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A labour-based approach to the analysis of structural transformation: application to French agricultural holdings 2000¹

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Abstract

The question of farm size has long been a concern in the agricultural economics literature. The observation of a long-lasting persistence of so-called small farms drew the attention of numerous researchers. The size of farms is often approximated by the farm area in hectares or the added value and gross margin. We propose to investigate the opportunity to use labour (family labour and hired, permanent and seasonal, wage labour) as an entry point for a typology of agricultural holdings, with an application on French data from the Census collected in 2000. Then, we characterize the holdings belonging to the groups defined by the typology based on the type of labour.

JEL: D22, D13, J43, Q12

Keywords: Agricultural labour, farm size, France

Introduction

The question of farm size has long been a concern in the agricultural economics literature (Eastwood and al. 2010 for a review). The observation of a long-lasting persistence of so-called small farms drew the attention of numerous researchers (Johnston and Ruttan, 1994): they questioned the relationship between farm size and productivity (Barrett et al., 2010). The empirical analyses conducted on various developed and developing countries often conclude on an inverse relationship between farm size and performance whereby smaller farms tend to perform better (in terms of productivity) than larger ones (see Mundlack, 2001 for a survey of the cross-farm microeconometrical literature on production scale economies).

In those studies, the size of farms is often approximated by the farm area in hectares (for the French case, Butault and Delame, 2005, for instance). The added value and the gross margin are used as a measure of farm size as well. The latter definition of farm size is, for instance, adopted by the European Union in the framework of the FADN (Farm Accountancy Data Network) where the economic dimension is constructed for each farm in terms of European Size Unit (ESU)².

However, those standards of measurement exhibit drawbacks: first, the farm area is measured whatever the type of crop cultivated and does not allow for an international comparison; second the economic dimension produced in the EU framework describes a potential gross margin computed on the basis of standard figures at the regional level according to the type of cultivation.

We propose to investigate the opportunity to use labour (namely, family labour and hired, permanent and seasonal, wage labour) as an entry point for a typology of agricultural holdings, with an application on French data from the Census collected in 2000.

The aim of this paper is twofold: after a short review of the respective role and weight of family labour and hired wage labour in the agricultural economics literature and in the recent evolution of the agricultural sector (section 1), we will

- (i) propose a typology of French agricultural holdings (based on census 2000 to be further on extended to Census 2010) based on the use of labour. We distinguish thereby family labour, seasonal hired wage labour and permanent hired wage labour (section 2), and.
- (ii) characterize the holdings belonging to the groups defined by the typology (section 3).

² http://ec.europa.eu/agriculture/rica/methodology1_en.cfm under the title “The economic size of farms” for a definition of the European Size Unit (ESU)

1. General question: farm size / family farming

1.1. Agricultural labour in the Agecon literature

A significant part of the economic literature deals with the historical debate on farm size – productivity inverse relationship that aims at exploring why small farms are supposed to be – in most cases - more productive than larger ones. This debate is more or less implicitly linked to the nature of the labour employed for farming. Usually, small farms are defined by the natural assets (hectares, thereafter ha), by the herd size or by the economic size and implicitly authors have examined these units as family farms. There is only few doubts that small farms and family farms categories partially overlap, but not necessarily; but this distinction has been seldom addressed. Nevertheless, we can assume that small farms can be understood as family farms where most of the labour is provided by the family meanwhile larger farms rely more on hired labour. Eastwood and al.(2010) recognize that: *“Although the term family farm is widespread in the literature, we have not been able to find a precise definition”*. Many authors paid a specific attention to the market imperfections approach, searching to explain the “inverse relationship” and developed formalized models to represent the unit of production. Even if size is often taken as a key factor to handle the diversity of farming units, a considerable literature developed approaches and models that consider labour as a key differentiating factor. We will limit our review to the most relevant for our purpose.

Eswaran and Kotwal (1986) model - assuming perfect markets in land and labor and heterogeneous assets distribution among households – leads to classify four categories based on assets or capital endowments, ranging from the labourer-cultivators to large capitalists (table 1). The distinction among the four categories refers to the capacity of each to be employed on one’s farm to the capacity to become employer of increasing number of external workers, thus specializing progressively in labour supervision. They focus on two specific skills that appear to be crucial in agriculture: the ability to supervise labour and the managerial ability for decision making in a risk prone environment regarding biological processes and unpredictable natural events on one side and market uncertainty. Regarding hired labour and tenancy contracts, they underline the need to consider labour input as the quantity of labour hired and the supervision effort to reduce shirking.

Table 1: Types of models of agricultural production units

Assets / Types	Labourer-Cultivator	Self-cultivator	Small capitalist	Large capitalist
Land	Work on some owned or rented land	More assets, more land and work exclusively on this land (owned or rented)	Employ more land and assets	Employ more land and assets
Labor	Work for others	Work only for themselves	Work on farm and supervise hired labor	Specialize in supervision of hired labor

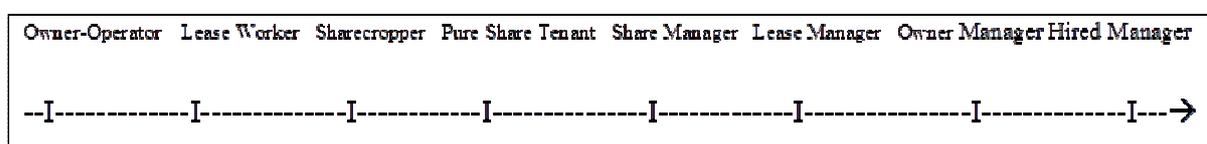
Based on Eswaran and Kotwal (1986)

Allen and Lueck (1998) combine the now classical conception of the firm developed by Coase (1937) with technical insight deriving from the specificity of the biological processes in farming. Their definition of the farm is therefore close to a firm in Coase’s perspective (page 347): *“A “pure” family farm is the simplest case, where a single farmer owns the output and controls all the*

farm assets, including all labor assets". This definition is directly opposed to "factory-style corporate agriculture" defined as a production unit "where many people own the farm and labor is provided by large groups of specialized fixed wage labor". In between they identify an intermediate form "in which two or three owners share output and capital and each owner provides labor". They call it "Partnerships". In this definition of family farms, they consider the household (husband and wife) as a single agent and ignore intra-family shirking as well as the distinction between farm ownership and renting. The specific performance of family farms compared to "factory-style corporate agriculture" lies in the capacity of family labour to closely monitor and / or react to random events (combination of climate shocks and biological reactions of plants and /or animals) and to adapt to an uneven distribution of labour needs along with the plant or animal biological cycles around the year.

Roumasset (1995) remains in the tracks of Coase (1937) and others when he defines the firm: "as an organization of economic agents bound together by a common governance structure for the profitable production and sale of goods and/or services". But when it comes to specify for agriculture, he focuses on the "constitutional" and governance structure that directly impact on production decisions and implementation and especially the control of shirking (Figure 1). Especially in agriculture "agricultural firms can be distinguished according to the governance structure controlling the shirking of labor and the abuse of land and capital assets". This leads the author to present a typology of the different types of firm based on the degree of labor specialization ranging from the "Owner-Operator" (ie family farmer without distinction between decision-making and implementation) up to the "Hired-Manager" (ie. enterprise with a profound division of labor from the unskilled worker up to the top manager, with a strategic decision making in the hands of the shareholders' representatives).

Figure 1: A taxonomy of agricultural firms according to specialization in labor, decision making and control.



Source: Roumasset (1995), page 168

1.2. Family labor and hired labor to define family farming

There is a wide literature on peasant and family farming which questions disciplinary approaches, family being a social institution and agriculture being treated as an economic activity. Complexity increases when considering the dual nature of the production that can simultaneously feed the family or be sold on markets. Economy of farming only partially fits with the basics of standard economics both because the production function is not exclusively driven by market signals and the decision making also includes social issues.

On peasant farming, the abundant literature combines a wide number of variables to define a peasant. Some refer to the balance between self-provision and market orientation (Marx, 1850; Thorner, 1962; de Janvry and Deere, 1979) others to the inclusion in a local peasant community (Mendras, 1976) others to their limited size compared to more commercially oriented agriculture (Otsuka, 1998) and many recognize as Wolf (1966) the dominated nature of peasant economies. But all scholars that defined peasant farming share one common feature which is the reliance on family labor. This reliance is neither exclusive nor limited to agriculture (pluriactivity is part of peasant farming – Chayanov 1990). So peasant farming is based on family labor.

On family farming, we follow the vision developed by scholars as Chayanov (1990), Lamarche (1990), Hill (1993), Djurfeldt (1993) and recently by Brookfield (2007). “*Family management, coupled with substantial work input, seems adequately to define family farms not only in Europe, but elsewhere. This mode of management and production is found in all continents*” (Brookfield, 2008). Once defined as such, it is impossible with the available data to precisely define which holding is run by a family. The legal status is specific to each context and is often related to fiscal or organizational choices within the family. Size is also not robust since large scale farms can be run by families. Bélières and al. (2014) propose to consider both the organic linkage between the family patrimony and the economic assets of the farm (as a productive unit) and the exclusion of permanent hired labour. The first criteria is not accessible in data bases or surveys, but limiting family farms to those relying exclusively on family labour is possible with censuses or surveys in which labour use is properly captured. Then, on the opposite, it is possible to strictly define the corporate type of farming when all labour is hired and at the same time there is no link between family patrimony and the economic assets.

Figure 2: Description of farms

	Entrepreneurial Agricultures		Family Agricultures
	<i>Entreprise farm</i>	<i>Family business farm</i>	<i>Family farm</i>
Labor	Exclusively hired labor	Combining family and hired labor	Family labor no permanent hired labor

Source: Bélières et al. (2013) ; FAO (2012)

We suggest here to rely of these definitions³ to analyse the 2000 Census data for France: this census is reporting precise data on the labour used with respect to: family or hired wage labour, seasonal or permanent labour, part-time or full-time active on the farm.

1.2. Proposal

We consider four categories:

(i) **Family farms** are farms working essentially with family labour and occasionally seasonal hired wage labour. Furthermore, family farms are characterized by a structural relationship between the productive activities and the family structure: therefore, the management type conforms to a familial approach. In order to capture the heterogeneity of this category, we furthermore distinguish between:

(a) Family farms type 1 with a limited investment in labour in absolute value (less than 0.5 Annual Work Unit⁴, thereafter AWU).

(b) Family farms type 2 with a significant implication of family labour.

(ii) **Family business** farms encompasses holdings that, beyond the use of family labour, hire at least one permanent worker. Those holdings rely then structurally on wage labour.

³ We should however note the limits of the measurement. The implication of family workers is divided into 5 categories according to the number of hours worked on-farm relatively to full-time work: the precise full-time equivalent is therefore not available.

⁴ AWU (annual work unit): corresponds to the work performed by one person who is occupied on an agricultural holding on a full-time basis

(iii) **Corporate (or entrepreneurial) farms** consists in the farms with exclusively hired labour and a clear separation between ownership of productive assets and labour.

2. Building the typology

We draw on the framework presented in section 1.2.: we propose to French data from the Agricultural Census 2000.

2.1. Definition of an agricultural holding and of the variables related to labour

(i) The French Agricultural Census 2000 was used on the basis of individual data, excluding Overseas departments (the test will be easily translated to the French Census 2010). The data provide a large range of characteristics of agricultural holdings. In the Census, an agricultural holding is defined as an independent entity:

- that operates more than 1 hectare of land
- or more than 0.2 hectare of specialized production (vineyard, for instance)
- or a sufficient activity in agricultural production measured in number of livestock or production volume.

The data base entails 663,807 holdings. When removing suspicious data reporting a Standard Gross Margin (thereafter SGM) equal to zero, we end up with 663,041 observations.

(ii) The data set reports for each holding:

- the amount of family labour (permanent and seasonal separately) in Annual Work Unit (thereafter AWU)
- the amount of wage labour (permanent and seasonal separately) in AWU
- the amount of family wage labour in AWU

2.2. The methodology to classify

In the next paragraph, we explain how we categorized holdings according to labor.

2.2.1. Corporate farms

Corporate farms were empirically defined as farms that report more than 95% of wage (familial and non-familial) labour compared to total labour. The threshold of 95% was chosen because misreporting of some data was discovered; in particular some of the holdings are reporting no familial labour whereas the total amount of labour is higher than the amount wage labour.

Group 4 (corporate agriculture): In total, 8,112 holdings are classified as corporate farms (1.2% of the total sample)

The confidence interval of 95% adds 1,772 holdings to those who report zero family labour⁵.

⁵ Among those 1,772 holdings, 1,423 report more than 99% of wage labour.

2.2.2. Family business farms

The holdings that reported more than one AWU of hired permanent wage labour are classified as family business farms.

- 64,879 holdings with at one permanent wage worker

We decided to add to those holdings a part of the remaining subsample. In fact, some of the holdings report a very high proportion of seasonal wage labour and according to our knowledge, those wage workers are substitutes to permanent workers: as the cost of seasonal workers is less than that of permanent workers, farmers get round the law and use strategically seasonal contracts (Darpeix and al., 2013). We decided thus to split the remaining sample into two samples in order to assess the fact that some farms are actually employing a large amount of hired wage labour relatively to the total amount of labour used on-farm. We used the k-mean method to find the threshold (81.5% of family labour in total labour). The results turned out to be robust when using k-median instead of k-mean.

- 49,117 holdings were thus added to the group of business farms

***Group 3 (Family business farms): In total, 113,996 holdings are classified as Family business farms
(17.2% of the total sample)***

2.2.3. Family farms

The remaining farms of the sample consist of holdings that use family labour and potentially seasonal wage labour (for a small proportion of total labour, according to the clustering procedure made to reallocate holdings across family business farms and family farms). A large part of those holdings (84%) report only family labour.

In order to discriminate further holdings belonging to this large and heterogeneous category, we break it down into two categories according to the amount of labour engaged in farming:

- (i) If the number of AWU is higher than 0.5, we consider holdings as significantly engaged in agricultural production (family farms type 2).

***Group 2 (Family farms type 2): In total, 360,242 holdings are classified as family farms type 2
(54.3% of the total sample)***

- (ii) If the number of AWU is less than 0.5, we consider holdings as engaged in agricultural production as a minor activity (family farms type 1).

***Group 1 (Family farms type 1): In total, 180,691 holdings are classified as family farms type 1
(27.2% of the total sample)***

See graph 1 for a summary of the results.

Graph 1. The classification of holdings

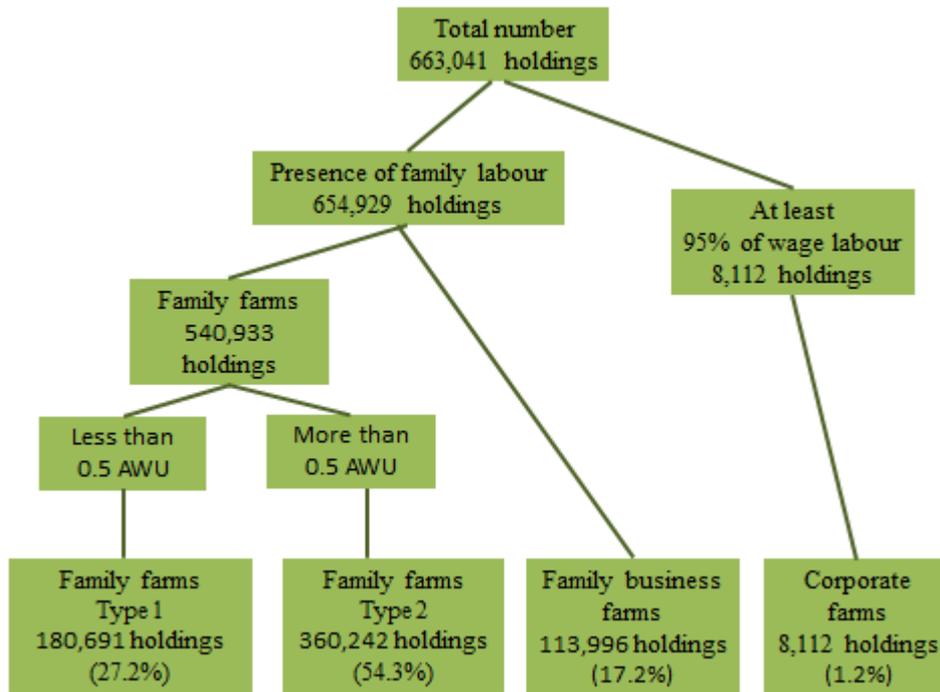


Table 2 gives further insights into the distribution of the holdings across the categories and the contribution of the categories to total labor and total SGM.

Table 2. Distribution of the holdings and weight of the categories

	Number (%)	AWU distribution total	Familial AWU distribution total	Wage Labour AWU distribution total	SGM in total
Family farms (1)	180,691 (27.2%)	4.2%	6.2%	0.0%	2.8%
Family farms (2)	360,242 (54.3%)	55.9%	73.5%	7,5%	53.7%
Patronal farms	113,996 (17.2%)	32.3%	20.2%	64.8%	37.7%
Corporate farms	8,112 (1.2%)	7.6%	0.1%	27.7%	5.8%

- Family farms as defined largely predominate in the sample (representing 81,6% of the total number) and patronal farms reach 17,2% of the total sample: this makes an overwhelming share of farms run by the family and leaves only 1,2% to corporate farming. Interesting is the weight of patronal farms. This latter figure is far from negligible in the French agricultural landscape. It represents a large part of the AWU engaged on farms (20.2%) and is even more represented in the case of wage labour

(with 64.8% of the AWU registered in patronal farms). Furthermore, patronal farms accounts for more than 37.7% of the total SGM, whereas they represent only 17.2% of the number of farms.

- In family farms (type 1 and 2), the share of family labour relatively to total labour is nearly 100% (97.4% on average) which is explained by our methodological choice to select the category of family farms: in fact, they are considered in this study as farms with no permanent wage workers or with an amount of seasonal wage labour statistically low enough to consider them as family farms.
- The distribution of family farms type 1 is noticeably different from that of family type 2, in terms of AWU and SGM: for family farms type 1, the weight of their contribution to AWU in the total is 6.2% whereas they weight nearly one third of the total population of farms in number (27.2%). Furthermore, they contribute to less than 3% of the value added (2.8%).
- Family farms type 2 turn out to gain in homogeneity when splitting them from type 1. This latter decision draws however some questions on the difference between family farms type 2 and patronal farms: in terms of contribution, in terms of AWU or value adding, namely SGM, those two farm types are rather similar. However, business farms rely much more on hired waged labour. We will investigate this issue further in this paper.

3. Characterization of the four categories

Here, we describe the categories of holdings (groups 1, 2, 3 and 4 in the previous section) that emerged from the classification. We draw first on descriptive statistics from a set of variables and end up with a range of relevant variables to analyse the categories. Second, we run an econometric regression to characterize the categories relatively to the variables selected in the first step.

3.1. Selection of the variables and descriptive statistics

In order to study the differences between the categories, we propose to describe: the size in terms of Annual Worker Unit (AWU) of the holdings belonging to each of the four categories; their Utilized Agricultural Area (UAA), their economic dimension (Standard Gross Margin - SGM); their technical orientation (OTEX); their legal status; and their strategies in terms of on-farm diversification of their activities.

3.1.1. Size (AWU, UAA, SGM)

Table 3 shows more precise characteristics of the holdings according to the category they belong to. The UAA (Total land cultivated by the holding) and the economic dimension (SGM in thousand euros) are indicators commonly used to measure farm size (Butault and Delame, 2005, for instance; see the EU classification too). The AWU (Total amount of labour used for productive purposes, full-time equivalent) is added to those indicators and the degree of labour intensity of the production (AWU per hectare). Standardized standard errors are given in brackets.

We expect to find a relationship between the size of the farm in UAA and SGM and the category to which the farm belongs to. In fact, the category “Family farms type 1 and 2” is composed of holdings that almost totally rely on the use of family labour. However, family labour is limited in size, and as the farm gets bigger, the probability of hiring labor increases (Findeis and Lass, 1994). The development of seasonal agricultural labour (Findeis, 2002) may counter-balance

this relationship, but the category “family farms” does not entail the farms with a very large proportion of seasonal wage labour.

Table 3. Descriptive statistics

	UAA (ha) *	SGM (1000 €)*	AWU (total)*	AWU per ha
Family farms (1)	5.9 (191%)	4.9 (196%)	0.2 (53%)	0.25 (485%)
Family farms (2)	52.5 (100%)	51.7 (92%)	1.4 (47%)	0.22 (1160%)
Family business	64.7 (131%)	114.36 (109%)	2.7 (97%)	0.42 (732%)
Corporate agriculture	62.1 (125%)	246.91 (253%)	8.9 (201%)	2.04 (512%)
Total sample	42 (177%)	102.17 (195%)	1.4 (180%)	0.28 (922%)

* In parentheses standardized standard deviation (percentage of variation around the mean)

The statistics (Table 3) show that family farms are significantly smaller in terms of labour use and total land area than both family business and corporate farms. However, family business and corporate farms do not differ that much in terms of UAA, but the number of AWU is far higher for corporate agriculture leading to a result in terms of labour intensity in favour of corporate holdings. However, we can note a very high dispersion (standardized standard errors) in the latter case: in fact the category of corporate holdings is highly heterogeneous: it entails large commercial companies as well as small owners that produce on a recreational basis without being directly involved in the production process (as in vineyard, in particular).

The amount of family labour is around 25% more important for patronal farms (1,4 vs 1,1) than for family farms. It is worth mentioning that these patronal farms employ more family labour and “produce” more than their equivalent in jobs through wage labour recruitment. Family farms with less than 1 familial AWU represent 44.2% of the sample (among them 42% report that the household head is retired); this proportion is less for patronal farms but not negligible as 32,1% of the farms have less than 1 familial AWU (among them 22% with a retired household head). This proportion drops when considering the threshold of 0.5 AWU (32% and 17.9% for family and patronal farms respectively).

Last, we see that corporate farms are much more labour intensive than business and family farms. The distribution of AWU per ha is highly asymmetrical with a median at 0.04. We will come back on this observation in the following section dealing with the technical orientation of the farms.

3.1.2 Technical orientation (OTEX)

It has been shown that production types that are highly labour-intensive tend to be those with hired labour – seasonal or permanent (Benjamin et al., 1996; Benjamin and Kimhi, 2006). And hired labour is the discriminant variable of the typology. The technical and economic orientation (OTEX) is a tool that classifies the holdings into different types of production, specialized or mixed. We use the two digit classification in order to keep a reasonable number of observations per production types and furthermore aggregated some of the OTEX into larger homogenous categories for the sake of readability. Table 4a presents the distribution of the entire sample over the categories and table 4b disaggregate the results according to the groups “family farms type 1”, “family farms type 2”, “family business farms” and “corporate farms”:

Table 4a. Distribution by OTEX, total

Technical orientation (code)	Total
Cereals and crops (13+14+81)	179916 (27%)
Horticulture (28+29)	15784 (2%)
Vineyards (37+38)	92304 (14%)
Fruits and permanent crops (39)	25305 (4%)
Dairy and mixed dairy (41+43)	87176 (13%)
Livestock (42)	77556 (12%)
Sheep and goats (44)	82456 (12%)
Poultry (50)	13104 (2%)
Polyculture (60+71+72)	64203 (9%)
Other mixed farms (82)	25237 (4%)
Total	663041 (100%)

Table 4b. Distribution of the typology by OTEX

Technical orientation (code): %	Family farms (1)	Family farms (2)	Family business	Corporate agriculture
Cereals and crops (13+14+81): 100%	37048 (21%) (21%)	108868 (61%) (30%)	32526 (18%) (29%)	1474 (1%) (18%)
Horticulture (28+29): 100%	109 (1%) (0%)	7075 (45%) (2%)	6532 (41%) (6%)	1087 (7%) (13%)
Vineyards (37+38): 100%	28996 (31%) (16%)	27191 (29%) (8%)	33732 (37%) (30%)	2385 (3%) (29%)
Fruits and permanent crops (39): 100%	9096 (36%) (5%)	6759 (27%) (2%)	8623 (34%) (8%)	827 (3%) (10%)
Dairy and mixed dairy (41+43): 100%	2386 (3%) (1%)	76236 (87%) (21%)	8341 (10%) (7%)	213 (0%) (3%)
Livestock (42): 100%	20205 (26%) (11%)	52027 (67%) (14%)	4972 (6%) (4%)	352 (0%) (4%)
Sheep and goats (44): 100%	42893 (52%) (24%)	33416 (41%) (9%)	5541 (7%) (5%)	606 (1%) (7%)
Poultry and pigs (50): 100%	1102 (8%) (1%)	8098 (62%) (2%)	3311 (25%) (3%)	593 (5%) (7%)
Polyculture - livestock (60+71+72): 100%	23931 (37%) (13%)	31742 (49%) (9%)	8086 (13%) (7%)	444 (1%) (5%)
Other mixed farms (82): 100%	13944 (55%) (8%)	8830 (35%) (0%)	2332 (9%) (2%)	131 (1%) (2%)
Total: 100%	180691 (27%) (100%)	360242 (54%) (100%)	113996 (17%) (100%)	8112 (1%) (100%)

Compared to the overall sample (table 4a)

- we can see (table 4b) that especially vineyards, horticulture and permanent crops, “poultry and pigs” are the sectors which are overrepresented in the categories of patronal and corporate farms, and to a lower extent “cereals and crops”;
- the distribution of the column “family farms type 2” is not extremely different from that of the total sample, in fact family farms type 2 represent more than 50% of the sample and thus are driving the distribution;
- however, looking at the row distribution (per aggregated OTEX category), we see that family farms type 2 accounts for 87% of the category “dairy and mixed dairy” and seems to be the major insertion of this economic activity.
- as what concerns family farms type 1, the categories “goats and sheep” and polyculture are the most present; whereas those farms are very marginally engaged in horticulture. These results will be further investigated in the next section.

3.1.3. Legal status

We identified the variable related to the legal status of farms as being relevant for interpreting the type management which is at work on the French holdings. We built therefore on previous studies on the topic (Bathélémy and Dussol, 2002 among others) that show that the legal status is related to the size of the holding.

The French national Agricultural Census considers 8 categories of legal status. For the purpose of this paper, we had to reconsider the original categories into larger groups. The Census questionnaire for 2000 distinguishes between “individual farmers” and 7 other types of legal status. What seems to be relevant in our case is an aggregate of different meaningful status into three categories:

- (i) Individual farm, that represents farms that are run by a single manager who is considered as a juridical person.
- (ii) Agricultural Company status: this category encompasses “collective” types of farm management (such as GAEC⁶) and company status which are specific to the agricultural sector (EARL, for instance). The term “collective” is used in the sense that their management brings together at least two individuals.
- (iii) Generic company status, i.e. Limited liability companies or public liability companies.

Looking at the legal status helps to check if corporate farms are more likely to operate under a standard company status (non-specific to the agricultural sector); and to look into family and family business farms that can operate under status specific to agriculture as well. We had a look at two variables that were regarded as the most relevant proxies for the type of management (decision making) at the holding level

⁶ GAEC for Groupement Agricole d’Exploitation en Commun, legal entities that gather individual persons into collective units dedicated to agricultural production.

Table 5. Distribution of the typology by legal status

	Individual farm	Agricultural company status	Generic company status	Total
Family farms (1)	178025 (99%) (33.2%)	1431 (0.5%) (1.2%)	1235 (0.5%) (10.8%)	180,691 (100%) (27.2%)
Family farms (2)	289359 (80%) (53.9%)	67680 (19%) (59.1%)	3203 (1%) (28%)	360,242 (100%) (54.3%)
Family business farms	68,843 (60%) (12.8%)	42,215 (37%) (36.8%)	2,938 (3%) (25.7%)	113,996 (100%) (17.2%)
Corporate farms	759 (9%) (0.1%)	3,307 (41%) (2.9%)	4,046 (50%) (35.5%)	8,112 (100%) (1.2%)
Total sample	536,986 (81%) (100%)	114,633 (17%) (100%)	11,412 (2%) (100%)	663,031 (100%) (100%)

Table 5 shows the repartition of the farms according to the categories related to labour and legal status. The major part of the corporate farms are registered as generic companies (50%), whereas only a small proportion of family and family business farms are generic companies (respectively 0,5%, 1% and 3%). Nevertheless, we see that a large proportion of family business farms decided to opt for a status specific to the agricultural sector (37%). In that respect, family farms type 2 relate more to business farms (with 19% of them under agriculture specific status type) than family farms type 1 do (with only 0.5% of the total having chosen this status). Individual farms are overwhelmingly found among family farms type 1 (99% of them being concerned, and still 80% for type 2); however, family business farms opt rather frequently for this status (60% of them).

3.1.4. On-farm on agricultural diversification of activities

We investigate in this section the linkage between on-farm diversification strategies and the type of farm: on the one hand, family farms may be more diversified (as an option for survival) than business or corporate farms (Aubert and Perrier-Cornet, 2009); on the other hand, business and corporate farms may have an easier access to the capital needed to diversify.

We decided to aggregate some of the variables in order to build the typology (table 6): diversified entails:

- (i) direct sales to consumers, or –
- (ii) on-farm processing of the product or
- (ii) having an activity in relationship with tourism.

Table 6 Distribution of the typology according to on-farm non-agricultural diversification⁷

	Not diversified	Diversified	Total
Family farms (1)	157,562 (87.2%) (30%)	23,129 (12.8%) (18%)	180,691 (100%) (27.2%)
Family farms (2)	293,961 (81.6%) (55%)	66,281 (18.4%) (50%)	360,242 (100%) (54.3%)
Family business farms	75,578 (66.3%) (14%)	38,418 (33.7%) (29%)	113,996 (100%) (17.2%)
Corporate farms	4,566 (56.3%) (1%)	3,546 (43.7%) (3%)	8,112 (100%) (1.2%)
Total sample	531,667 (80.2%) (100%)	131,374 (19.8%) (100%)	663,031 (100%) (100%)

We can note the presence of a non-negligible part of family business farms in the category of the diversified farms (respectively 12.8% and 18.4% for family farms type 1 and 2). Almost 50% of them are concentrated in wine production due to processing component of the activity. And 13% of them are engaged in mixed culture due to the activity of direct sales (present for 21% of the sub-sample).

However, the largest part of the diversified farms is found in family business farms and corporate farms. And the results show that the farms which are the most probably diversified are corporate farms.

3.2. Description of the categories

In order to describe the joint influence of the variables presented in the preceding section on the probability to belong to a specific category, we use a multinomial logit regression with the categories as endogenous variable and the variables presented in the previous section as exogenous variables (table 7). We performed a Hausman test for the assumption of independence of irrelevant alternatives. We accept the independence but only weakly (10%) in the case of corporate agriculture.

The relative risk ratios (RRR) are reported in table 7 where the category of “family farms type 2” is chosen as the reference category. As we consider a logistic regression, the odd of success is $\frac{prob(y=1|x)}{prob(y=0|x)} = e^{\beta x} = \alpha$. If the coefficient affected to one variable x is more than 1 for a category j , then the variable has a positive effect on the probability to belong to j relatively to k (the reference category). Moreover the odds of belonging to the category j is α times as large as belonging to category k .

⁷ Accommodation ; cottages ; restoration ; crafts ; direct sales ; transformation, etc

Table 7. Description of the characteristics

Probability to belong to the categories (multinomial logit)

	Family farms I	Family farms II	Family business	Corporate agriculture
Cereals and crops (13+14+81)	6,63***	Ref	2,00***	3,24***
Horticulture (28+29)	1,30***		8,12***	21,42***
Vineyards (37+38)	5,71***		9,82***	19,33***
Fruits and permanent crops (39)	5,94***		11,40***	23,40***
Dairy and mixed dairy (41+43)	Ref		Ref	Ref
Livestock (42)	2,40***		1,39***	4,22***
Sheep and goats (44)	4,18***		2,45***	9,27***
Poultry and pigs (50)	1,17***		2,83***	8,39***
Polyculture - livestock (60+71+72)	3,52***		2,07***	3,22***
Other mixed farms (82)	8,10***		2,16***	3,74***
Diversified holding (1 if yes) (a)	0,44***		1,35***	1,43***
Individual farm	Ref		Ref	Ref
Company status specific to agriculture (b)	0,91***		1,45***	10,06***
General company status (c)	0,70***		3,23***	335,44***
UUA (ha)	0,96***		1,00***	1,00***
Economic dimension (1000 €)	0,91***		1,01***	1,01***
Age	1,01***		1,01***	1,01***
Constant	0,79***		0,03***	0,00***
N	663 041			
Pseudo R2	0,40			
LR chi2(22)	552861,4		Prob > chi2	0.0000
*** p<0.01, ** p<0.05, * p<0.1				

(a) A holding is diversified if (i) direct sales to consumers are reported OR (ii) the production is processed on-farm; OR (ii) an activity related to tourism is developed on-farm.

(b) Gaec, EARL, SCEA ...

(c) SA SARL ...

The results (table 7) show that:

First, the importance of the economic and technical orientations is essential: in reference to the category “Dairy and mixed dairy”, family farms type 2 are less represented in the major part of other the categories. In particular, the coefficients related to being engaged in horticulture, vineyards and permanent crops are far higher than others, suggesting that those categories are mostly occupied by business and corporate farms.. Polyculture is highly represented in small farms (family farms type 1). The production of sheeps and goats too.

Second, farms that diversify towards on-farm non-agricultural production are more likely to belong to the categories of family business and corporate farms than to those of family farming (RR=1.35 and 1.43 respectively). However the differential is not high relatively to other coefficients, especially concerning the OTEX. This seems to be due to two trends: first, family business and corporate farms are more likely to access the working capital needed to develop on-farm non-agricultural activities (especially direct sales and processing); however, on-farm diversification of activities may be an option for the survival of small family farms (Aubert and Perrier-Cornet, 2009). Nonetheless, diversification of activities increases the need for labour (Capt and Dussol, 2004).

Third, we see that the legal status widely differ according to the farm category. Commercial companies with a generic legal status (LLC, PLC ...) are more likely to be observed in the categories of family business or corporate farms than in family farms type 2. However, table 7 shows that companies with a status specific to agriculture are not highly different in the category of family business farms than in family farms 2 (RRR=1.45). This may be due to the fact that status specific to agriculture entail corporate organizations (GAEC) as a company type that encompass co-workers, every though they remain family farms. The same direction is observed for family farms type 1 that are, with that respect, not much different from those from type 2 (RRR=0.91)

Fourth, the dimension of the farm has not a large influence on the category the farm belongs to. We distinguished between physical (AWU in hectares) and economic (SGM) dimensions. Neither one or the other turns out to influence the chance to belong to any category (family farms 2 being the reference), when controlling for the technical and economic orientation.

Last, the age of the family head does not seem to have any influence on the category to which farms belong: in particular, we may have thought that retired family heads are running the small family farms type 1. When controlling for other variables, such a result does not come out.

4. Conclusions

We proposed a typology of French agricultural holdings based on agricultural labour. We distinguished thereby between family labour and permanent and seasonal hired wage labour in order to split the sample into four categories: family holdings with limited labour implication, family holdings with a larger labour implication, family business farms and corporate farms.

We then characterized the four categories. We find that (i) the technical and economic orientation is essential to understand the insertion of the farm in each of the category. In particular, seasonal labour intensive sectors (vineyards, horticulture) are more probably found in business and corporate farms. Year-long labour-intensive sectors (“dairy”, “sheep and goats”) are found in family types of farms; (ii) the on-farm diversification towards non-agricultural activities is mostly observed in family business and corporate farms; (iii) farm size – physical (ha) and economic (SGM)– does not seem to be a determinant of belonging to any of the categories we propose, when controlling for others factors.

Beyond the results commonly found in the empirical literature, this analysis based on a proposal for a typology opens a range of questions: First, the heterogeneity of the groups we

propose may be further investigated: even though farms fall in the same category, their characteristics and the strategies of their owners or operators are different; second, some of the results on the technical and economic orientation (OTEX) are not always intuitive, like that on the category “poultry and pigs” and that of horticulture in contrast to vineyards and “permanent fruit crops”; third, the on-farm diversification of activities shows that the influence in terms of labour demand is a key point. Then we were limited by the nature of Census data on diversification in agriculture, while the household dimension with labour outside agriculture might be key to understand the rationale of the different categories.

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