Will Family Farms Continue to Dominate Agricultural Production in the Future?: Implications for Data Collection

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Abstract

Agricultural production is dominated by family farms, although other types of farming exist. In some sectors of agriculture (e.g. pigs and poultry, horticulture, wine) the increase in scale leads to a concentration of the production on very large holdings. At the same time we see farmers exploring different strategies like diversification. We also observe a trend of more part-time farming in which resources are shifted to other sectors.

This paper analyses these trends for the USA and the EU, with special attention to the Netherlands and Italy concerning multi-functional farming. Theory, trends and recent data suggest that a bi-polar structure is emerging, with more complicated governance structures. US farms are on average smaller in economic terms than European ones. The frequency of multifunctional strategies seems to be more important in the Netherlands and Italy than in the US (with the exception of pluri-activity). However data on structure and farm strategies concerning multifunctional practices is underdeveloped and hard to analyse. We suggest to improve data collection and international standardization.

1. Introduction

The family farm is a corner stone of the agricultural production system in most parts of the world. Even to the extend that some agricultural policies explicitly refer to this form of organization. Other forms exist: in situations were markets do not very well function, peasant farms with an orientation on subsistence farming dominate. On the other side of the spectrum there are large industrial farms in which ownership and management are separated. In several agricultural sectors like fruits, vegetables, pigs and poultry, farms are fast getting larger, due to changes in technology and markets. This raises the question if the family farm will continue to dominate agricultural production in the future.

To answer this question section 2 discusses the theory that explains the existence of the family farm. Section 3 discusses the potential strategies of farm households. Extra attention is paid to the definitions of diversification, pluri-activity and multi-functionality, to reduce confusion in the use of these terms. Section 4 describes the data available for the USA and EU for our empirical analysis. To compare the different data sets we had to recalculate some of the data into common measure for farm size.

Section 5 provides our findings on the size distribution and the related question if a bi-polar farm structure is in the making, including some results on the governing structure of the farms. In

section 6 we report on the choices that farm households make in their strategies. Section 7 discusses the implication of these findings for data collection¹.

2. The specific and changing nature of the family farm

Farming is organised in small entities, where traditionally the farmer and the household members of his family are providing the labour and capital (including land) for the business. Around the kitchen table of the farm where they live, they manage the farm and take the risks (Gasson and Errington, 1993, de Haan, 1993). Their reward for this is a "family farm income". Sociologist have stressed that the interaction between family and farm means that a family farm is more than a professional occupation, it reflects a life style (Calus, 2009). The phenonomen of family farms is so dominant in agriculture and in rural regions that is has become normative, a political force and an objective in itself (de Haan, 1993). Although it should be noted that the definition of a family farm has changed over time to accomodate new realities with more use of rented land, outside labour, contractors, and borrowed capital (Reinhardt and Bartlett, 1989).

Economists have explained that the interaction between family and farm means that the total family farm income as a reward for labour, capital, management and risk means that there is no clear marginal reward for each of these inputs: the total return determines the decisions, not the marginal ones. This goes back to the agricultural household model developped by Chayanov in his Theory on Peasant Economy: decisions on production, consumption and the allocation of time over farm work, household work and leisure are integrated. Linked with the sociologist view on farming as a life style, this leads to questioning the profit maximisation objective that economists normally assume for a business.

Family Farms are not the only organisational form. Peasant farming is a system with family farm households that are only partially integrated in markets that tend to function with a high degree of imperfection (Ellis, 1988). Family (farm) businesses and industrial farms are two types defined by Calus (2009), based on Gasson and Errington (1993): more use of hired labour for work and management and family shareholders for the enterpreneurship function characterise the family (farm) business. The industrial farm resembles the joint stock company: hired labour, hired management and shareholders.

Industrial farms have been developed in communist systems, but are also prominent in certain agricultural industries in capitalist countries, like banana and tea plantations as well as in sugar cane and fruit. Other examples are in pigs and poultry farming.

The organisational forms that are prevalent in agriculture can be explained by economics. Different forms have their own costs and benifits. One explanation is based on the scarcity of the production factors: in many cases industrial organisational forms in agriculture are linked to situations in developping countries where local capital and management are scarce (and brought in by multinational companies) and cheap labour is abundant. Pollack (1985) interpreted the family farm as an organisational solution to the difficulty of monitoring and supervising hired workers. Others stressed risk-sharing perspectives, especially in share-cropping and contract farming (Otsuka et al, 1992; Chueng, 1969).

¹ This paper is based on two earlier papers by the authors prepared for the (closed) 2nd meeting of the UN Wye Group on rural indicators and income measurement, Rome, June 2009: Ahearn et al. (2009) and Aguglia et al. (2009).

In recent years economists have stressed an incentive based, transaction costs and property rights approach from the new institional economics discipline. Based on the work of Coase, Chueng, Demsetz, Hart and others Allen and Lueck (1998; 2002) modelled the choice of the organisational form as a trade off between specialisation and moral hazard incentives. Specialisation of different tasks (employing different kind of labour or out sourcing activities to specialised firms like contractors) is attractive but limited by agency costs. Seasonality, randomness of outcomes of the production process (due to imperfect control of the biological production process), costs of supervising (also due to the spatial characteristics of a farm) limit the benefits of specialisation. This explains why farming has generally not converted from small, family-based firms into large, factory-style corporate firms (Allen and Lueck, 1998). A similar approach can explain relations in the food chain that determine the boundaries between the (family) farm and its trading partners. Boehle (1999) explained the choice between organisational arrangements in the food chain like spot markets, long-term contracts, joint ventures and vertical ownership using three variables: asset specifity, programmability and the possibility to seperate the performance of the partners. If the performance of the partners can easily be identified, asset specifity is low and the production process is not very programmable, spot markets are an efficient institution. In the opposite case vertical ownership is more efficient. Bogetoft and Oleson (2002) explained different contract forms in Danish agriculture, using contract theory. Specialisation comes at a cost as information has to be shared. Coordination (to ensure the right quantity with the right quality at the right time and place), motivation (to ensure that partners have incentives to stick to the coordination) and transaction costs are important aspects that for instance explain that institutional and contractual arrangements for growing sugar beet are quite different from those for vining peas. Also investments in cooperatives by farmers can be explained by hold-up problems due to asset specifity.

Trends in agriculture

In relation to the factors that explain the existence of the family farm and the organisation of the food chain we see a number of trends. These can differ somewhat between agricultural sectors and countries. For the Netherlands they are summarized in table 1.

Aspect that influences farm organisation	Explanation	Potential effect on farm structure						
Mechanisation and robotisation	Improving labour productivity and economies of scale	Larger farms, using more capital per farm and per labour unit						
Farmers are higher educated than before	Farmers become too expensive to drive a tractor: split between managerial and operational labour	Division of labour in larger farms						
Spouses are higher educated and more mobile (car) than before	Spouses keep their own job after marriage as opportunity costs are higher (also as they run more the risk than in the past that their relation breaks up)	More income from non-farming activities in the household						
Liberalisation of labour market	Less restrictive labour market (over time rates, hiring and firing) and entrance of East European workers	Division of labour in larger farms						
Managerial labour becomes larger part of	Operational labour is easier mechanized than managerial labour	Farms and food chain partners try to reduce this cost item by						

Table 1 Trends in Dutch agriculture and their effects on farm structure

cost price	(Baumol's insight explaining the growing service industries)	economies of scale via larger
Programmability increases	Bio-sciences and ICT make agriculture less a black box, randomness of outcomes decreases and reduces negative external effects (environment). Inventories can give way to just in time processes	Agriculture becomes more fit for industrial farms, as e.g. in pigs and poultry, glass house horticulture and coordination between different stages of the food chain increases. More contracts, less spot market.
Risk becomes measurable and tradable	Over the last 25 years risk has become better tradable and markets to diversify risk have been introduced (futures, derivatives, insurance)	Specialised knowledge needed and firms in the food chain can diversify risks to others than farmers
ICT decreases monitoring costs	It becomes easier to monitor hired labour (web cams, tracking and tracing) also as the outcome of activities become separable between decisions and input of hired labour and nature's randomness	Large holdings become possible.
Land markets (especially lease market) liberalize	Short period leasing for specialized crops like plant potatoes, vegetables or flower bulbs by specialist farmers (specialization effect, asset specifity) becomes easier and less risky	Larger holdings depending on the rent of land.
Higher income levels lead to more leisure time	Hobby farming in the country side (with a job outside agriculture at travel distance by car) becomes possible	More small hobby farms that are interested in renting land out.
Liberalisation in spatial planning	Spatial planning rules makes alternative use of outdated farm buildings easier and make building in the country side easier	More small hobby farms that are interested in renting land out to large farms >> bi-polar structure might emerge
High land prices in metropolitan areas	Also due to institutional arrangements in land development and fiscal law capital gains from land are an attractive source of income for farmers and non- farmers	Farmers that are in theory too small continue to reap capital gains. Are interested in renting land out and new, multi- functional services.
Higher income levels lead to new demands	New demands for services (health, eco- services, recreation) and products (organic etc.)	New business opportunities, some of them more attractive for smaller sized farms. In some cases franchising (farm shops, health care)
More interest in food safety and food quality	New contractual arrangements to coordinate the production process of such products	Spot markets disappear in favour of contracts, joint ventures
IPR	Bio-technology leads to intellectual property rights on seeds and semen; more asset-specifity (farmers have to invest in client-related know how)	Contracts in stead of spot markets
Agriculture looses special treatments in fiscal policies	Family farms and cooperatives have gained in the past from a better fiscal treatment than other business forms like stock companies. This is more and more harmonized	More chances for other business forms.

In their 1998 paper Allen and Lueck stated: "In general, seasonality and randomness so limit the benefits of specialization that family farms are optimal, but when farmers are successful in mitigating the effects of seasonality and random shocks to output, farm organizations gravitate toward factory processes and corporate ownership." Discussing his explanatory variables Boehlje (1999) explains that agriculture is becoming more programmable, with a higher asset specifity and sometimes less separable contributions of the contract partners. Hence the spot market disappears in favour of long-term contracts, joint ventures and even vertical ownership. Menard and Valceschini (2005) underline the upcoming importance of hybrid organisation and institutions in the food chain to develop, signal and monitor food safety and quality. Currently we see a number of trends that underline a move from the traditional family farm to more complex arrangements. Boundaries between the farm and other operators in the food chain become more blurred by the sophisticated use of contracts and integration. Farms themselves become more heterogeneous. Farms and household become more separated.

3. Strategies of farm households

The product mix of farms these days is much wider than just food and fibres. Farms have traditionally tried to cope with the problem of chronic low agricultural income, by devoting part of the resources available on farm to off- or on-farm more profitable activities. For example, the participation of some of the member of the farm household to off-farm labour market or the activation of direct selling or on farm process.

More recently, the adjustment process that farm businesses can activate to react to the price cost squeeze that is afflicting the agricultural sector have become more complex. Farms are progressively shifting their resources from the production of traditional crops and livestock products to that of new products with high growth such as agritourism, educational and social services. In addition, the new support in favour of rural development and multifunctionality have opened new opportunities for investments in non-commodity outputs.

It is useful to clarify the distinction between the concept of multifunctionality and those of diversification and pluriactivity. In fact, though the literature often uses these three terms as synonyms, partly because of the many ways their definitions overlap, they refer nonetheless to distinct phenomena (table 2).

Concept	Unit of analysis	Definition
Multi- functionality	Agriculture / Farm	Use of the farm's resources for agricultural production and non-market outputs (e.g. landscape, organic products, quality products, on-site conservation of bio-diversity, etc.)
Diversification	Rural business (agricultural and non-)	Use of the business' resources for agricultural and non-agricultural production (e.g. photovoltaic energy, rural tourism, etc.)
Pluri-activity	Family household	Use of family resources on or off the farm.

Table 2	: Definition	of multifun	ctionality	diversification	and pluri-activity
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In this paper, the concept of multifunctionality originates from the OECD definition of the (jointly produced) public goods. This definition suggests that multifunctionality is a

characteristic of the agricultural system in a certain rural area or region. And not necessarily of an individual farm. This is most clear in public goods as landscape, which are defined on the level of (certain parts of) Tuscany or the Beemster (a Dutch polder on the Unesco Heritage list).

There is more than pure private and pure public goods. Table 3 uses the concepts of non-rivalry and exclusion to show that there are two intermediate forms. Common goods where rivalry exists but exclusion is not possible; common fish grounds or water systems are classic examples. And quasi public goods, where exclusion is possible, but rivalry does not exists. Landscape is a classic one: persons can be asked a fee to enter a region, but as long as the area is not overcrowded the visit of one person does not reduce the possibilities of another to experience the landscape.

The four types of goods as described in table 3 suggest that there are possibilities for governments to ensure the production of public goods by private parties such as farmers. This is the case for public goods, where governments can hand out contracts or pay subsidies to promote the provision of such goods. But it is even more the case with common goods and quasi public goods where also producers themselves have options to organise themselves. Slangen (2008) for instance suggests on basis of the club theory that cooperatives can play a role in landscape provision. A nature or landscape cooperative can reduce transaction costs in a contract with the government and can improve the blending of pure individual goods (e.g. milk production) with quasi public goods (e.g. access to land for hikers or cows in the meadow) at a regional level. Such farm groups might also create common goods (from web sites to joint facilities) that help them to reap the benefits of multifunctionality.

	Non-rivalry goods and services (indivisible)	Rivalry goods and services (divisible)
Impossibility of	(1) Pure public goods	(2) Common goods
exclusion or	open space / rest / biodiversity / natural	ground and surface water / fish
rejection	habitat / cultural heritage	in the ocean, rivers and canals / wildlife
Possibility of exclusion or	(3) Quasi public goods	(4) Pure individual goods
rejection	nature / landscape	agricultural products / agricultural tourism / health care farms

Table	3 : A	typology	of goods
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Source: Salverda et al, based on Van Huylenbroeck and Slangen (2003)

The coordination mechanisms available can also be classified in four types (figure 1): the invisible hand for the market, the visible hand within a hierarchy and the handshake (trust, shared mission and objectives) and the handbook (the contract with detailed instructions). In reality institutional arrangements are often a combination of the coordination mechanisms: also a contract asks for some common values (in contract handling for instance and contracts are per definition incomplete). The message is here that the different coordination mechanisms provide incentives to preserve or enhance the multifunctionality aspect of agriculture.

Figure 1: *Four types of coordination mechanisms*



Source: Salverda et al, 2009, based on Borgen and Hegrenes (2005)

In cases where this is done multifunctionality becomes observable at the farm level and is reflected in farm accounts. As we will show in this paper, this makes it also possible to provide data on the level of engagement of farms in multifunctionality at the level of a region. It should be noted however that this does not measure the multifunctionality of a region: that can be much higher, especially if the visible hand is the coordination mechanism for public goods (meaning that this is done by the government itself) and that the handshake (common values and norms on farming) guarantees common goods, without much payments or contracts.

Information for decision making

To coordinate decision making in multifunctionality, farmers need incentives. In particular, let us use the hypothesis that farmers decide whether to use their available resources for monofunctional production - with the sole objective of agricultural production - or for multifunctional production, with more than one product jointly, some of which have externality characteristics. In the first case, production activity can lead incidentally to creating some externalities (environmental or socio-economic), but in amounts not planned and controlled by the farmer, since potential associated costs and benefits are not included in the set of values considered in farm decision-making. In the second case, farmers become multifunctional, since they recognise potential economies of scope² in joint production of two or more products, or because they can see economic value³ in possible non-market output produced jointly with agricultural products, a value used in deciding how to maximise the farm's private benefits. Recognition of the economic value of externalities produced by multifunctional agriculture may

² When joint production of two or more products becomes more economical than producing them separately, this is economy of scope. ³ This value can be approximated, for example, from the price differential obtained for a quality or organic product,

or from official financial support received for conserving the rural landscape or bio-diversity.

occur, for example, following awareness campaigns showing how the market rewards the quality and environmental characteristics of the product (organic, integrated agriculture, traditional or local products), compared to the price of conventional products; or with the granting of public support designed to optimise production of externalities (as with agri-environmental measures). Whatever the process of identifying and measuring the economic benefit associated with multifunctional production, the farmer may use this information to allocate farm resources efficiently, to create a combination of agricultural and non-agricultural products that will maximise private benefit, and at the same time guarantee an adequate supply of public goods.

Thus, multifunctionality is a rational economic choice, not necessarily guided by sensitivity for the natural environment or other non-economic considerations. The farmer's sensitivity to nature conservation or local cultural heritage may be a stimulus factor for adopting multifunctional practices, but it is not in itself sufficient to justify choosing multifunctionality, and especially cannot guarantee the economic sustainability of that choice over time. To successfully produce and sell an organic product, or a local traditional product or a service, as happens with social agriculture⁴, farmers must be prepared to take the risk of often very specific investments that are consequently difficult to reverse (*non-recoverable costs*). Moreover, they must know how to move in a complex, little known market and often distant from potential customers; all this implies certification and advertising costs, but also real *transaction costs* associated with looking for sales and communication channels with potential customers. In other words, multifunctionality involves a very complex cost-benefit analysis, for farmers to be able to identify and measure the economic value of potential external and indirect benefits, as well as various kinds of costs that may arise from choosing multifunctionality.

These considerations clearly show that choosing multifunctionality is not to be viewed solely as a strategy for survival, the exclusive prerogative of marginal, small or residential farms. Indeed, when a farm identifies the economic value of the benefits of multifunctionality, and internalises them in the production planning process, the adoption of MPs (multifunctional practices) becomes part of a series of competitive strategy options for any type or size of farm.

Diversification and pluriactivity

The concept of *diversification* refers to the farm as a unit of analysis, but here the unit may gradually depart from its original "agricultural" nature, toward non-agricultural but rural activity. In the extreme, this analysis unit may lose all agricultural connotations and be identified because of its territorial location as "rural". In other words, a business with land as a resource, as well as labour and capital, which *also* makes it suitable for agricultural production. In any case, land and other resources may be used to produce non-agricultural goods and services, such as rural tourism or energy production (photovoltaic and wind-powered for example) or conservation of the environment and natural resources⁵. In this case as well, sensible farmers will base their decision on the combination of agricultural and non-agricultural products, to maximise their private benefits. The optimum combination, and then the degree of diversification and eventual

⁴ Social agriculture refers to a primary activity designed to provide social services, like training, therapy and education (see, for example, Pascale (2005) and Senni (2007).

 $^{^{5}}$ In this case, the environmental function replaces the agricultural, unlike with multifunctionality where nature conservation occurs jointly with production of market outputs. In the first case, for example, think of a wildlife farm or nature reserve (private). Multifunctional farms are those that produce agricultural varieties in danger of extinction.

specialisation, are derived from the ratio between the prices of producible goods, given the existing combination of resources and technology⁶.

The polar cases of specialisation are represented on one hand by a multi- or monofunctional farm (all resources dedicated exclusively to crops and livestock, and possible externalities obtained jointly) and on the other by a farm devoted to non-agricultural products (total de-activation of agricultural function). In fact, diversification can be interpreted as broadening the range of production possibilities of a business that was originally agricultural.

Finally, the concept of *pluriactivity* is different from the two preceding concepts, in that the unit of analysis is no longer the farm but the farmer's family or household (Saraceno, 1985). Pluriactivity refers to cases where, after evaluating the advantages of family labour inside and outside the business, one or more family members (thus part of the family's available labour resource, but not necessarily of the farm or rural business) work outside the business (in agricultural or non-agricultural activities, as dependent or independent workers). The choice to work off the farm may be interpreted, as shown by household models, as the result of a maximisation process of family income- given as the sum of farm and non farm family income produced by a family.

According to Van der Ploeg and Roep (2003), the process of farm transformation (as opposed to the trend of specialisation and increasing scale) moves along 3 distinct trends: a deepening of agricultural production, a broadening of functions activated by farms and a re-grounding of farm processes. In the first case, the farm differentiates its productive potential by moving toward agricultural goods with unconventional characteristics (organic products, quality products, typical products, etc.), or by moving along the supply chain, acquiring functions down the line from production (direct sales, etc.).

Broadening involves a process of expanding income-producing activities, some of which can also be completely independent of real agricultural production, by exploiting entrepreneurial activities in a rural context wider than strictly agricultural (rural tourism, landscape management, therapy farms, as well as new organisational forms with services managed by persons other than the farmer or agricultural entrepreneur) 7 .

Regrounding refers to those cases in which some production factors, labour in particular, are devoted to activities outside the farm. The regrounding category contains pluriactivity and those cases which the anglo-saxon literature refers to as *economical farming*, that is those cases in which production costs are reduced, hence the autonomy of the farm is increased, by replacing internal to external inputs. Working outside the farm and reducing production costs have in common that the inputs in the farm activity are reduced.

A strong trend toward deepening of primary activity leads to a farm that differentiates its product by favouring, directly and indirectly, production of positive externalities; a strong process of broadening produces externalities, but leads to a kind of farm that may also gradually reduce or eliminate its original primary activity entirely. In this sense, broadening may lead to a diversification off the agricultural sector. Regrounding refers to a reallocation of production factors within the farm, but its main analysis unit is not the farm in itself, rather the family. However, regrounding affects also the multifunctional activity of farms: on one side pluriactivity implies less time to devote to other practices (because family members are involved in other non-

⁶ Or of the economic value in the case of production of non-market goods, as in the case of a private nature reserve subsidised by the public sector. ⁷ In this regard, see also the work of Oostindie, Renting (2005), part of the Multagri research project (6th

Framework Research Programme of the European Commission).

agricultural, sometimes non-rural activities); on the other hand, the proximity of pluriactive farms with urban centres give farms the possibility of specialising in services demanded by citizens and increasingly supplied by farms (such as recreational services, therapy services, didactic services, and so on). Given this picture, in reality what happens more frequently on farms is a combination of deepening, broadening and regrounding, which identifies various levels of multifunctionality.

4. Data and measuring farm size

The most basic indicators to describe the structure of any industry are the number and size distribution of units, or in our case, farms. Describing the structure in basic, nonmonetary terms, is helpful in developing an understanding of how to develop a meaningful stratification within the industry for monetary indicators. This is useful to understand the dynamics in the industry over time and to understand to what extent income problems are linked to management and strategy of firms or to the structure of the industry.

Agriculture as an industry is unique, as has been commonly understood. In particular, agriculture continues to be dominated by many, oftentimes small, family farms. Allen and Lueck (1998) argue that the factors that contribute to this situation result from the dependence of the farm production function on nature, which is seasonal and random. There is also evidence that farmers are willing to trade-off cash returns for non-pecuniary benefits by continuing to operate small family farms (e.g., Fall and Magnuc, 2004; Key, 2005). Often times ignored in the empirical literature, perhaps because it is widely acknowledged, is that family farms usually provide the family a place of residence, with intergenerational links, and a variety of nonmarket social and natural amenities.

The different yield levels per ha and the highly skewed size distribution of farms worldwide limits the comparability of national statistics with indicators of the average farm size, especially in terms of physical characteristics like ha. However standardized indicators for cross-country comparisons of farm structure are not available.

Standardized indicators should allow for comparability and inclusiveness in defining the farm population across countries. The countries which have farm definitions that incorporate a requirement that farms be commercial in nature will limit the cross-country comparability of indicators. If the scope of the farm population is limited to commercial production, the indicators will very quickly become irrelevant for many of the most important policy issues in rural development. While many farms are small in terms of their production of agricultural commodities, they may be producing other goods and services that will garner public support in the form of subsidies or gain in value in the marketplace, such as landscape amenities, carbon sequestration potential, or locally-produced food. Furthermore, to the extent that an integrated rural and farm data system is desirable, the small farm households will be within the scope of the population of interest. On the other hand, we believe this is controversial and should be the subject of debate for a very pragmatic reason: the data collection costs of identifying and collecting information from very small farms. If the primary goal is information on agricultural production, the data collection costs may not warrant the outlay in terms of agricultural coverage. Furthermore, if indicators only reflect the means of the population, the inclusion of the small farms distorts the position of the group of farms fully engaged in agricultural production.

Statistical approaches to containing the data collection costs associated with inclusion of small farms include adjusting sample weights for undercounted small farms or by modeling the small farm sector.

Standardized indicators should not limit the population of farms which are the focus of indicator development to family farms (however defined). Just as the appropriate definitions of rural territories may vary depending on the context and the issue at hand, the definition of a family farm will always be variable, making comparisons problematic. Limiting indicators to family farms, the group for which household indicators are meaningful, may prevent indicators from capturing important structural change in agriculture.

Both the European and the US definitions of farms are not without controversy. For an EU perspective, Poppe et al (2006) discuss the issues with the farm definition and, for the U.S., the definitional issues are discussed in O'Donoghue et al. (2009).

For the EU, a holding is a technical-economic unit under single management engaged in agricultural production. According to Eurostat (2000), p. 10:

"The field of observation of the Community farm structure surveys extends to the following survey units: Agricultural holdings with a utilised agricultural area of 1 ha or more; agricultural holdings with an utilised agricultural area of less than 1 ha if they produce on a certain scale for sale or if their production unit exceeds certain natural thresholds. Member countries may introduce thresholds if certain conditions are not met."⁸

In the US, a farm is defined (by the National Agricultural Statistics Service) as any place from which \$US 1,000 or more of agricultural product was produced and sold, or normally would have been sold, during the year (USDA, NASS, 2009). Hence, it is a very inclusive definition and includes farms operated by households that are retired or attracted to farming for reasons not primarily related to production, such as the rural lifestyle or investment opportunities. In addition, since the definition is dollar-based, it becomes more liberal with each passing year as price levels change. Although it is regularly discussed, an inclusive definition of a farm is very popular with many for a variety of reasons (O'Donoghue, 2009). For example, some Federal program dollars are distributed to states in part based on the farm population in a state, e.g., extension funds.

As stated above, not only the cut off points of a farm census or survey are important for international comparability but also the measure of size. Input measures like ha's do nor reveal much information on the income potential of a farm as productivity per ha differs dramatically between regions due to differences in climate and soil and hence in types of farming. However indicators based on an output measure as value added, output or gross margins are not available.

⁸ Different thresholds are, in fact, used by some member countries. The countries that likely have higher thresholds than 1 ha include: Belgium, Denmark, the Netherlands, Sweden, and the UK. These thresholds are defined by either larger hectare sizes, standard gross margins, or major occupation of the farmer. While the UK defines both main and minor holdings, the Eurostat statistics only include the larger "main" holdings for this country. Belgium's definition is perhaps the most conservative, and includes only those whose major occupation is farming or who produce on a "commercial" basis. Denmark uses 5 ha, the Netherlands uses 4,200 ECU (in 1997), and Sweden uses 2 ha, as alternative thresholds. The Netherlands notes that the definition covers 99% of total agricultural production.

For this reason we estimated European Size Units (ESU) for the US data set. This has been based on the farm account data available in ARMS.

For our comparison of farm structure in the USA and EU we used the data from the ARMS Survey in the US and Eurostat's Farm Structure Survey (FSS) for Europe. As the definitions of farms, and the lower cut-off points of the census differ, we calculated some statistics in which we excluded the smallest US farms. To analyse the farm household strategies and the uptake of multifunctionality, diversification and pluri-activity we used the FADN and ARMS data. FADN data was restricted to the Netherlands and Italy. In this case we did not correct for different lower thresholds of the surveys, that differ between the three countries.

We provide farm (holdings) distributions by two underlying size measures: an input measure, hectare classes, and an output measure, Standard Gross Margin classes. We estimated gross margins for the US. Both data sets exclude farms of less than 1 hectare (ha) with negative standard gross margins (SGM). Furthermore, to emphasize the diversity within, we present measures of these indicators for two EU countries: The Netherlands and Italy. The size distribution varies considerably by geographic region of the U.S., just as it does among the member countries of the EU.

In recognition of any biases that could be interjected by the lack of comparability in farm definitions across the countries, we report the distributions in two ways. First, we consider all farms/holdings in calculating the share of farms in each class. We also report the share of hectares in each of the size classes. Since the cross-country definitional inconsistencies affect the populations at the small end of the distribution, we also report the distributional statistics after eliminating the small tail of the distribution. In this second way, for farm size measured in hectares, we eliminate farms of less than 5 hectares. For farm size measured in ESUs, we eliminate farms of less than 4 ESUs.

The FADN survey provides information revealing the presence of MPs, associated with both environmental and socio-economic functions.

For the first, environmental group of MPs, FADN provides information about the

- use of organic farming
- use of low-impact techniques,
- production of landscape conservation services,
- production of bio-diversity conservation services
- use of practices that encourage extended production.

While information about these three MPs is only available for participation in agri-environmental programmes within Rural Development Programs⁹ of the CAP, information for adoption of low-impact and organic production goes beyond mere participation in public programmes. For organic practices, it is possible to have information on farms' certification of organic processes and/or products. For low-impact techniques, information refers to farms' self-certification.

- In addition to these indications, FADN provides information about MPs that produce socio-economic externalities, especially on a local level. For example, it's possible to learn if the farm offers touristic services (farm stay, meals, etc.) services,
- uses designation of origin and protected geographical indication (PDOs, PGIs),
- produces traditional products.

Finally, the survey provides indications about more traditional forms of diversification such as:

⁹ Participation information is given as receipt of environmental premium.

- direct selling;
- on farm processing;
- renting machinery;
- leasing of land;

whereas information is not currently available about energy production and the provision of social and therapeutic services¹⁰.

On the whole, the FADN survey appears to be more suited to measuring deepening rather than broadening; this result is expected, given the survey's original purpose focussed mainly on characteristic management of agricultural enterprise. As for the re-grounding category the FADN provides information about the presence of pluriactivity in the household, whereas it does not provide any indicator of economical farming behaviour.

In summing up, multifunctional practices considered in this work are those shown in the following table 4.

Table 4: Multifunctional practices in the FADN data base

Indicator of multifunctional practice	Broadening	Deepening	Regrounding
Organic process/product certification		Х	
Use of low-impact production methods		Х	
Certification of origin		Х	
Traditional products		Х	
Direct sales		Х	
Extensification		Х	
Agritourism/farm stays	Х		
Landscape conservation	Х		
Biodiversity conservation	Х		
Renting machinery	Х		
Leasing of land	Х		
On farm processing		Х	
Pluriactivity			Х

5. Findings on farm structure

Figure 2 (based on Annex Tables 1a. and 1b) compare the size distribution for the territories using land area classes (hectares) and Figure 3 (Annex Tables 2a. and 2b) compare the size distributions using an output based measure of size, the Economic Size Unit (ESU).¹¹ In 2007, there were 2 ½ times more farms/holdings in the EU than in the US (approximately, 5.6 compared to 2.2 million), but the US has nearly three times the land area in farms. US farms are significantly more likely to be 100 ha or more, than are EU holdings (26% compared to 5% in 2007). Conversely, US farms are also less likely to be less than 5 ha than are EU holdings (12% compared to 54% in 2007). About 90 percent of EU farms are less than 50 ha, compared to

¹⁰ In this regard, note that the FADN questionnaire has been re-formulated to survey this information in future.

¹¹ The disadvantage of using the land area size measure is the great variability in the productivity of the land. In the U.S., for example, there are approximately 1 billion acres classified as agricultural land, excluding forests, but less than half of that is cropland. The majority of US agricultural land is used for pasture and range. On the other hand, measurement issues are facilitated when size classes are defined by land area.

about 58 percent of US farms. Of course, the distribution of the land area by farm size is even more skewed than the distribution of the number of farms/holdings. The farms/holdings of 100 ha or more control 12 percent of the land in the EU and 87 percent of the land in the US. It seems accurate to say that, in general, US farms are larger than EU holdings when size is measured in land area. We reach the same conclusions when we eliminate the holdings of less than 5 ha from the distributions, although the differences between farm sizes in the US and the EU are not as large.



The size distribution of farms for Italy and the Netherlands shows the diversity within the EU. Italy has a smaller farm structure than the EU at large, while the Netherlands has a larger farm structure. For example, in Italy for 2007, 85 percent of the farms, comprising 34 percent of the land, are in farms of less than 20 ha. In the Netherlands, in contrast, only 42 percent of the farms, comprising 5 percent of the land, are in farms of less than 20 ha.--and these include a significant number of glasshouse holdings that are big in sales but not in land use.

The conclusion about comparative size distributions is less extreme when the economic measure of size, the ESU, is employed. The ESU measure of size allows us to capture the differences in the intensity of production on the land area. One reason for differences in the intensity of agriculture might be the result of differences in climate and the quality of the natural resource

base. For example, large areas of the US, especially in the West, have low land quality. It is in these areas of the US that we see a large share of the largest farms in terms of land area.

Based on ESUs, it is still true that a greater percent of farms are classified as large in the US than in the EU, but the differences are not as great as in the case of size measured by land area. There were 10% of US farms of 100 ESUs or more, compared to 5% of the EU holdings in 2007. Roughly one-quarter of the farms/holdings in the two territories are greater than 16 ESUs (27% in the EU and 26% in the US). However, using the ESU size measure, the US has a greater share of small farms of less than 2 ESUs than does the EU, 55% compared to 28%. In fact, comparing the US to member countries, the US' share of small farms is even larger than Italy's share of small holdings <2 ESU of 34 percent.



When we eliminate the smallest farms (of under 4 ESUs), in the interest of consistency in definition, we reach the same qualitative conclusions regarding the larger farm structure of US farms. However, the Netherlands has a larger proportion of its holdings in the largest size class of 100 ESUs or more than the US, indicating the diversity within the EU.

Changes in the Size Distribution

By comparing the 1997 size distributions for the two size measures, hectare classes and ESU (in Annex 1 tables 1a. and 2a.) to those for 2007 (Annex 1 tables 1b. and 2b), we get a sense of the different dynamics in the territories. Figure 4 summarizes the results. For the EU territories as a group, the number of holdings in the decade between 1997 and 2007 in the small hectare size

classes (<20 ha) declined, while the share of farms in the larger size classes increased. This shift represents an increase in the concentration of production in the EU. This is consistent with the results reported by Poppe, et al. (2006). Obstensibly, during this same period, the US experienced another dynamic. The share of small farms increased, and the share of the largest farms (50 ha. and over) declined. However, the decline in the share of large farms is also reflecting an increased concentration in production: although the number and share of large farms decreased, as a group these large farms still operated the same share of farmland and still produced the same share of production in 2007 as they did a decade before. Had the size cut off for large farms been greater, for the US, there would have been both an increase in the number of farms and the share of farms that are large. The US result of a decline in the share of large farms (>100 ha), in contrast to the EU's increase in the share of large farms illustrates that this fact alone cannot be used as evidence of the concentration in production, since both territories experienced an increase in concentration. For the US, there has also been a relatively rapid increase in the number of small farms; this increase has a significant effect on the share of farms in any particular size class. A popular measure in industrial organization is to report market shares for the 4 largest firms in an industry, i.e., CR4 ratios. This low number of farms, four, may present some confidentiality concerns for agriculture, although Bunte has done so for the NL (OECD, 2006). A common way that concentration is reported in the US for agriculture, is to report the number and share of farms that account for a certain share of the sales or production (75, 50, 25, and 10 percent). For example, in 2007, 1.5 percent or 32,886 farms accounted for half of all products sold, compared to 2.4 percent or 46,068 in 1997, and 3.6 percent or 75,682 in 1987 (USDA, NASS, 2007 and earlier censuses).



When size is measured by the ESU class, the same dynamics are observed as when size is measured by hectare class, but there are less dramatic shifts over time. For example, the share of holdings in the EU declined in the smallest class and increased in the largest class. For the US, the most notable dynamic was the larger share of small farms in 2007 compared to 1997 and, while the share of farms in the largest size class change little during the decade, the share of land operated by these farms increased from 36 percent of all hectares operated to 45 percent.

The comparison above regarding shifts in the size distributions between two time periods for aggregated size groups does not provide information about the underlying dynamics of farm entries and exits as well as the growth and size reduction for those farms that continue over time. In the US, the Census of Agriculture data have been linked to show that many farm businesses go out of business and many new farms come into business (Ahearn, Korb, Yee, 2009). Considering the 5 censuses and 4 time periods between 1978-97, the rate of entry and exit varies somewhat—for two periods the entry rate exceeded the exit rate and for two periods the opposite was true--but entry rates overall were relatively stable, showing no strong upward or downward trend. Both the annualized entry and exit rates during the four subperiods ranged from 8 to 11

percent.¹² In farming, businesses enter at all sizes. Entry rates among small farm businesses, however, are significantly greater than for other farm sizes. Entry rates decline steadily as farm size grows, until farms reach a US mid-size range of 100 hectares or more. In addition, to the rates of exit and entry, it is interesting to consider the tendency of farms who stay in business, i.e., the survivors, to either expand or contract. The majority of surviving farms stay in the same size class from one census period to another. The smallest farms (under 20 hectares) have one of the highest shares of farms remaining in their size class. This size-tenure dynamic is not generally found in manufacturing industries, where the pattern is for smaller firms to increase in size over time. The small size class of farms, however, is likely dominated by those in operation largely to provide its operators with a farm residence, rather than serve as a viable commercial operation. Since family farms dominate agriculture across countries, the dynamic of farm size growth and survival will be commonly affected by the life-cycle of the farm family. However, it will likely vary considerably over countries due to variation in inheritance laws.



Figure 5. Distribution of US-farms by type of legal organization and number of households sharing in net income of the farms

The developments in farm structure suggest that a bi-polar structure is emerging: large farms where production is concentrated on one side and very small farms with totally different business models and objectives on the other side. This is in line with the theoretical background and trends given in the first sections of this paper. It also shows up in the complicated governance structure of farms, as recently documented in a paper by Johnson et al. (2009). Figure 5, taken from that paper, shows that farms in the US are organized in different legal forms, and often support more than one household. Similar results have been found for Canada and the Netherlands.

Source: Agricultural Resource Management Survey, 2007

¹² Entry and exit of farming businesses differs from changes in the use of land for agricultural purposes. Since 1978, the acres of land used in agriculture have declined. The 442 million acres of land used for cropland in 2002 was the lowest level since land-use estimates were made for 1945.

Figure 6 (also taken from Johnson et al, 2009) shows for the Netherlands that the classic sole proprietor farm is a less common form than the partnership with family members or others. Their share in production or subsidies is even lower. Limited companies are still a small number, but invest aggressively and take this juridical form as a risk management tool.



6. Findings on the strategic choices of farm households

There are clearly large difference in the off-farm work of farm households between the US and member countries of EU. Figure 7 (based on table 3 in Annex 1) reports participation for three time periods, 1987, 1997, and 2007. For the US, we report the share of principal operators that worked any days off the farm and the share of principal operators that had a nonfarm occupation as his or her major occupation. For the EU, for 1987 and 1997 "old", data are the share of operators that worked any days off the farm and for 1997 "new" and 2007, data are for the share of operators that had a nonfarm activity as the major or subsidiary occupation.

Farm operators in the US are more likely to work off the farm than farmers in the EU-15, with the exception of Sweden. Pluriactivity is not a new phenomenon in the US. Questions regarding off-farm work were included in the Census of Agriculture as early as 1929, where about 30 percent of farm operators reported being engaged in pluriactivity (Jenkins and Robison, 1937). As today, the extent varied significantly over farm size and space. Two states (Maine and Vermont) had nearly half (49 percent) of its operators report that they worked off the farm parttime in 1929. The high level of off-farm work participation for US farmers increased as recently as the last two Census for 2002 and 2007 (USDA, NASS). This increase was consistent with the increase in the share of small farms accounted for by the 2007 Census. Pluriactivity in EU member countries combined was 31 percent in 2007, compared to 65 percent in the U.S. However, there is a great deal of variation in pluriactivity across EU countries, ranging from 16

percent in Belgium to Sweden's 71 percent. Different member countries have also experienced higher rates of growth in the past decade, such as Denmark, Ireland, Sweden, and the UK.¹³



The high rate of off-farm work among farm operators in the US should not be surprising when we consider that more than half of all farms lose money farming in a typical year (e.g., 54 percent in 2007 according the ARMS). Perhaps, another factor explaining the US' greater offfarm work participation is the result of the lower government payments US farmers receive compared to EU farmers. In the US, only about 40 percent of farms receive any government payments. The OECD provides various estimates of support, by commodity and country, using Producer Subsidy Equivalents (PSEs) (OECD, 2001a).¹⁴ A comparison of the PSEs for the US and EU indicates that the EU's agricultural sector has consistently received a greater share of its returns from government support than in the US (Normile and Leetmaa, 2004). In the US, studies of off-farm work have shown that government payments are negatively related to off-farm work participation (El-Osta and Ahearn, 1996; Mishra and Goodwin, 1997). A study by Weersink, Nicholson, and Weerhewa (1998) points to the importance of differing policies, both farm and social, in explaining off-farm work between the US and Canada. They studied the off-farm work of dairy farm families in Ontario, Canada which is geographically similar to New York in the US. They concluded that the more generous and stable Ontario dairy policies and the government-provided medical care of Ontario were the major factors in explaining the differences in the observed lower rates of off-farm work of Ontario farm families.

More detailed data are available for Italy, the Netherlands and the USA for the diffusion of the 3 strategies (broadening, deepening and regrounding). Tables are in Annex 1. Figure 8 provides a

¹³ Some of the variation may be due to variation in the farm definition.

¹⁴ The PSEs accounts for 66% of the value of agricultural production in the US and 63% of the value of production in the EU.

summary in terms of frequencies. It should be stressed that this first-time-ever international comparison is most likely distorted by the different definitions used in the different surveys (ARMS for the US, national FADNs for Italy and the Netherlands).

Regrounding (here measured as pluri-activity, and only reported on family farms) is the most important strategy in the US and the Netherlands. It is important in Italy too, but there the frequency of the strategy of deepening is slightly more important. Deepening is more important than broadening in the US too, thanks to the participation in conservation tillage programs, but in the Netherlands broadening is popular. This is mainly due to the uptake in (government) contracts for nature management¹⁵. But surprisingly also agri-tourism is more important in the densely populated Dutch countryside than under the Italian sun.



Conventional, family and non family, farms are characterized by large physical and economic (ESU) dimension in all the groups. It is interesting to note that in Italy as well as in the Netherlands the conventional farms have the smallest average number of hectares (UAA) among the targeted groups. A more detailed analysis of the different groups of farms based on their characteristics is given in Aguglia et al (2009).

¹⁵ Which raises some questions on the usefulness of the grouping of activities like landscape conservation as broadening and conserving tillage programs as deepening



Figure 9 provides some income data for the different types of farming in Italy and the Netherlands. It shows that farms with broadening (the most favoured strategy in the Netherlands) have a higher income than those involved in deepening. In Italy it is the other way around. It also shows that conventional farms in the Netherlands have higher incomes than those in multi-functional strategies, where in Italy the economic incentive for deepening or broadening seems stronger.

All in all, the main outcomes of the analyses in this section are the following:

- the product mix offered by farm business is very complex. It includes traditional agricultural commodities, non agricultural commodities and especially services rapidly growing (educational, social, etc.) as well as non-commodity outputs, for example landscape or biodiversity conservation;
- farm household resources are progressively devoted to off farm activities such as in the case of pluriactivity or in that of land used for the production of wind or solar energy or for storage.

As a consequence, the share of revenues from selling food and fibres is relatively lowering, while that originated by non traditional deepening and broadening activities is increasing. At the same time, agriculture is no longer the only and sometime not even the dominant source of income for the farm household.

7. The challenge for data collection, and potential solutions.

This paper discussed the developments in family farms in the USA and Europe¹⁶. Based on the theory of the family farm and the current trends (partly based on ICT) in agriculture we conclude that the structure of agriculture is changing. A bi-polar structure is to be expected, and this is confirmed by data. More and better data on these structural trends and the governance structures of farms is needed. This includes international comparability: it is amazing that simple data on farm size are not available in a comparable format for the US and the EU. The difference between ha's and acreages can perhaps be overcome but would give a distorted picture seen the differences in land productivity. The forthcoming Standard Output (SO) measurements, destined to replace the EU's Standard Gross Margin (SGM) measures will facilitate cross-country comparisons between the EU and other countries. This is because of the greater simplicity of SO measures and because output mix and production technologies vary across countries. The classes of inputs that are considered in the measurement of SGM are not intuitive and inclusive for a wide variety of production technologies. For example, labor, while a variable input, is not included. Nor is energy included as a variable input. Both of these inputs vary significantly by commodity mix. However, the accounting treatment for various types of government subsidies to be included in SO measures, and size measurement based on output in other countries, is still in need of justification before a harmonized approach can be adopted. Also the "standardisation" in SO needs to be internationally standardized.

A further advancement in understanding the structure of farming would come from a longitudinal analysis of the entry, exit, and survival-growth dynamics. Such an analysis is only possible in countries that have panel data sets, such as Canada. A cross-country comparison for that subset of countries may prove insightful, if compared in light of the variation in domestic agricultural policies and inheritance laws.

The structural changes in society and agriculture confront the farmers with several strategic options. In this paper we have explored these developments from a multi-functionality view and tried to apply Van der Ploeg's Deepening / Broadening / Regrounding typology to the current FADN data sets. Although this generates interesting results and many questions for further investigation, our experience is that the statistical information gathered by farm surveys designed to monitor a productivistic agriculture are not able to take account of the complex situation defined by post-productivism and rural development. Data collection systems have to be revised to provide a fair and exhaustive view of farm business/household income situation and measurement.

One important area for farm indicator development relates to the engagement of farms in the production of multifunctionality and nontraditional goods and services and has much in common with concepts of sustainability. These growth strategies include the production of nonmarket goods and services, such as environmental services. Governments are currently compensating

¹⁶ We were not able to look at the situation in other continents, but we would not be surprised if the same kind of conclusions could be drawn there. On Asia, Rigg (2009) states for instances: "It's not unusual to find rural households in Thailand where land is no longer worked; where the thread of farming knowledge between the generations has been broken; where young man and women live away from home but entrust their children to their grandparents; where sons and daughters are registered as resident in one place but live in another; where villages surrounded by rice lands are supported and sustained by income from factory work; and where the buffalo is memory. There is a deep sense that the pace and character of change in the Asian countryside is such that scholars are playing theoretical and explanatory catch-up, while governments are attempting to manage a process that they do not fully appreciate, rarely understand and, often, do not particularly like"

farms for environmental and conservation services, including farmland preservation. Other activities associated with multifunctionality include community-oriented production aimed at local markets, such as Community Supported Agriculture and agritourism. Organic production and value-added production (such as jams from berries) are both marketed locally and distributed widely through traditional markets. Also included in the multifunctionality category of activities are energy-related production activities, such as wind energy and bioenergy sources. These activities are small, but growing, components of the agricultural activities in many countries. Also in this area international standardization is of importance. Notwithstanding the excellent cooperation with FADN experts in Italy and the Netherlands we faced a lot of hurdles to make the datasets at least roughly comparable. The EU as well as member states themselves (e.g. in the PACIOLI network, see Boone et al, 2008) could do more. The UN Wye Group and OECD could do the same at the international level. And national sponsors of research into multifunctional agriculture should consider sponsoring such activities actively. The difference of incomes between the different farm types (figure 9) suggest that international benchmarking provides clues on how to change the institutional framework and incentive mechanisms if one would like to promote certain multifunctional practices.

Such datasets should also provide information on environmental performance, (rural and agricultural) government support, non-farm income, taxes and social security as this sheds light on the adoption of multifunctional practices and the emergence of a bi-polar structure. Such data are also needed for policy analysis. Accountability (a central theme in the US' Obama administration) and Impact assessment (the EU term) are high on policy agenda's. Food and energy have become more important on the policy agenda and this attention goes hand in hand with high levels of subsidies or intervention in markets, where most governments are faced with budget problems. This calls for monitoring and evaluation with appropriate data sets. Of course that should not defer us from looking for cost savings in the statistical system as such. ICT and the use of administrative data (like tax records, subsidy data etc.) holds a promise to get more data for less money. In addition some of the data that are currently gathered can be stopped. This is in the EU for example the case for data on individual products (now that the CAP moved from payments per crop to decoupled payments at farm level), including technical details on those products. Another issue might be the number of farms surveyed. With the concentration of production and the integration of (European) markets, one could argue that less farms are needed to give a picture of the income on dairy farms in North Western Europe. On the other hand the rural development plans ask for more detailed regional data (but probably not on the same indicators). So here is a controversial topic to study and debate.

A last remark concerns the large farms, for which data are needed to stay representative for the agricultural production. It must be recognized that statistical agencies are increasingly challenged by the need to collect information from very large farms. A 2007 Invited Paper panel at the AAEA meetings in Portland provided a set of innovative approaches to data collection for economic research purposes in an increasingly concentrated sector, but these ideas are not easily transferable to indicator development (Fernandez-Cornejo and Just, 2007; Hueth et al 2007; Perloff and Denbaly, 2007). But making more use of case studies on a limited number of farms might be an attractive way forward.

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Annex 1

, ,	Holdings (1000)			Land area (1000 hectares)		
	No.	% of all	%, exc. Small	No.	% of all	%, exc. Small
European Union						
Under 5 ha	3.902	56		7.008	5	
5-20	1.687	24	55	17.229	13	14
20-50 ha	802	11	26	25.459	20	21
50 to 100 ha	372	5	12	25.784	20	21
100 ha and over	226	3	7	53.211	41	44
total	6.989	100	100	128.691	100	100
NL						
Under 5 ha	35	32		72	4	
5-20	37	34	50	403	20	21
20-50 ha	29	27	40	919	46	47
50 to 100 ha	7	6	9	429	21	22
100 ha and over	1	1	1	187	9	10
total	108	100	100	2.011	100	100
Italie						
Under 5 ha	1.754	76		2.818	19	
5-20	424	18	76	3.970	27	33
20-50 ha	96	4	17	2.903	20	24
50 to 100 ha	27	1	5	1.868	13	16
100 ha and over	14	1	3	3.274	22	27
total	2.315	100	100	14.833	100	100
U.S.						
Under 5 ha	205	10		600	0	
5-20	365	18	20	4,187	1	1
20-50 ha	423	21	23	14,095	4	4
50 to 100 ha	355	17	19	25,913	7	7
100 ha and over	696	34	38	332,870	88	88
total	2.044	100	100	377,664	100	100

Table 1a. Comparison of farm/holding size distribution measured in hectares, EU-15, NL, Italie, and the U.S., 1997

For U.S., includes all except 5,155 holdings with less than 1 hectare and with negative SGM. Sources: For EU, Farm Structure Surveys. For US, USDA, NASS and ERS, ARMS.

	Holdings (1000)			Land area (1000 hectares)		
	No.	% of all	%, exc. Small	No.	% of all	%, exc. Small
European Union						
Under 5 ha	3.033	54		5.515	4	
5-20	729	13	28	13.598	11	11
20-50 ha	1.230	22	48	20.400	16	17
50 to 100 ha	353	6	14	24.808	20	21
100 ha and over	264	5	10	60.225	48	51
total	5.608	100	100	124.546	100	100
NL						
Under 5 ha	21	28		46	2	
5-20	11	14	20	255	13	14
20-50 ha	33	43	60	702	37	38
50 to 100 ha	9	12	17	611	32	33
100 ha and over	2	3	4	301	16	16
total	77	100	100	1.914	100	100
Italie						
Under 5 ha	1.230	73		2.021	16	
5-20	203	12	45	3.109	24	29
20-50 ha	206	12	46	2.599	20	24
50 to 100 ha	27	2	6	1.839	14	17
100 ha and over	13	1	3	3.177	25	30
total	1.679	100	100	12.744	100	100
U.S.						
Under 5 ha	251	12		752	<1	
5-20	525	24	27	6,140	2	2
20-50 ha	485	22	25	16,097	5	5
50 to 100 ha	341	16	18	24,158	7	7
100 ha and over	576	26	30	308,602	87	87
total	2,179	100	100	355,750	100	100

Table 1b. Comparison of farm/holding size distribution measured in hectares, EU-15, NL, Italie, and the U.S., 2007

For U.S., includes all except 17,946 holdings with less than 1 hectare and with negative SGM. Sources: For EU, Farm Structure Surveys. For US, USDA, NASS and ERS, ARMS.

	Holdings (1000)		Land area (1000 hectares)			
	No.	% of all	%, exc. Small	No.	% of all	%, exc. Small
European Union						
0 to <2	2.357	34		7.422	6	
2 to<4	1.174	17		5.448	4	
4 to <8	1.039	15	30	8.719	7	8
8 to <16	840	12	24	13.067	10	11
16 to <40	843	12	24	27.429	21	24
40 to <100	536	8	15	35.432	28	31
100 or more	201	3	6	31.196	24	27
total	6.991	100	100	128.712	100	100
NL						
0 to <2	0	0		0	0	
2 to<4	1	1		3	0	
4 to <8	10	9	9	36	2	2
8 to <16	13	12	12	78	4	4
16 to <40	19	17	17	189	9	9
40 to <100	33	30	31	624	31	31
100 or more	33	30	31	1.080	54	54
Total	108	100	100	2.011	100	100
Italie						
0 to <2	1.072	46		1.371	9	
2 to<4	451	19		1.328	9	
4 to <8	336	14	42	1.959	13	16
8 to <16	215	9	27	2.297	15	19
16 to <40	162	7	20	3.105	21	26
40 to <100	59	3	7	2.315	16	19
100 or more	21	1	3	2.458	17	20
Total	2.315	100	100	14.833	100	100
U.S.						
< 0	556	27		35,652	9	
0 to <2	389	19		24,389	6	
2 to<4	158	8		10,555	3	
4 to <8	161	8	17	15,874	4	5
8 to <16	143	7	15	19,911	5	6
16 to <40	226	11	24	52,220	14	17
40 to <100	221	11	23	81,733	22	27
100 or more	190	9	20	137,328	36	45
total	2,044	100	100	377,662	100	100

Table 2a. Comparison of farm/holding size distribution measured in ESU, EU-15, NL, Italie, and the U.S., 1997

For U.S., includes all except 5,155 holdings with less than 1 hectare and with negative SGM. Sources: For EU, Farm Structure Surveys. For US, USDA, NASS and ERS, ARMS.

	Holdings (1	000)		Land area (1000 hectares)		
	No.	% of all	%, exc. Small	No.	% of all	%, exc. Small
European Union						
0 to <2	1.565	28		6.932	6	
2 to<4	928	17		4.282	3	
4 to <8	887	16	28	7.073	6	6
8 to <16	704	13	23	10.404	8	9
16 to <40	720	13	23	22.476	18	20
40 to <100	514	9	16	33.159	27	29
100 or more	291	5	9	40.220	32	35
Total	5.608	100	100	124.546	100	100
NL						
0 to <2	0	0		0	0	
2 to<4	1	1		3	0	
4 to <8	8	10	10	30	2	2
8 to <16	9	12	12	64	3	3
16 to <40	13	17	17	171	9	9
40 to <100	19	25	26	481	25	25
100 or more	27	35	36	1.165	61	61
Total	77	100	100	1.914	100	100
Italie						
0 to <2	568	34		688	5	
2 to<4	350	21		826	6	
4 to <8	293	17	39	1.298	10	12
8 to <16	188	11	25	1.544	12	14
16 to <40	160	10	21	2.635	21	23
40 to <100	80	5	10	2.474	19	22
100 or more	40	2	5	3.279	26	29
Total	1.679	100	100	12.744	100	100
U.S.						
< 0	668	31		36,138	10	
0 to <2	515	24		24,664	7	
2 to<4	159	7		9,213	3	
4 to <8	160	7	19	11,885	3	4
8 to <16	123	6	15	14,682	4	5
16 to <40	187	9	22	40,488	11	14
40 to <100	147	7	18	57,134	16	20
100 or more	219	10	26	161,545	45	57
total	2,179	100	100	335,750	100	100

Table 2b. Comparison of farm/holding size distribution measured in ESU, EU-15, NL, Italie, and the U.S., 2007

For U.S., includes all except 17,946 holdings with less than 1 hectare and with negative SGM. Sources: For EU, Farm Structure Surveys. For US, USDA, NASS and ERS, ARMS.

	OLD	OLD	NEW	NEW
Area	1987	1997	1997	2007
	Pe	rcent		
U.S., any days	57	58	58	65
U.S., nonfarm major	46	50		
occupation			50	55
EUR, 12	30			
EUR, 15		37	29	31
Belgium	33	19	17	16
Denmark	33	36	35	48
Germany	43	49	45	48
Greece	33	31	27	23
Spain	28	44	28	32
France	36	29	25	25
Ireland	36	34	33	47
Italy	24	31	24	28
Luxembourg	18	33	17	19
Netherlands	23	25	22	28
Austria		51	39	38
Portugal	39	39	33	25
Finland		52	49	43
Sweden		62	59	71
United Kingdom	24	39	30	42

Table 3. Percent of farm operators/holders with any off-farm work

For EU, New is other gainful activity as the major or subsidiary occupation. In 2007, number of holdings and, in 1997, number of persons. For U.S., source is Census of Agriculture for the principal operator. For EU, source is Farm Structure Surveys.

Italian Farms							
	Total	% of the category on total farms	% on each own cathegory	of which family farms	% of the category on family farms	% on each own cathegory	
BROADENING*	263 528	37 23	100	261 558	37 24	100	
Agri-tourism	12 780	1 81	100	12 538	1 70	100	
Landscape conservation	12,709	0.6	4.51	12,000	0.60	4.40	
Biodiversity conservation	4,200	0.0	0.60	1 956	0.00	0.70	
Renting machinery	23 536	3 33	8 30	23 205	3 32	8.28	
Leasing of land	238 701	33 73	8/ 18	236 973	33 74	84.25	
Temporary leasing	230,701	0 33	0.81	2 2 2 8 6	0.33	04.20	
	2,000	0.00	0.01	2,200	0.00	0.01	
DEEPENING*	335.233	47.36	100	333,249	47.45	100	
Direct sales	161.235	22.78	27.97	160.363	22.83	28.01	
Certification of origin PDO	71.482	10.1	12.40	70.573	10.05	12.33	
Organic farming	29.567	4.18	5.13	29.341	4.18	5.13	
Low impact farming	39.556	5.59	6.86	39.182	5.58	6.84	
Extensification	8.816	1.25	1.53	8.816	1.26	1.54	
On farm processing	265,765	37.55	46.11	264,170	37.61	46.15	
REGROUNDING							
Pluriactivity				298,542	42.51		
Total farms	707,776	100		702,360	99.23		
* Totals and percentages per category refer to the number of farms in which at least one							

Table 4: Diffusion of broadening, deepening and regrounding strategies in Italian farms, 2006

practice has been activated. As a consequence they differ from the sum of the column. Source: calculations on Italian FADN, 2006.

Table 5: Cha	racteristics ass	ociated to d	conventional	and mul	tifunctional	farms	in I	Italy
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	Conventional		Deepening		Broade	ning	Pluriactive
	non fam.	fam.	non fam.	fam.	non fam.	fam.	fam.
tot_land	80.1	12.79	97.46	16.78	158.36	27.16	13.16
tot_used_l~d	63.53	11.14	64.41	14.29	109.37	23.79	10.9
tot_AWU	4.09	1.23	3.6	1.2	4.79	1.58	0.91
fam_AWU	0.67	1	0.63	1.01	0.88	1.28	0.75
	0.16	0.81	0.18	0.84	0.18	0.81	0.82
ESU	6.81	5.22	6.56	5.11	7.72	6.06	4.85
cond11	0.56	0.94	0.3	0.96	0.41	0.95	0.96

If_sole 0 0.96 0 0.97 0 0.92 0.91 If_partner 0 0.04 0 0.03 0 0.08 0.03 If_corp 0.3 0 0.63 0 0.36 0 0 If_other 0.7 0 0.37 0 0.64 0 0 circ0 0.34 0.42 0.23 0.2 0.45 0.49 0.26 circ3 0.15 0.13 0.53 0.29 0.24 0.21 0.13 circ4 0.51 0.46 0.25 0.51 0.31 0.29 0.55
If_partner 0 0.04 0 0.03 0 0.08 0.01 If_corp 0.3 0 0.63 0 0.36 0 0 If_other 0.7 0 0.37 0 0.64 0 0 circ0 0.34 0.42 0.23 0.2 0.45 0.49 0.24 circ3 0.15 0.13 0.53 0.29 0.24 0.21 0.13 circ4 0.51 0.46 0.25 0.51 0.31 0.29 0.55
If_corp 0.3 0 0.63 0 0.36 0 If_other 0.7 0 0.37 0 0.64 0 0 circ0 0.34 0.42 0.23 0.2 0.45 0.49 0.23 circ3 0.15 0.13 0.53 0.29 0.24 0.21 0.13 circ4 0.51 0.46 0.25 0.51 0.31 0.29 0.55
If_other 0.7 0 0.37 0 0.64 0 circ0 0.34 0.42 0.23 0.2 0.45 0.49 0.23 circ3 0.15 0.13 0.53 0.29 0.24 0.21 0.13 circ4 0.51 0.46 0.25 0.51 0.31 0.29 0.55
circ00.340.420.230.20.450.490.2circ30.150.130.530.290.240.210.13circ40.510.460.250.510.310.290.55
circ30.150.13 0.530.29 0.240.210.13circ4 0.51 0.460.250.510.310.29 0.55
circ4 0.51 0.46 0.25 0.51 0.31 0.29 0.5
upland 0.05 0.13 0.17 0.15 0.28 0.19 0.13
hill 0.23 0.41 0.65 0.6 0.33 0.43 0.43
flatland 0.72 0.45 0.18 0.24 0.39 0.38 0.44
ft_cop 0.19 0.23 0.11 0.09 0.22 0.19 0.14
ft_hor 0.07 0.06 0 0.02 0.05 0.03 0.03
ft_wine 0.02 0.09 0.1 0.09 0.07 0.05 0.1
ft_fruit 0.17 0.19 0.06 0.06 0.02 0.07 0.1
ft_oliv 0 0.03 0.34 0.2 0 0.05 0.1
ote_latte 0.03 0.05 0.06 0.06 0.14 0.14 0.04
farm_net_i~e 125962.86 14829.49 46885.19 13968.48 182478.59 26882.73 6879.6
hh_indep_l~e 0.03 0 0.13 0.08 0.1 0.06 0.3
hh_dep_lab~e 0.15 0 0.1 0.18 0 0.1 0.6
hh_pensions 0.16 0.32 0.18 0.3 0.19 0.22 0.34
hh_capital~e 0 0.01 0.01 0.01 0.01
rf_ulf 4409.7 7140.48 9029.3 402.20

Table 6: Diffusion of broadening, deepening and regrounding strategies in Dutch farms,2007

		Dutch	n Farms			
	Total	% of the category on total farms	% on each own category	of which Family farms	% of the category on family farms	% on each own category
BROADENING	40,002	66.47	100	39,470	67.05	100
Agri-tourism total	5,296	8.80	13.24	5,246	8.91	13.29
Accommodation	2,073	3.44	5.18	2,073	3.52	5.25
Excursions	1,476	2.45	3.69	1,426	2.42	3.61
Restoration	389	0.65	0.97	389	0.66	0.99
Sports	688	1.14	1.72	688	1.17	1.74
Storage	1,811	3.01	4.53	1,811	3.08	4.59
(nature conservation) Landscape conservation Biodiversity conservation Renting machinery	14,548 -	24.17	36.37	14,470 -	24.58	36.66
(contract work)	17,207	28.59	43.02	17,138	29.11	43.42
Leasing of land	22,852	37.97	57.13	22,478	38.18	56.95

Temporary leasing	-			-		
Green care	516	0.86	1.29	516	0.88	1.31
Energy	1,091	1.81	2.73	1,016	1.73	2.57
DEEPENING Direct sales	11,224	18.65	100	10,964	18.63	100
products Direct sales	9,433	15.67	84.04			
processed products	442	0.73	3.94	442	0.75	4.03
On farm processing	872	1.45	7.77	872	1.48	7.95
Certification of origin PDO Organic farming	- 2 117	3 52	18 86	- 2 088	3 55	19 04
Low impact farming	-	0.02	10.00	2,000	0.00	10.04
Extensification	-			-		
REGROUNDING (sma	ller part of sa	ample *)				
Pluriactivity	29,659	49.28	100	29,286	49.75	100
Conventional (smaller part of sample *)	8,125	13.50	100	8,014	13.62	100
Total farms	60,182	100		58,867	97.81	

*) only the farms of which off farm income is known = 50% of total sample)

Table 7: Characteristics associated to conventional and multifunctional farms, the

 Netherlands

							Pluri-	
	Conve	entional *)	Deep	ening	Broad	ening	active *)	Total
	non		non		non			
	fam.	fam.	fam.	fam.	fam.	fam.	fam.	
Farms								
represented		8,014	260	10,964	532	39,470	29,286	60,102
tot_land		22.8	16.1	35.2	48.7	41.4	34.9	34.0
UAA		21.7	14.2	32.8	43.5	39.0	33.3	32.1
tot_AWU		2.28	12.96	2.66	5.96	1.98	2.18	2.19
fam_AWU		1.42	1.35	1.46	1.51	1.34	1.26	1.32
Fam/tot AWU (%)		62	10	55	25	68	58	60
ESU Distribution of farms		144	670	141	424	129	107	125
Arable		1	6	9	6	17	15	14
Dairy		39	0	20	23	31	35	32
intensive		15	0	4	25	6	8	9

livestock

_

12 24
24
5,269
',146
5,402
3,830
2,326
50
3

*) only the farms of which off farm income is known = 50% of total sample)

Table 8.–	-Multifunctionality	characteristics of	of U.S.	farms by	ESU, 2007

	European siz	e unit	
Item	< 100 ESU	100 or more ESU	All
Number of farms	1 958 351	219 023	2 177 374
Percent of farms	89.9	10.1	100.0
Number of family farms*	1 918 008	205 985	2 123 993
Percent of family farms*	90.3	97	100.0
Average number of bectares	99	738	163
Percent of hectares	54.6	45.4	100.0
Average value of production Euro	20 726	803 391	99 455
Share of value of production	18.7	81.3	100.0
BROADENING		Percent	
Agritourism	2	2	2
Government landscape conservation	15	24	16
Energy production (wind, solar)	1	2	1
Own all acres operated	70	23	65
Use of hired manager	0	3	1
Use of hired labor	26	79	31
Ownership shared outside household	10	27	11
Use of borrowed capital	-		
Non-real estate debt	11	41	14
Real estate debt	19	48	22
Farm business debt-asset ratio >=0.10	16	48	19
DEEPENING			
Commodity specialization	54	92	58
Organic production	1	2	1
Fallow and cover crop	18	25	19
Conserving tillage practices	19	61	23
Intensive management grazing	20	24	21
Government practices program	1	4	1
Community-oriented marketing:	7	6	7
Community sponsored ag	0	1	0
Value added ag	2	3	2
Direct sales	6	4	6
REGROUNDING			
Share with non-farm earnings	82	64	80

Source: 2007 USDA Agricultural Resource Management Survey. Alaska, Hawaii, and US territories are excluded from the surveys. Excludes farms of < 1 ha. with a farm loss. *Farms where 50% or more of assets are owned by related individuals.