) than in arable and horticulture TF. Viticulture appears to be the most unstable, with a higher rate of farm exit, but also a large number of farm entrants in the form of professionalized pluriactive farmers. More than a quarter of all small viticultural enterprises in 2007 were owned by farmers whose principal profession was not farming in 2000. Equally, viticulture is the sector with the largest number of small farms experiencing growth.

4.3 The success of small organic farms

Small farms which diversified their activities in 2000 and those that produced under quality labels experienced a comparatively low rate of farm exit. The contrast is even more apparent in relation to organic agriculture, where 4 out of 5 small farms which were practicing organic methods in 2000 were still present in farming as of 2007, while 60% of farmers in the other categories were not.

With regards to the pluriactivity of agricultural households, the rate of small farm failure was not greatly different to pluriactive households of other sizes.

The statistical analysis of farm trajectories, does not demonstrate large differences, from the point of view of farm survival, between small farms engaged in alternative strategies and others, except for organic farms, which only account for a small number of farms in France.

5. FACTORS EXPLAINING THE SURVIVAL AND GROWTH OF SMALL FARMS

The descriptive statistical elements presented above provide an initial explanation for the survival or decline of small farms in France. Further econometric analysis is necessary to provide evidence to explain the trajectories of these farms.

5.1 Methodological comments

5.1.1 Econometric and selection bias

We aim to explain both the survival or disappearance of small farms and, in the case of those farms which survive, their growth and their development. This presents an initial methodological problem of selection bias linked to the fact that growth and development are notions only applicable to surviving enterprises. As a result, the final sample used does not represent the total population. The Heckman method allows us to correct this bias.

Heckman's approach consists of two steps. First, it is necessary to estimate the probability of an enterprise surviving. Second, this probability must be integrated into the model.

Strictly speaking, the two stages may be expressed in the following way:

- The probability of survival can be expressed as follows:

$$Y_1 = 1 \text{ if } Y_1^* > \text{threshold} \\ 0 \text{ else}$$

$$\text{With } Y_1^* = X_1' \beta_1 + \varepsilon_1$$

Y_1^* is a continuous inobservable variable. Only the final step is observed and it reflects a more complex choice.

The evolution of the exploitation must take into account the observed selection bias. Therefore the model must be expressed as :

$$Y_2 = X_2' \beta_2 + \varepsilon_2 \text{ if } Y_1 = 1$$

A correction term of this selection estimated by the first step in the model corrects the estimation of the second step. We don't have the same results as if we had estimated only perennial farms.

5.1.2 Endogenous variables

Survival versus farm exit:

We define surviving farms as all those which had an ESU of less than 40 in 2000 and which still existed as an agricultural enterprise in 2007 (i.e. at least one member of the family declared themselves as a farmer by profession and worked at least half-time on the farm). Farm exits are defined as those farms which have disappeared from the classification since 2000 and within which no person has declared to have devoted more than half of their labour during 2007. The latter have in general diminished considerably in size and are principally micro-enterprises operated by retirees.

Development indicators for agricultural enterprises:

Two indicators of development have been taken into account: the variation in the SGM between 2000 and 2007 and the change in the total number of employees in the enterprise. The rate of variation in SGM is a useful indicator for representing the economic evolution of the enterprise, and this presents an important frame for our study objective. The SGM is calculated using coefficients per standard hectare, estimated by region, for each type of crop or animal. An enterprise which increases its herd or its area, or replaces less intensive production (weak added-value/hectare being in general closely associated with a weak level of labour/hectare) with more financially rewarding methods will see its SGM increase. However, these coefficients do not take into account the impact of certain diversification strategies or production under quality labels (with the exception of viticulture where the SGM coefficients differ greatly according to whether they grow under the *appellation d'origine* or not). As an example, we might use two enterprises in the same region with the same UAA, producing the same crops and with the same SGM but differentiated by the fact one is organic and one is conventional. While they appear the same, one transforms and sells their own products, while the other does not develop any activity to transform or sell direct to the consumer. Under such circumstances, SGM is an insufficient measure for the objective of our study.

Equally, we have also used the total amount of labour, expressed as annual work units (AWU), as an indicator of growth. This is based on declared labour inputs submitted by the head of the enterprise at each survey. We hypothesize that an increase in the amount of labour is an indicator of the durability or growth of the enterprise. This indicator allows us to incorporate, in contrast to the SGM, the eventual impacts of diversification strategies and a shift to quality production. On the other hand, this indicator does not provide a measure of the extent to which off-farm work contribute to the survival of agricultural households.

5.1.3 Explanatory variables.

The model employed is in two parts. It aims to simultaneously understand the determinants of enterprise trajectories and the impact of these trajectories on the evolution of perennial enterprises.

An initial collection of explanatory factors allows us to discover what drives small farms to survive rather than exit agriculture. A second collection of factors provides explanations for the development of enterprises in terms of SGM and labour, among surviving farms.

In the first, values are drawn from the initial survey (Farm Structure Survey 2000). Consistent with our original hypotheses, we test the durability of enterprises under the influence of two collections of variables:

- Localisation variables: i) urban-rural location (urban, peri-urban, rural centre, remote rural); ii) localisation in a department where small farms play an important role in the regional agricultural economy.
- Alternative strategy variable: evidence of diversification activities (production of added-value products, direct-selling, farm tourism); production under

quality labels (appellation d'origine, other quality labels); organic agriculture; off-farm labour of family members.

We use the initial farm size (UAA 2000), the type of farm system (TF 2000) and the age of the head of the enterprise as control variables.

The second collection of explanatory factors includes variables for 2000, 2007 and evolution between 2000 and 2007.

Variables relating to the diversification of activity, to quality production and to the presence of off-farm revenue are evaluated against four criteria. For example, whether an enterprise engaged in diversified activity in 2000 and 2007, whether the enterprise engaged in such activity in neither 2000 nor 2007, whether it developed or abandoned a diversifying activity between 2000 and 2007. Equally, changes in the TF figure are taken into account.

Assessments are carried out for three categories of exploitation, based on a definition of their economic size: i) very small farms (less than 16 ESU in 2000), other small farms (16—40 ESU in 2000), all small farms (less than 40 ESU in 2000).

The methodology is deployed in two stages, and accordingly the results are interpreted in two stages. The first reveals the factors determining whether an enterprise survives and the second the evolutionary factors determining the durability of enterprises.

From a general perspective, each model is subjected to a test of their statistical significance based on probability. We conclude that the criteria employed demonstrates the pertinence of our analysis.

In addition to its relevance to our model, the significance test for the ρ^2 also establishes the coherence of our model. More precisely, it indicates whether the survival of the enterprise is effectively a determining criteria in understanding its development.

We show that the probability of an enterprise surviving or declining influences the evolution of the enterprise. Considering only surviving enterprises over-estimates the growth of AWU. On the other hand, if we consider the information criteria, we note that the model where development is measured by the evolution of labour is more appropriate. As such, we will only comment here on the results of our modelling using the AWU totals.

² ρ is the correlative coefficient for the two models. Its significance clarifies whether the unknown variables in the first model impact on the variables in the second model.

5.2 Results

5.2.1 *Continuing to farm versus farm exit*

Understanding the survival of agricultural enterprises or their exit from farming rests on a dichotomous analysis. The following interpretations are the results of a logit analysis. Odds Ratio interpretations allow us to establish and quantify relationships.

Being located in one of the 20 departments where small farms play a significant role in the agricultural economy is the strongest indicator of the likely survival of small farm enterprises. Proximity to urban centres is also an important variable, but only for very small enterprises, and with a much weaker relationship than the previous variable.

Indicators of diversification and of production under quality labels all have a positive impact on the survival of small farms relative to their size. The relationship is particularly strong for organic farming. As such, diversification of production systems and changing production to quality labelled or organic processes seems to be a factor in the durability of small farms. Those exploitations employing “standard” production methods or where the basis of the enterprise remains the production of commodities seem destined to disappear.

The effect of household pluriactivity appears to be a lot more nuanced. It seems to be related to farm exit among enterprises with between 16 and 40 ESU, but is related to survival among very small enterprises (less than 16 ESU).

If the age of the head of the enterprise and the size of the enterprise confirms, unsurprisingly, the expected results, the role of the sector of the type of farm, represented by TF, is more difficult to interpret.

5.2.2 *Evolution of perennial enterprises*

The rate of growth by UAA and that of SGM are among those factors whose impact on the evolution of farm labour within an enterprise are stable. The higher these rates were between 2000 and 2007, the greater the increase in labour. As such, there exists a relationship between increases in labour and the economic development and form of the enterprise.

We established a direct link between an enterprise’s growth and whether it produced under a quality label or organic production system. A structural pattern seems to exist between these two factors resulting in the greater probability of enterprise survival and growth.

We also established a pattern in relation to diversification. Those exploitations which were not diversified in 2007 (regardless of whether they were diversified or not in 2000) were more likely to see their enterprise grow than those which were diversified in both 2000 and 2007. The relationship between diversification and growth is equally strong for newly diversified enterprises. We discovered that while diversification

leads to initial growth of the enterprise, this later stabilises. It appears that diversification is therefore related to both the growth and durability of the enterprise.

The growth of an enterprise also seems related to stability in the type of farming. As such, enterprises which reoriented their production between 2000 and 2007 are less likely (at least for economically medium-sized enterprises) to grow than those enterprises which did not.

As for the decision to remain in farming, it is more difficult to establish a link between the pluriactivity of an agricultural household and the growth of that enterprise. Very small perennial enterprises which had no family members working off-farm in 2000 experienced an increase in both the economic size of the enterprise and their on-farm labour in 2007. But, we do not find a pattern for any other cohort larger than small farms, where the absence of off-farm work would penalise the growth of the enterprise.

Table 5: Econometric Results – durability of farms and evolution of farm labor

| | | employment indicator | | |
|-------------------------|-------------------------|---------------------------------|--------------------------|---------------------------------------|
| | | very small farms ESU < 16 | small farms ESU16- 40 | medium and large farms ESU >=40 |
| parameters | | | | |
| durability of farms | sau00 | + | + | + |
| | ep00 | 1,01 | 0,96 | 0,99 |
| | divers00 | 1,13 | 1,04 | 1,07 |
| | qlt00 | 1,08 | 1,02 | 1,09 |
| | bio00 | 1,12 | 1,07 | 1,08 |
| | age00 | - | - | - |
| | market gardening / arbo | 1,02 | | 1,02 |
| | viticulture | 0,96 | 1,06 | 1,04 |
| | dairy farming | 1,06 | 0,99 | 1,03 |
| | beef farming | 1,10 | 1,08 | 1,02 |
| | other livestock | 1,05 | 1,05 | 0,96 |
| | mixed forms | 1,04 | 1,02 | |
| | urban | 1,02 | | |
| | peri urban | | 1,01 | |
| | rural | | 1,03 | 1,01 |
| | contrib_20_mbs | 1,07 | 1,11 | 1,07 |
| evolution of farm labor | ESU_rate | + | + | + |
| | UAA_rate | + | + | + |
| | ep (0,0) | + | - | - |
| | ep (0,1) | + | + | + |
| | ep (1,0) | | - | |
| | qlt07 | + | + | + |
| | divers (0,0) | - | - | - |
| | divers (0,1) | + | + | + |
| | divers (1,0) | - | - | - |
| | bio07 | + | + | + |
| | TF_change | | - | - |
| | age07 | - | + | - |
| Rho | | - | - | - |
| Model Fit Summary | | | | |
| AIC | | 130 544 | 217 932 | 381 845 |
| Schwarz Criterion | | 130 845 | 218 250 | 382 179 |

6. DISCUSSION AND CONCLUSION

Our analysis suggests four principal findings:

1. With the exception of organic farming, small farms in France are no more likely than other enterprises to employ “alternative” economic strategies (e.g. diversification of on-farm activity and production under quality labels). However, when employed, these strategies have a positive effect on the durability and growth of small farms.
2. Similarly, there is no significant difference in the levels of pluriactivity between different sized farm households. As such, we are unable to conclude that pluriactivity has a positive effect on the durability or growth of an enterprise.
3. Regarding the effects of location on the durability of small farms, localisation in mountainous or disadvantaged agricultural regions is a much more important factor in the durability of small farms than proximity to urban areas.
4. The trajectories of small farms are above all defined by farm exits, largely the retirement of older farmers at the end of their careers. They are also characterised by a regionally differentiated “turn over” which replenishes the stock of small farms, either through the reclassification of larger enterprises, or the progressive professionalisation of small farm owners whose principal income is off-farm.

In conclusion, this study identifies two questions which require further research:

1. How do we explain the apparently weak tendency of small farms to employ alternative strategies such as diversification and the production of goods under quality labels where these factors contribute to their durability? This requires the ability to identify the obstacles to adopting such strategies. It is possible that these may be related to insufficient levels of human and social capital.
2. To what extent can the relative sustainability of small farms in disadvantaged or mountainous regions be explained by the public support mechanisms for agriculture in operation in these regions? This could be achieved by combining this work with that investigating the political impacts of the implementation of the ‘second pillar’ of the CAP in the European Union.

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