FACTOR MARKETS

Comparative Analysis of Factor Markets for Agriculture across the Member States

245123-FP7-KBBE-2009-3

WORKING PAPER

No. 7, October 2011

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Farm Level Capital:
Capital positions, structures, the dynamics of farm level investments, capital accumulation and leverage positions

ABSTRACT

This paper aims to describe and highlight the key issues of farm capital structures, the dynamics of investments and accumulation of farm capital, and the financial leverage and borrowing rates on farms in selected European countries. Data collected from the Farm Account Data Network (FADN) suggest that the European farming sector uses quite different farm business strategies, capabilities to generate capital revenues, and segmented agricultural loan market regimes. Such diverse business strategies have substantial, and perhaps more substantial than expected, implications for the financial leverage and performance of farms. As an illustration, the financial risks clearly increased in the Danish agricultural sector with loan rates following an upward sloping trend in 2006; the first sign of the forthcoming financial crisis that may also severely hit highly leveraged agricultural firms.

By using standard measures for farm assets and lending rates, we reveal that countries adopt different approaches to evaluating agricultural assets, or the agricultural asset markets simply differ substantially depending on the country in question. This has implications for most of the financial indicators. In those countries that have seen rapidly increasing asset prices at the margin, which were revised accordingly in the accounting systems for the whole stock of assets, firm values increased significantly, even though the firms had been disinvesting. If there is an asset price bubble and it bursts, there may be serious knock-on effects for some countries. The large variation in leverage positions and their substantial decrease over time raises new issues to be addressed in more analytical studies.

Available for free downloading from the Factor Markets (www.factormarkets.eu) and CEPS (www.ceps.eu) websites

ISBN-13: 978-94-6138-128-6

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Sami Myyrä, Kyosti Pietola and Anna-Maija Heikkilä*

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1. Introduction

Commercial farms are profitable if they produce annual income and accumulate the expected value of the firm along the lines suggested by Bellman's principle of optimality (see below). Annual income has generated considerable interest in research and agricultural policy-making. However, besides generating annual income, a family farmer may also have a goal to accumulate wealth through capital gains by investing and increasing the value of his or her assets either on-farm or off-farm. The capital gains are then realised later in the future, either by forwarding the farm and the assets to a successor or by selling them on the market. The question then is what would be the preferred strategy for the farmer to accumulate his/her wealth by balancing the net income flows and investments in assets to increase expected capital gains? It appears that agricultural policies have promoted, and farmers have exploited, different strategies in this regard in different European countries. In some countries, quite aggressive expansion strategies combined with rather risky financial leverage positions have prevailed; while in other countries farmer expansion strategies have been more modest and restricted to safer financial leverage.

It is evident that farmers' access to scarce farm assets, such as land, and access to attractive terms of financing for the preferred strategies plays a major role in agricultural development. In addition to income flow considerations, financing possibilities are bound from above by the leverage rates and collateral requirements of farms. These upper bounds may be exogenously fixed, particularly for family farms that do not have the same possibilities to collect their own capital in their asset portfolios, as, for example, limited companies. Therefore, the current capital endowments, capital structures and financial leverage of farms are the critical underlying factors that finally determine the potential for future development patterns and the performance of European agricultural sectors. An emerging question is how efficient the local capital market is in valuing farm assets correctly, in defining fair upper boundaries to financial leverage, and in defining attractive borrowing rates for agricultural loans.

This paper describes and highlights the key issues of farm capital endowments and structures, the dynamics of investments and accumulation of farm capital, as well as the financial leverage and borrowing rates on farms in selected European countries. This description is extended by providing a simple calculation of agriculture premium rates asked by lenders for agricultural loans compared to other industrial sectors. This 'agri premium' describes the general position of agricultural entrepreneurs on financial markets in these selected countries.

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We further examine how the leverage positions are developed as compared to asset price developments, since there is a possibility that the dominant strategies endorsed by a large number of farms will also affect local asset prices. If aggressive expansion strategies to exploit economies of scale have been dominant and the financial market has been liquid, allowing for high financial leverage, then the likelihood of asset price bubbles may have increased. Asset price bubbles may reduce the sector's resilience to financial shocks. If the liquidity of the financial market decreases, the price bubble may burst and the financial risks taken in highly leveraged firms may be realised.

Asset price bubbles also relate to the extent to which the agricultural subsidies under the CAP are capitalised into agricultural asset values, such as land and farm compounds. In financing agricultural holdings, the capitalisation effects can be two-fold and complicated by the fact that asset ownership and active farming deviate from each other. As more and more agricultural assets are held and operated under lease contracts, the capitalisation effect accumulates only proportionally in the values of active farms, while the remaining proportion adds directly to the operating costs in terms of increasing rents and investment expenses. Thus, farm capital structures and leverage positions give valuable signals of how resilient the European agricultural systems are to exogenous shocks in production (natural) or in the capital and commodity markets.

2. Data and measurements

2.1 Data

To determine farm assets and leverage positions, data from the Farm Account Data Network (FADN) are examined. The FADN is a survey carried out by the member states of the European Union. Every year it collects accountancy data from about 80,000 agricultural holdings. The FADN is the only source of micro-economic data that is harmonised so that the book-keeping principles are the same in all member states and the data are comparable among these countries.

The FADN data cover commercial agricultural holdings defined by their economic size (RI/CC 882 Rev.8.1).[1] Since the smallest farms, such as subsistence farms for the most part only producing for their own household consumption, are excluded in the data, the FADN data represent 39% of all agricultural holdings within EU member states. In terms of agricultural output, the FADN farms nevertheless reflect EU agriculture well, since the farms represented by the FADN account for more than 90% of all commercial agricultural production in the EU.[2]

In collecting the data, for the most part we used the electronic link of MTT Economic Research, Finland (www.mtt.fi/eufadn). The original data source is: FADN-EC-DG AGRI/L3.

The indicators we compute are for the most part drawn from two FADN accounts: the annual balance sheets and profit/loss statements (see Appendix 1 for detailed definitions). The capital and asset values are taken as the end of year closing values. In addition, the net investments are collected from separate data sheets. More definitions of the indicators used are provided with the results.

2.2 Countries studied

In the description of investments, leverage positions and capital market issues at the farm level, we focus on a particular selection of EU countries, since highlighting the main issues would otherwise become too detailed. The countries are selected in the analysis so that they

[1] Definition of variables used in FADN standard results, European Commission, (2007) DGAgRD, Brussels.
[2] See the European Commission website:
(http://ec.europa.eu/agriculture/analysis/fadn/index_en.htm).

represent different economic sub-regions and agricultural sectors in Europe. Germany, France, Italy and the UK represent the old member states with large agricultural sectors. Competitive arable crop farming is hugely important in all these countries, especially in France. These countries also represent a conservative approach to asset valuation and thus give a good reference point for studying the development in new member states. However, there is considerable variation in farm size among this group of member states, which on average terms include the largest (UK) and smallest (Italy) farms in the study. Unfortunately, the 2008 FADN data from Italy were not complete/available at the time of analysis, so we therefore have to restrict the analysis for Italy to 2007 data.

Denmark and the Netherlands represent the most intensive farming systems in Europe. In these countries, farms have invested heavily in either high-value crops or in intensive animal production. In the Netherlands, in particular, the agricultural asset values, such as land values, have also been increased by significant population pressures. High land values create financial collateral, but they also restrict farmer access to land and, due to environmental regulations, impose restrictions more broadly on the expansion of farming systems.

Ireland represents a country where cattle and sheep production based on grasslands and pastures plays a large role. The latest developments in the Irish banking sector also give an interesting starting point for the study. Farms in Ireland represent the smallest of this study, if measured in terms of economic size units (ESU) (Table 1).

Table 1. Countries selected for the descriptive analysis

	Year of joining the EU (former EEC)	Average farm size (ha) in 2008	Share of total rented land in UAA (%)	Average farm size (ESU) in 2008	All subsidies** euros per farm excluding investment aid in 2008.	All subsidies** euros per ESU excluding investment aid in 2008.
Denmark	1973	82.57	28.3	114.0	29,621	260
Germany	1950	84.81	69.9	93.6	35,391	378
France	1950	77.77	84.6	77.6	28,013	361
Hungary	2004	54.34	66.1	22.6	14,536	643
Ireland	1973	45.70	17.8	22.2	20,482	898
Italy*	1950	16.8	38.8	32.9	5,687	173
Netherlands	1950	32.54	40.1	157.7	17,439	111
Finland	1995	52.61	35.0	40.6	48,052	1,184
UK	1973	160.19	42.8	100.6	43,968	437

*2007

** CAP + national subsidies.

UAA, Utilised Agricultural Area.

Source: Farm Account Data Network (FADN).

Finland represents the northern agricultural regions with extensive natural handicaps due to the Arctic climate. In addition, it is one of the three countries that joined the EU in 1995. The Finnish case is also interesting since its average farm size was small in 1995 and extensive structural adjustment and investment programmes were launched when it joined the common market.

Hungary is one of the ten countries that joined the EU in 2004. Its competitive and large arable crop sector contributes significantly to the EU supply for arable crops. Hungary is a country with an agricultural history of large collective farms, so the farming structures and farms asset structures differ from those of the old member countries. Since we are for the most part using FADN data, we could not include an example of the two 2007 accession countries, because their FADN data would have been too sparse.

2.3 Accumulation of farm assets

The economic well-being of farms is typically evaluated in terms of farm income. However, the true evaluation of economic success should be also based on the wealth accumulation of the farm household (Hill, 2000). Accumulated assets enable farms to secure credit and smooth the consumption expenditures in times of income shortfall. Studies explaining wealth accumulation on agricultural holdings are sparse, and to our knowledge do not exist for such an international analysis or comparison between countries (Vercammen, 2007). However, analyses in the opposite direction, i.e. annual farm income, have been numerous (Winters et al., 2009). These studies have assessed the effects of promoting certain key assets, such as education systems, roads, equipment or land, and how they affect the economic activities and annual farm income of rural households. Nevertheless, this paper does not explain the reasons for the accumulation of assets in selected EU countries, but rather describes the trends observed in 1989–2008.

National analyses have highlighted some explanatory variables for asset accumulation in agriculture (Mishra & El-Osta, 2005: Lagerkvist et al., 2007). Mishra and El-Osta (2005) pointed out the importance of land. Intermediate and large farms tend to have greater wealth. However, it is not only farm size that matters. Farms located in sparsely populated rural areas appear to have fewer business opportunities and they also face a lower increase in land prices than farms located in neighbourhoods close to metropolitan areas. Mishra and El-Osta (2005) additionally confirmed a classical U-shaped wealth/age profile, where disinvestments in productivity-increasing agricultural assets occur among young and aged farmers. The finding was that the disinvestment strategy starts at an earlier age among those farmers whose wealth primarily originates from agriculture as compared to farmers who also have other wealth sources. This tendency somehow indicates that off-farm income may significantly contribute to agricultural investments. Aged farmers working off-farm may at least require higher labour productivity in agriculture and thus substitute labour with capital, even if these investments do not increase the total factor productivity of the farm.

Mishra and El-Osta (2005) noted that off-farm income and assets contribute to investments in agricultural assets. Lagerkvist et al. (2007) tested whether farm capital is endogenous to off-farm income. The data they used rejected exogeneity and suggested a significant connection between off-farm income and farm assets. Thus, not only agricultural markets, production decisions and agricultural policy affect the accumulation of farm assets, but also the surrounding business and employment opportunities defined by the overall economic activities in the area.

Numerous studies have shown that subsidies, either coupled to or decoupled from production, capitalise in farm productive assets such as land (Hennessy, 1998; Ciaian & Swinnen, 2006). It has also been demonstrated with a stochastic dynamic programming model that direct payments raise the expected value of marginal investments because they reduce the risk of bankruptcy over time and thus affect the expected values of farm assets (Vercammen, 2007).

As showed by Vercammen (2007), the time horizon is important in farm investments, but the discount rates as well as the borrowing/savings rates also have a major influence on farmers' decisions when considering the opportunity cost of capital and, in particular, investing in agriculture versus withdrawing the profits for consumption. Thus, rate of time preferences (RTP) indicate how much farmers discount the utility of consuming in the next period relative to the utility of consuming now. The rate of time preference is an important determinant in dynamic modelling of investments because the returns and costs occur over time and alternative streams must be compared.

Lence (2000) formalised decision-making by farmers in a generalised expected utility (GEU) framework in which the objective of farmers is to maximise the lifetime utility function. By applying this framework to US farm data on consumption and assets returns, he showed that farmers discount the utility of future consumption at a rate somewhere between 2.9% and 5.1% per year.

The optimal timing of investments conditional on time preferences and uncertainty can be formalised through a stochastic dynamic optimisation problem. Numerically solvable investment rules could be formalised, for example, in a dynamic programming framework introduced by Bellman (1957):

$$(1) \qquad V_t(z_t) = \max_{u_t} \left\{ R_t(z_t, u_t) + \beta V_{t+1}(z_{t+1}) \right\}, \quad t = 0,1,\ldots,T$$

$$\text{subject to} \qquad z_{t+1} = g(z_t, u_t)$$

$$z_o \text{ and } \beta \text{ given .}$$

where the optimal value function (V_t) is the function of the current asset level (z_t) and annual use of inputs u_t . $R_t(.)$ is the one-period net return function, and β is the discount factor. The optimal value function is constrained by transition equations, in which $g(.)$ is a function of investments in agricultural productive assets and annual input use. Assets are also influenced by depreciation. These rules give the optimal level of investments, for example, in land improvements or capital investments in animal husbandry, and thus set the asset level to be achieved (Myyrä et al., 2005; Niemi et al., 2010).[3]

The Bellman equation also highlights the trade-offs between the current net revenues (R_t) and the expected capital gains through the next period value function (V_{t+1}), i.e. the next period value of the investment asset. In this context, the farmer could, for example, accept a decrease in his or her current income if it is at least compensated through an increase in the expected capital gains. In other words, a farmer could accept a low income if the value of the firm is expected to increase. This trade-off clearly has implications for choosing between investment and capital accumulation options, and also for the development of a firm's leverage position.

An additional motivation for investments and the search for capital gains rather than collecting high current profits comes through taxation, for at least two reasons. First, tax authorities cannot tax capital gains before they are observed. Thus, the present value of taxes is reduced, as the capital gains taxes can only be collected after the asset is sold and the gain is realised. This taxing realm has been shown to significantly affect the optimal timing of decisions concerning the underlying assets (e.g. Dammon & Spat, 1996; Pietola et al., 2011).

Second, tax systems in the EU commonly favour agricultural assets. Concessions compared to the taxation of other forms of capital typically appear in cases of inheritance, gift taxes or stamp duties (Hill & Cahill, 2007). Most EU countries also impose concessions on annual property taxes for agriculture. These are often implemented at the regional level, and national situations may thus be complex with considerable variation within countries. Special valuation methods and prices lower than real market prices are typically used as a taxation base (OECD, 2006). Taxation incentives and concessions on capital taxes might lead to over-investments in agriculture.

2.3.1 Total assets

Definition

A farmer's total assets are defined to include land, other fixed assets and total current assets. Only assets in farmer ownership are taken into account, excluding leased machinery, for example. These indicators are based on the value of the various assets at the closing valuation.

For those assets that depreciate, the depreciation rates can usually be decided by farmers up to certain upper bounds that are imposed locally, e.g. through taxation regulations separately

[3] An alternative is to use the dual approach and then estimate the optimal investment demands, input demands and output supplies as a system (e.g. Pietola & Myers, 2000). These groups of models are often also referred to as the flexible accelerator models.

for each asset class, such as machinery and buildings. Farmers can choose the preferred depreciation rates according to various factors, which depend for the most part on the particular conditions of the region, the intensity of asset use, and also on the expected degree of technical progress. The amount of annual depreciation may be calculated according to the linear or diminishing balance method (RI/CC 1439).

Flexible depreciation rates raise questions about the possibility of manipulating the value of assets. Depreciation systems have been compared, for example, by Barkaszi et al. (2009), and they also provide a complete table of depreciation systems and recording in different EU member states.

Total assets on a farm change over time for two reasons. First, the balance of gross investments and depreciation, i.e. the net investments, define whether capital accumulates or decays at given (fixed) prices. Second, the asset values can be re-evaluated to account for inflation and market price movements. Re-evaluation of asset values can have a strong and sometimes predominant influence on the value of total assets.

To at least partially control for large investments affecting the farm size and factoring out the farm size effect in comparing farm assets, we normalise the data according to the farms' economic size units (ESU). These ESU-normalised asset values reveal differences in asset valuation in book-keeping (Tables 1–4 and Appendix 2). It is evident that different asset ownership and leasing strategies create large discrepancies between countries in the asset portfolios of farms. In some regions, traditional family farms own most of the agricultural assets, whereas in other countries farms have been outsourcing activities and/or rent all their machinery and land.

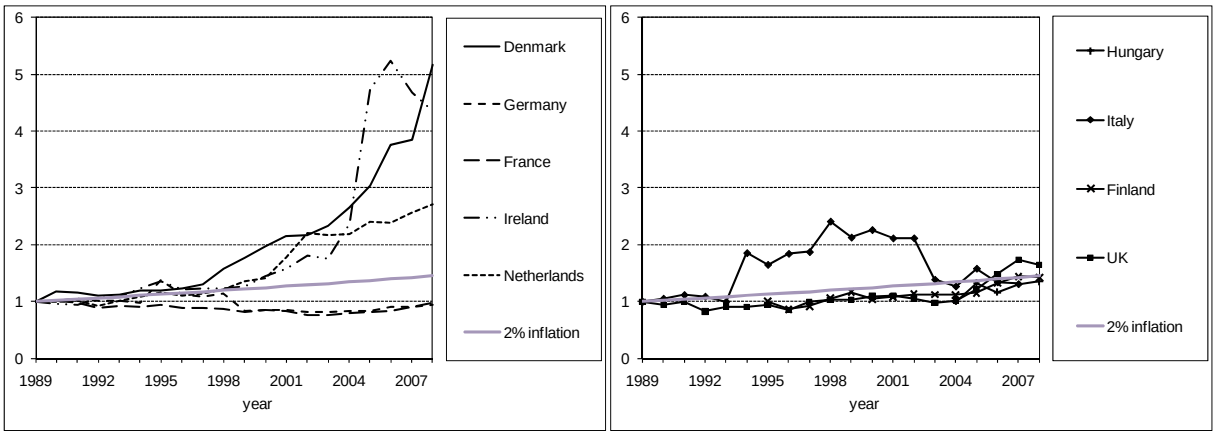
And further, the development of asset values in real terms depends on the inflation rate. Therefore, one benchmark to look at the development of agricultural asset values is to compare them to inflation. In doing this, we simplify our comparisons by using a fixed 2% annual inflation for all countries. The 2% annual inflation rate approximately corresponds to the geometric average of the inflation rate in Europe since 1997.[4] At 2% annual inflation, the real value of an asset remains unchanged over a 20-year period (e.g. 1989–2008), if its nominal value increases the initial value at the beginning of the period by 1.46 times. The results are presented according to the production sector in Figures 1–3.

Arable crop farms

On arable farms the asset values per economic size unit (ESU) have been increasing most rapidly in Denmark, where they rose by a factor of 5.2 during the years 1989–2008 (Figure 1). The asset values have also increased reasonably rapidly and have clearly exceeded inflation in Ireland (4.4) and the Netherlands (2.7). In addition, asset prices have risen quickly in Hungary, but for this country we only have data since the country joined the EU in 2004.

[4] See the Eurostat website (http://epp.eurostat.ec.europa.eu/tgm/table.do?tab=table&plugin=1&language=en&pcode=tsieb060), HICP - all items - annual average inflation rate - annual average rate of change in Harmonised Indices of Consumer Prices (HICPs).

Figure 1. Total assets on arable farms (euros/ESU) in 1989–2008. 1989 = 1, nominal values (2% inflation is indicated by a grey line)



Source: Authors' own calculations.

In absolute terms of euros per farm, asset values also increased most rapidly on Danish arable farms, where the value of land alone increased from €53 000 in 1989 to €1.3 million in 2008, i.e. by 25-fold, while the economic size (ESU) of these farms doubled from 26.5 to 55.6 ESU. The appreciation of land values in Danish accounts has been extremely rapid. For example, land values increased from €393 000 in 2006 to €842 000 in 2007 with only a marginal change in total area (+0.3 ha). At the same time, the values of other fixed assets were dramatically scaled down (see Appendix 2 for details).

The increase in asset values in Denmark, Ireland and the Netherlands has primarily been based on the re-estimation of asset values rather than investments or increases in farm size. Taken as a geometric mean, increasing asset values have provided good compensation for owners by giving 9.0–5.4% annual capital gains (Table 2).

Table 2. Total assets on arable farms in 1989 and 2008

TOTAL ASSETS (euros/ESU), nominal prices						
Euros/ESU, nominal prices				**Euros/farm, nominal prices**		
	1989#)	**2008##)**	Annual increase (%) in total assets / ESU	**1989#)**	**2008##)**	Annual increase (%) in total assets / farm
Denmark	6,449	33,297	9.0	170,902	1,851,317	13.4
Germany	9,744	9,163	-0.3	334,227	998,798	5.9
France	3,985	3,918	-0.1	178,530	324,410	3.2
Hungary*)	6,329	8,540	7.8	122,154	175,923	9.5
Ireland	9,467	41,238	8.1	368,255	1,455,717	7.5
Italy**)	10,494	13,767	1.5	124,877	379,981	6.4
Netherlands	6,527	17,731	5.4	494,085	1,794,343	7.0
Finland***)	9,108	12,967	2.8	177,601	320,290	4.6
UK	8,339	13,689	2.6	842,281	1,715,173	3.8

#*)2004
##**)2007
#***)1995
Source: FADN data.

The normalised per ESU values for agricultural assets on arable farms in Germany (0.9) and France (1.0) have remained constant or even decreased. Thus, in real terms the asset values have clearly decreased in both of these countries (grey line in Figure 1). However, farm size has tripled in Germany and doubled in France. Thus, the asset values per farm have increased concurrently with the increase in farm size.

In Italy (1.5), Finland (2.8) and the UK (2.6), the asset values of arable farms have followed or slightly exceeded inflation. The development has been smooth in Finland and the UK. In Italy, asset values jumped in 1994, but they decreased to the 2% inflation curve again in 2003. The development of asset values on Hungarian arable farms was rapid in the late 1990s, but then subsequently decreased almost to the 2% inflation path.

Dairy farms

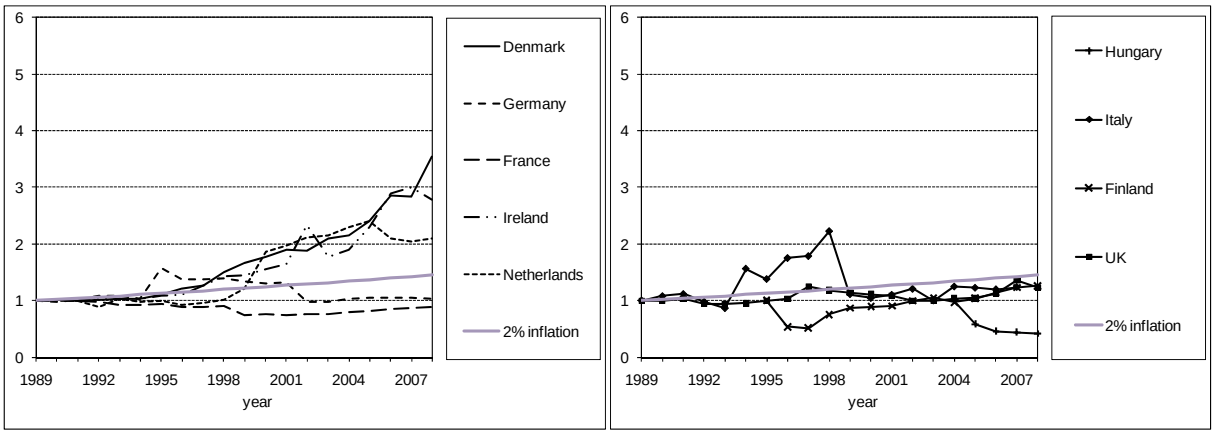
The ranking of countries in agricultural asset value comparisons is similar for dairy farms when compared to the arable crop farms described above. Asset values increased most rapidly and clearly faster than 2% inflation in Denmark, the Netherlands and Ireland (Figure 2). A clear gap is also apparent between these and the remaining countries in terms of asset values per ESU, which were respectively €17 076, €17 749 and €23 510 at the end of the sampling period in 2008 (Table 2). The remaining countries, except Italy, showed asset values below €10,000 per ESU. Thus, in Denmark, the Netherlands and Ireland, dairy farms have been about twice as capital-intensive as elsewhere in Europe. Since the late 1990s, the asset values have increased rapidly as a function of increasing farm size in the three countries with the most capital intensive dairy farms (Appendix 2).

In the mid-1990s, the asset values on dairy farms in Germany and Italy temporarily jumped, but since then the countries have followed the same pattern as the others. Without knowing the real life changes and development in dairy farms in Germany and Italy, this sharp change in asset values per ESU seems odd. The structural development of dairy farms has been very rapid, especially in Italy, where the ESU of milk farms increased from 18.0 to 70.5 during 1989–2007. The occurrence of production lags from investment to full production might give one explanation for the jump in asset values/ESU. This is also justified by the per farm asset values, which have increased in the long term in parallel with farm size.

The stagnated development of asset values on UK and French dairy farms might reveal problems in the profitability of the dairy sector in these countries. Replacement investments have simply overdone the depreciation so that the net investments have been positive in nominal terms, but they have not really kept up with inflation.

The asset values per ESU on Hungarian dairy farms have shown a striking downward sloping trend since the country joined the EU, but this trend is due to a rapid increase in farm size in ESU. The total assets of Hungarian dairy farms per farm have remained almost constant, regardless of participation in the EU (Table 3). Almost similar development was recorded in Finland when it joined the EU. It might be predicted that investment support schemes would induce asset accumulation that exceeds inflation in Hungary, but this does not seem to have been the case (Figure 2). For further details, see Appendix 2.

Figure 2. Total assets on dairy farms (euros/ESU) in 1989–2008. 1989 = 1, nominal values (2% inflation is indicated with a grey line)



Source: Authors' own calculations.

Table 3. Total assets on dairy farms in 1989 and 2008

TOTAL ASSETS						
Euros/ESU, nominal prices				**Euros/farm, nominal prices**		
	1989#)	**2008##)**	Annual increase (%) in total assets / ESU	**1989#)**	**2008##)**	Annual increase (%) in total assets / farm
Denmark	4,823	17,076	6.9	290,832	3,452,757	13.9
Germany	9,220	9,587	0.2	277,511	688,370	4.9
France	5,935	5,320	-0.6	170,925	347,934	3.8
Hungary*)	9,273	3,890	-19.5	278,194	248,587	-2.8
Ireland	8,456	23,510	5.5	268,050	1,403,559	9.1
Italy**)	11,170	13,841	1.2	201,064	975,768	9.2
Netherlands	8,398	17,549	4.0	597,113	2,197,195	7.1
Finland***)	6,174	7,793	1.8	129,031	407,558	9.3
UK	7,828	9,643	1.1	564,366	1,261,302	4.3

#*)2004, ##**)2007, #***)1995

Source: FADN data.

Pig and poultry farms (granivores)

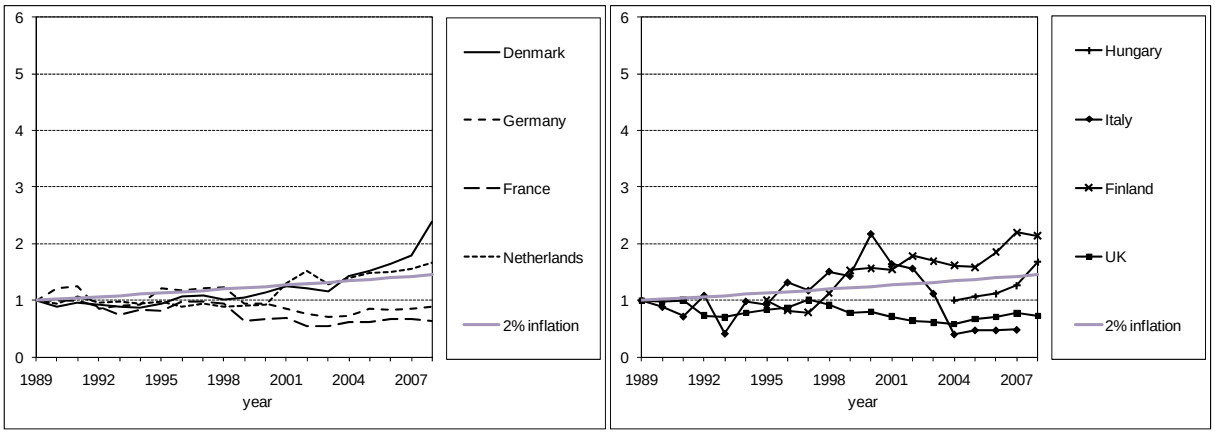
The asset values per ESU increased fastest in Finland and Hungary after they joined the European Union: Finland in 1995 and Hungary in 2004. EU membership almost doubled the asset values in these countries, but the reasons for this development differ. In Hungary, the average farm size has decreased and assets per farm remained stable, hence resulting in increasing asset values per economic size unit (ESU). In Finland, on the other hand, the average farm size has almost doubled and assets per farm have almost quadrupled.

The changes in asset values normalised for ESU have not been as great for granivore farms as for arable and dairy farms. However, at some points in time the asset values jumped in some member states to an extent that is not observed in other production sectors. For example, values per ESU have been volatile in Italy. This might be partially caused by the definition of the ESU, which is based on the distribution of different farm output values. Therefore, a significant proportion of farms may have switched from one group to another depending on the annual yield and price variation. The large annual variation in farm size also suggests that

farms have been switching between the categories. For example, the size of Italian granivore farms more than tripled within a year, increasing from ESU 148.6 in 2003 to ESU 472.8 in 2004.

The group of farms with the largest farm assets in this study are granivore farms in Denmark. They have in average terms a balance sheet with total assets valued at almost €4.7 million euros (Appendix 2). Farm asset values have increased significantly due to large net investments and the increasing size of their operations, but also due to increased asset prices. The asset values were scaled up, especially in the later years of the sample. The total asset values continued to increase by one million euros in 2007–2008, while farm size slightly decreased. This almost doubled the net asset values on these farms, from €825,025 to €1,500,821. For details, see Appendix 2.

Figure 3. The total assets on granivore farms (euros/ESU) in 1989–2008. 1989 = 1, nominal values (2% inflation is indicated by a grey line)



Source: Authors' own calculations.

Table 4. The total assets on granivore farms in 1989 and 2008

TOTAL ASSETS						
Euros/ESU, nominal prices				**Euros/farm, nominal prices**		
	1989#)	**2008##)**	Annual increase (%) in total assets / ESU	**1989#)**	**2008##)**	Annual increase (%) in total assets / farm
Denmark	5,653	13,471	4.7	514,476	4,685,311	12.3
Germany	8,226	7,240	-0.7	301,102	876,767	5.8
France	4,868	3,096	-2.4	278,490	325,394	0.8
Hungary*)	5,521	9,232	13.7	264,461	301,912	3.4
Ireland						
Italy**)	6,844	3,316	-3.9	401,097	1,155,259	6.1
Netherlands	6,479	10,720	2.7	412,721	1,597,290	7.4
Finland***)	3,644	7,789	6.0	200,832	725,218	10.4
UK	6,374	4,598	-1.7	409,224	838,800	3.8

#*)2004, ##**)2007, #***)1995

Source: FADN data.

2.3.2 Profit-to-assets ratio

Definition

The profit-to-asset ratio (profit/assets) is calculated for farms as (net profit + interests paid) / total assets.

All results are subject to total assets and describe the correlation between profits and assets. A large number of studies have confirmed the positive correlation between farm (land) asset values and returns on agricultural assets. The negative correlation between asset values and interest rates is also well established (Featherstone, 1987). Interest rates faced by agricultural holdings, also referred to as lending rates, will be described in chapter 2.5.3.

Arable crop farms

The geometric average of the profit-to-asset ratio over the study period among the selected countries has been 5.9% on average. Thus, these indicators suggest that when allocating no profits as returns on the farm families' own labour, the farm assets have generated an average annual return of 5.9%. The lowest ratio has been in Denmark (3.8%) and the highest in France (13%). France differs considerably from other countries, since the second highest ratio is 8.2%, which is observed for Hungary over the shorter time period of 2004–2008. The main explanation for the high profit-to-asset ratios in France is the low asset prices.

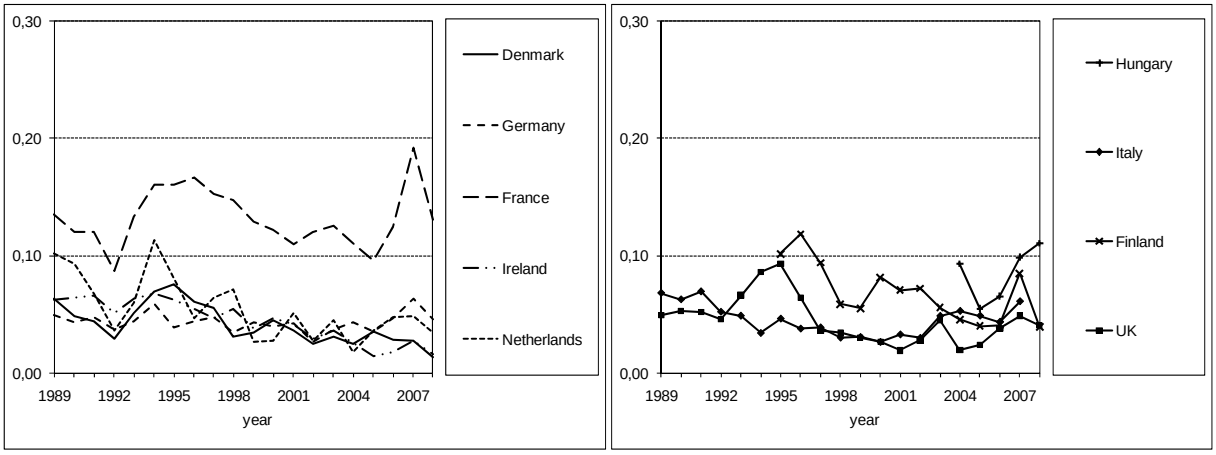
In large member states such as France, Germany and the UK, the asset values have increased in parallel with net profits and interests paid. Thus, the profitability measured by the profit-to-assets ratio has remained unchanged in the long term.

The effects of the sharp increase in grain prices during the 2007/2008 food crisis can be observed in the data. The surge in grain prices in 2007 increased the profit-to-asset ratios accordingly and ended a long-lasting downward sloping trend in the profit-to-assets ratio of arable farms. Thereafter, when the grain prices decreased again, the ratios also quickly decreased and in many countries they returned to the pre-food crisis levels in 2006.

The profit-to-asset ratio has been significantly lower in Germany (4.4%) than in France (13.2%). The volatility has also been lower, remaining within the boundaries of 2.6% and 6.4% (Figure 4). In the Netherlands and Ireland, the ratios gradually decreased over the sampling period, ending at their lowest values in 2008.

In new EU member states, which are represented in this analysis by Hungary, the profit-to-asset ratio seems to be higher than average. The grain price peak in 2007 still carried good profitability through to 2008, while the ratio decreased in other member countries.

Figure 4. Profit-to-asset ratios on arable crop farms in 1989–2008



Source: Authors' own calculations.

Dairy farms

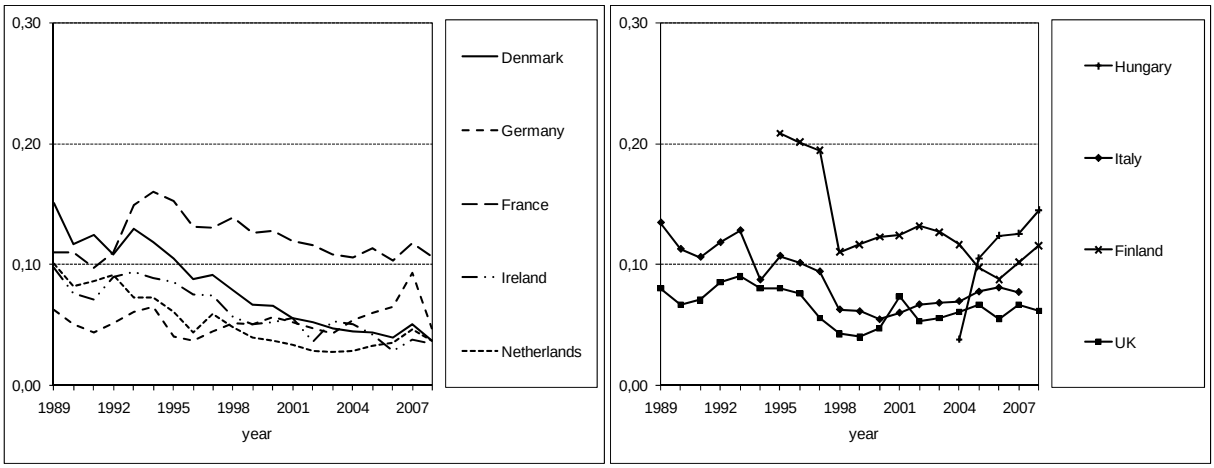
On dairy farms, the geometric average of the profit-to-asset ratio over the study period has been on average 8.1% among the selected countries, which is 2.2%-points higher than the corresponding ratio on crop farms. This discrepancy comes at least partially from the high labour intensity of the European dairy sector. The lowest ratio has been in the Netherlands (4.9%) and the highest in Finland (12.8%), with France ranking second immediately after Finland with the ratio of 12.1%.

The profitability trends of dairy farms measured by profit-to-asset ratios have been declining, with few exceptions (Figure 5). The profit-to-asset ratio has declined sharply in Denmark, Ireland and the Netherlands to the level of 3.5%, when it used to be around 10% in the late 1980s. This development shows that the capability of dairy farmers to carry on and generate good returns in relation to their debt load has been worsening. It appears that the profit-to-asset ratio has followed the agricultural lending ratio in these countries, as lending rates have also been decreasing. However, lending rates have turned to an increasing trend, and an important question is whether dairy farms will also be able to turn their profit-to-asset ratios to an increasing trend. The current FADN data demonstrate that at least in Denmark the lending rates are rising faster than profit-to-asset ratios. In fact, entrepreneurial profits have already turned negative on Danish dairy farms, a situation that has not been observed in any other country in any year. Negative entrepreneurial profits mean that farming families have received no compensation for either their own capital or the family labour. Nevertheless, Danish dairy farmers have received compensation for their efforts through increased asset values, as described earlier.

Dairy farms in France have maintained their profit-to-asset ratio above 10% following the peak in 1994 (14.9%). Surprisingly, German dairy farms seem to have benefited from the peak in grain prices in 2007. The profit-to-asset ratios of dairy farms in the UK have remained between 10% and 5%, with a few exceptions in the late 1990s.

The developments in profit-to-asset ratios in the more recent member states of Finland and Hungary have differed. In Finland, the development pattern has been sloping downward. Especially in 1998, when investments triggered by the investment aid programmes were realised, the asset values quickly rose without sharp changes in output. Sales increased smoothly later on. In Hungary, the sales of dairy farms have already doubled, while asset values per farm have decreased (Table 4).

Figure 5. Profit-to-asset ratios on dairy farms in 1989–2008



Source: Authors' own calculations.

Pig and poultry farms (granivores)

On pig and poultry farms, the geometric average of the profit-to-asset ratio over the study period has been 5.1% on average among the selected countries, but the ratio has displayed

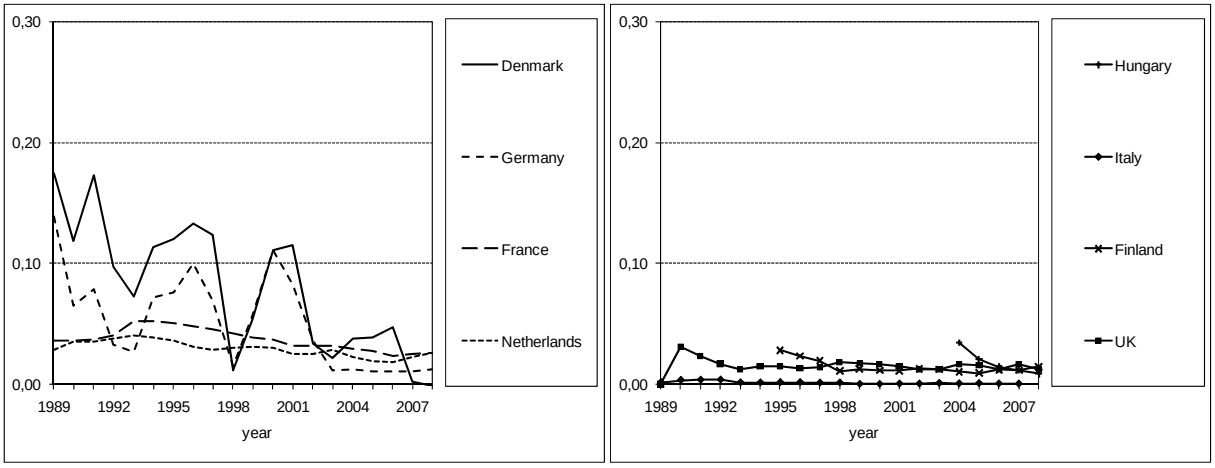
large variation between countries and years. The lowest ratio has been in Italy (1.0%) and the highest in Denmark (5.9%).

Farms with granivores used to have the highest profit volatility across time, and the average standard deviation of the profit-to-asset ratio is estimated amongst the case countries at 53% of the mean. The highest annual variation has been in Germany, where the standard error of the ratio is estimated to be as high as 108% of the mean. Denmark ranks second with 92% variation. The lowest annual variability has been in the Netherlands (22%).

Increasing grain prices have hit these farms very hard and their profitability decreased to an extremely low level towards the end of the sampling period. The situation is worst in Denmark, with negative entrepreneurial profits and over €3 million in farm-based liabilities. However, the net assets are still high, and if an average granivore farmer in Denmark decides to exit the industry, he/she will walk away with over €1.5 million (see the net values of farms in Table 6).

The profit-to-assets ratios also reveal how resilient these industries are towards adverse livestock epidemics and the resulting market shocks. A swine fever epidemic in 1997–1998 in the Netherlands (Elbers et al., 1999), for example, reduced the producer prices in general in Europe and especially cut the profits in Denmark and Germany.

Figure 6. Profit-to-asset ratios on granivore farms in 1989–2008



Source: Authors' own calculations.

2.3.3 Turnover ratio

Definition

Another profitability measurement where assets are used as a denominator is the turnover ratio. This ratio describes the capital rotation speed in agriculture and is computed as the total output / total assets.

The turnover ratio is an extensively used key figure for describing the agricultural economic situation, especially in North America. The main difference between the profit-to-asset and turnover ratio is the contribution of leased capital goods. In the former, all external inputs are compensated before comparing profits to assets, whereas the turnover ratio does not make such an explicit distinction according to whether some of the capital goods are leased or owned by the farmer. Nevertheless, neither of these indicators includes the value of leased land in the total assets used as the denominator.

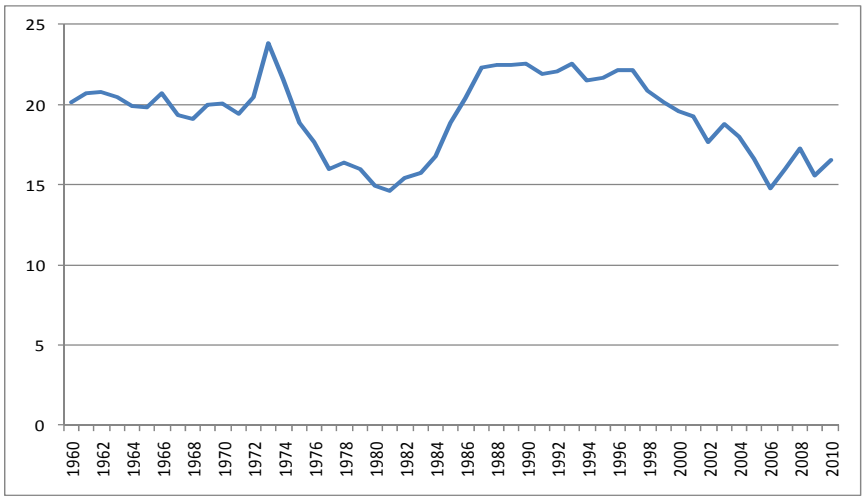
North America

As mentioned above, the turnover ratio is a widely used indicator in North America. In Canada over recent years the capital turnover ratio has been relatively stable at $0.20 of annual revenue for each dollar of asset employed in the sector. Significant variation exists

according to farm size, ranging from a low of $0.05 for lifestyle farms to $0.33 for larger farms. This means that for every dollar of assets held, large commercial farms generate an annual revenue of $0.33, compared to $0.20 for the average farm.[5]

In the US farming sector, asset values are expected to rise by 6.1% in 2011, mainly influenced by a projected 6.3% increase in farm real estate assets. Other important factors contributing to higher values for farm sector assets include projected increases in machinery and equipment values (up 4.3%), the value of crop inventories (up 20.0%), and financial assets (up 5.4%). Farmland values are also expected to rise (http://www.ers.usda.gov/briefing/farmincome/wealth.htm). However, it seems that the turnover has not increased to the same degree as asset values (Figure 7). Based on increasing asset values and only minor changes in total debt, the farm sector's solvency position remains strong in the US (See Table 5 for more solvency ratios in the US).

Figure 7. Asset-to-turnover ratio in US agriculture 1960–2008



Source: United States Department of Agriculture (USDA).

Arable crop farms

The average turnover ratio on arable crop farms has been 21%. The lowest has been in Italy (10%) and the highest in France (45%). Again, France differs considerably from other old member countries, since the asset values are estimated to be lower in France than in other countries. The second highest turnover ratio is recorded for Hungary at 33%, while Germany and the Netherlands come next with a ratio of 20%.

At the lower end of the distribution, in Ireland and Denmark, the increasing asset values have reduced the turnover ratios to the lowest levels at the end of our sampling period in 2008. Farms in these countries are currently operating with turnover ratios of less than 10%. The decreasing trend on Danish arable farms has continued consistently for 20 years. A similar downward sloping trend is also present in other production lines in Denmark.

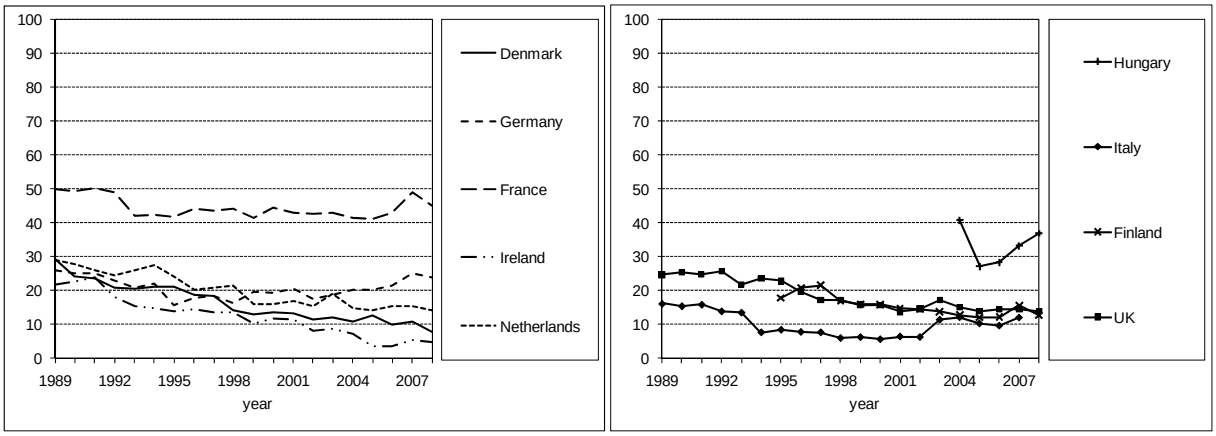
The absolute turnover of arable farms in France and Denmark is almost equal, respectively being €146,266 and €142,908, but the book-keeping value of assets differs. The assets are valued in France at €324,410 and in Denmark at €1,851,317 (see Appendix 1). The average size of arable farms is ESU 82.8 and ESU 55.6, respectively. The difference in asset values is widened by the asset prices and even more so by the rented arable areas. In France the mean area of arable farms is 102.43 ha, of which 89.09 ha are rented, but in Denmark the mean area is 68.27 ha, of which only 19.00 ha are rented. Thus, land ownership explains most of the differences in assets, but not all. The sum of other fixed assets and current assets on

[5] See the Canadian Agri-Food Institute's report of November 2005 (http://www.capi-icpa.ca/archives/pdfs/PapID23_SyntReport05.pdf).

French arable farms is €255,188, while on Danish arable farms the corresponding figure is €536,641. Thus, assets other than land also have higher book-keeping values on Danish than on French arable farms (Appendix 1).

The turnover ratio on German arable farms has followed the same path as US farms in general, even though farm asset values have tripled within 20 years (Appendix 1). The economic farm size has also tripled and thus the asset/ESU ratio has remained constant (Table 6).

Figure 8. Turnover ratios (%) on arable crop farms in 1989–2008



Source: Authors' own calculations.

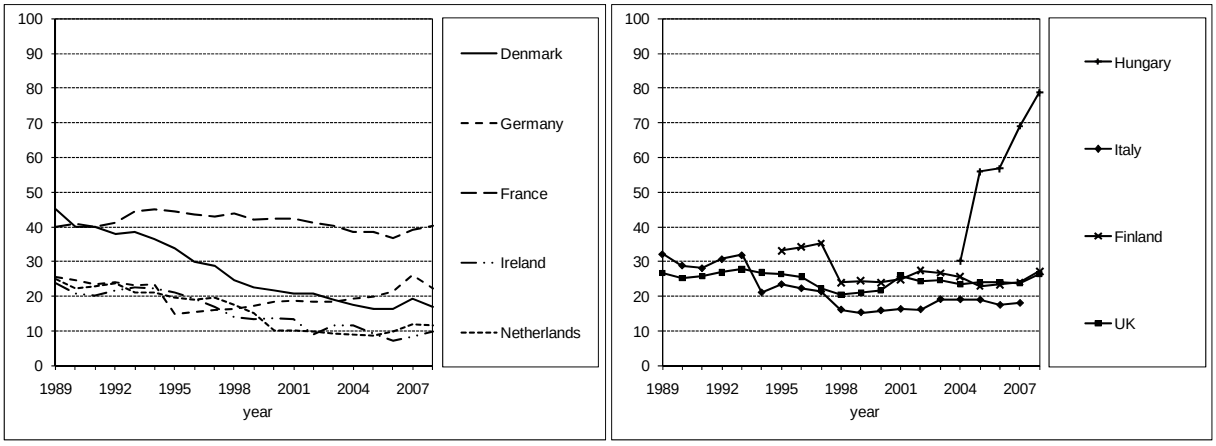
Dairy farms

The average turnover ratio on dairy farms has been 28%. It has been lowest in Ireland (16%) and in the Netherlands (16%), and highest in Hungary (58%). Among the old member countries the highest average ratio has been recorded in France (41%).

Hungary joined the EU relatively recently, and the transition process could be recognised from the turnover ratio. The value of milk production has increased steadily, but the book-keeping values of land were scaled down significantly from 2004 to 2005. The land values were €147,139 in 2004 and were reduced to €29,941 in 2005, while the land areas of farms remained unchanged. Thus, this clearly demonstrates the importance of evaluation methods when economic indicators are studied.

In general, the spread of turnover ratios of EU dairy farms is large, but not as large as on farms with granivores. The turnover ratios have decreased over time in most countries, with only Hungary making a clear exception to this general development. The downward sloping trend has been steepest in Denmark, where the turnover ratio was 45% in 1989 and decreased to less than half of this, to 17%, in 2008.

Figure 9. Turnover ratios (%) on dairy farms in 1989–2008



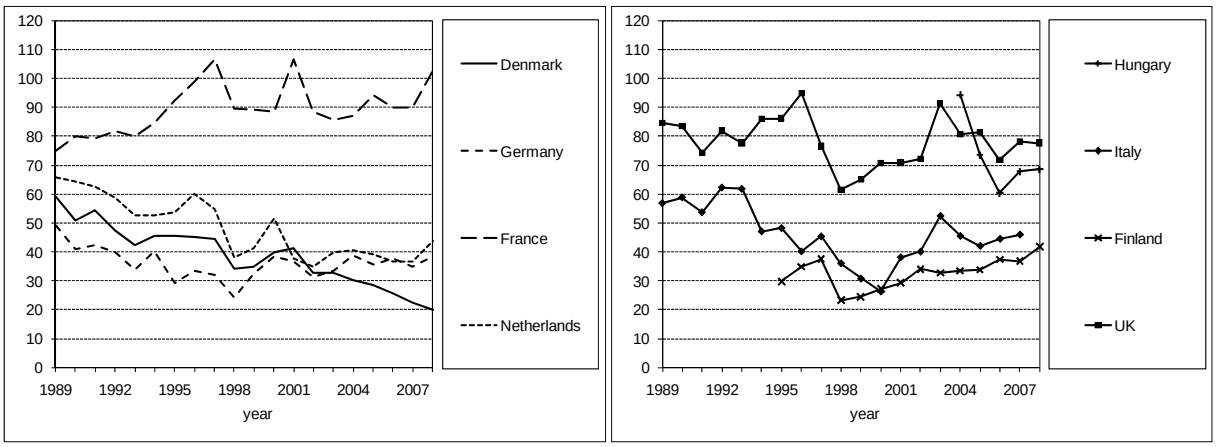
Source: Authors' own calculations.

Pig and poultry farms (granivores)

The average turnover ratio on pig and poultry farms has been 55%. It has been lowest in Finland (32%) and highest in France (90%). Thus, the country-specific differences are again large, as they have been in other production lines. The granivore sector also differs from the other sectors in that the annual variations are also very large as the annual revenues are volatile. The largest annual changes in the average turnover ratios exceeded 20%-points.

The development patterns of the turnover and, hence, also the turnover ratios have differed substantially across countries (Figure 10). In France the turnover of granivore farms increased from 1989 to 2008 by 60%. At the same time, Danish farms increased their turnover by 209%. However, the trend in the turnover ratio is decreasing in Denmark and increasing in France. Thus, the results suggest that French farms have become more efficient and Danish farms less efficient in generating revenue from their capital. Furthermore, the pricing of capital goods differs between countries, which further widens the gap between the development paths.

Figure 10. Turnover ratios (%) on granivore farms in 1989–2008



Source: Authors' own calculations.

2.4 Leverage positions

The theory and determinants of the capital structure choices of farmers in capital markets are presented in Factor Markets Study Deliverable 4.3. This paper describes the observed leverage position trends in EU agriculture. In the EU, farms mostly operate using their own capital, but extra financing is typically needed for large investments. The equity ratio

measures a farmer's own capital involved in farming. A high ratio indicates possibilities to manage adverse weather shocks and normal fluctuation in prices by giving room for external short- or long-term financing through collateral stock. Thus, these figures indicate the financial resiliency of the EU agricultural economy.

The equity ratio, debt-to-assets ratio and debt-to-equity ratio are typically used to measure the financial situation and solvency of agricultural firms in the US. These figures are available and have been used for more detailed analyses of financial trends in US agriculture. Table 5 summarises the aggregated level solvency measures of US farms.

However, neither the above-mentioned nor any other corresponding indicators are provided directly for European agriculture in public domains by Eurostat. The FADN does not report them either, even though they could help to identify the relative debt burdens and financial resilience of farming businesses. The Factor Markets study provided these aggregate level measures in the report "Aggregate Capital Markets: Horizontal comparison of indicators and the dynamics of aggregate investments". This report further describes the development of the net value of EU farms (Table 6). The evolution of the equity ratio of EU farms is thereafter presented according to the production line in Figures 11–13.

Table 5. Solvency ratios of US agriculture in 2000–2010

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010F
Equity ratio (%)	74.3	74.6	74.1	78.0	79.5	80.6	81.6	82.0	79.3	79.4	80.5
Debt-to-equity ratio (%)	15.8	15.7	16.4	13.5	12.9	12.4	11.8	11.6	13.6	13.5	12.8
Debt-to-assets ratio (%)	13.6	13.6	14.1	11.9	11.5	11.0	10.6	10.4	12.0	11.9	11.3

The equity ratio (%) has been calculated by the authors from the available US data

Source: http://www.ers.usda.gov/Briefing/FarmIncome/.

F = Forecast.

Table 6. Farm equity in 1989 and 2008 (€/farm) (Equity = total assets – liabilities)

	Grain		Dairy		Granivores	
	1989	2008	1989	2008	1989	2008
Denmark	61,338	1,170,448	127,184	1,293,031	182,079	1,500,821
Germany	279,444	825,870	222,752	574,603	224,175	637,748
France	113,960	199,139	119,528	216,754	140,299	109,972
Hungary*)	*89,310*	137,677	*232,413*	131,523	*141,097*	215,418
Ireland	339,522	1,415,811	247,654	1,329,462		
Italy **)	123,137	*375,496*	193,930	*950,390*	392,930	*1,155,259*
Netherlands	372,585	1,271,778	430,433	1,531,028	258,772	739,216
Finland***)	*132,560*	251,148	*84,851*	291,718	*125,575*	438,493
UK	728,542	1,557,101	493,291	1,080,129	290,362	568,786

*)2004**) 2007 ***)1995

Definition

Equity ratio = (total assets – liabilities) / total assets.

Arable crop farms

On the sampled arable crop farms, the equity ratio has been 79% on average. It has been lowest in Denmark (49%) and highest in Italy (99%). The equity ratio is also low on French arable crop farms, but again the low equity ratios in Denmark and France have completely different underlying reasons in the accounting systems. In Denmark the arable farms have

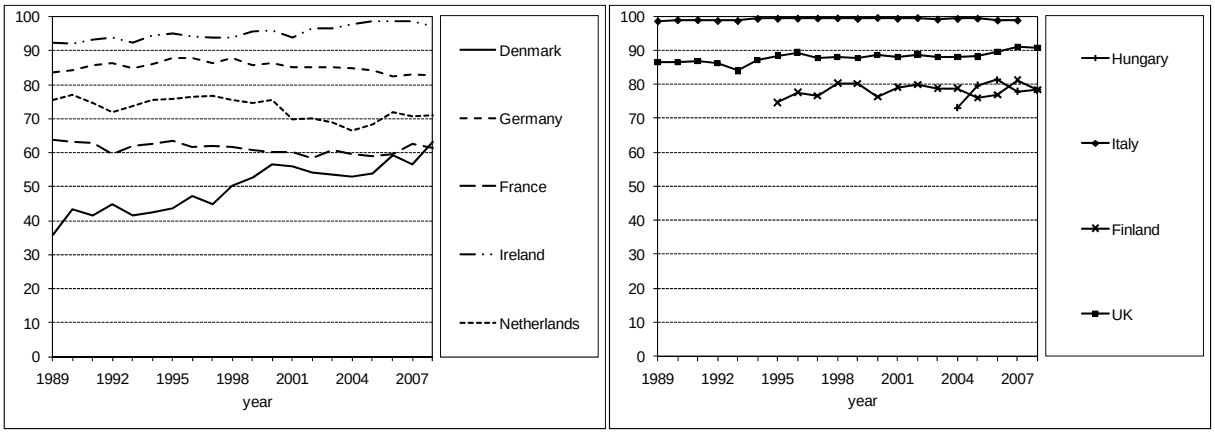
total assets per ESU that are 8.5 times higher than the corresponding ESU-normalised assets of arable farms in France. The asset values have increased faster compared to debts in Denmark than in France. Based on this, the observed trends are favourable to Denmark. Naturally, the turnover-to-assets ratio is in favour of France, as seen in Figure 8.

Italian farms, having an average equity ratio close to 100%, in practice operate fully on their own capital, and their economic resiliency does not directly depend on the performance of the financial market. Liabilities recorded for Italian farms are just a few thousand euros per farm, e.g. €4,485 in 2007. The high equity ratio may, however, signal that the access of farmers to credit and agricultural production assets may have been more constrained in Italy than in other countries.

The equity ratios are also high on Irish arable crop farms, but these farms differ from their Italian counterparts, since they have average liabilities of €40,000 per farm. The asset values in Ireland have been high and they have increased faster than debts, and the equity ratio reached 98.6% in 2007.

In the UK the trend in the equity ratio has been very similar to that in Ireland, but the level of the equity ratio has remained somewhat lower. The trend has been mixed on arable farms in Germany. First, the ratio increased in the early 1990s, being at the highest level in 1995 (Figure 11). From the late 1990s onwards the debts have increased faster than asset values. In the more recent member states (Finland and Hungary), membership has not induced any significant trend in the equity ratio of arable farms.

Figure 11. Equity ratio (%) of arable crop farms in 1989–2008



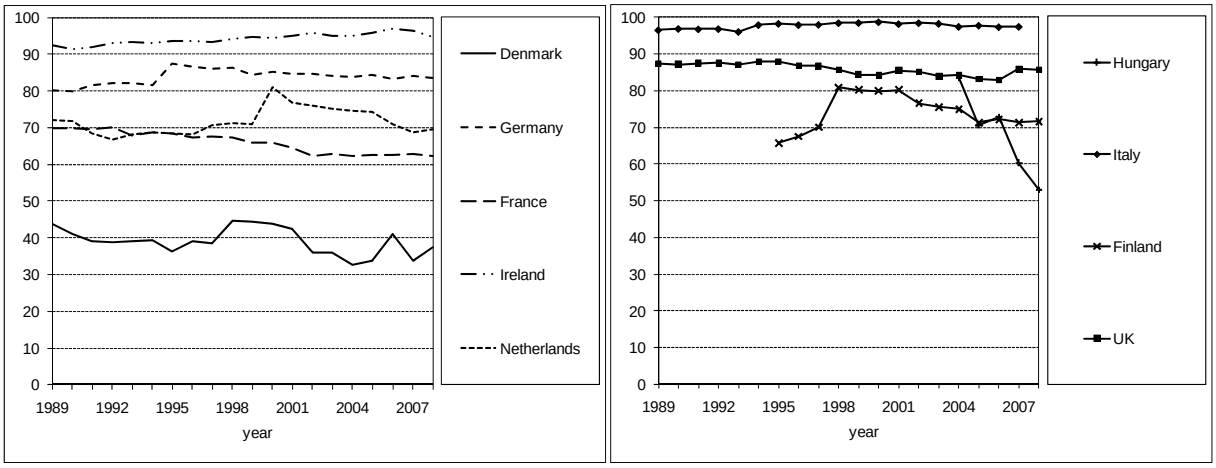
Source: Authors' own calculations.

Dairy farms

The equity ratio on the sampled dairy farms is estimated at 76%, which is slightly lower than on the arable crop farms. As with the arable crop farms the ratio has been lowest in Denmark (39%) and highest in Italy (97%).

Equity ratios do not exhibit clear trends, but they appear to display one-off jumps and drops in some countries (Figure 12). The most striking changes have been recorded in Hungary, where large investments by dairy farms have almost tripled the total liabilities within four years, but the asset values have not increased with the same pace. The liabilities on Hungarian dairy farms currently equal those in Germany, France, Ireland, Finland and the UK. If the current trend continues, the aggregate equity ratio of Hungarian dairy farms will soon reach equally low levels as those on Danish dairy farms.

Figure 12. Equity ratio (%) on dairy farms in 1989–2008



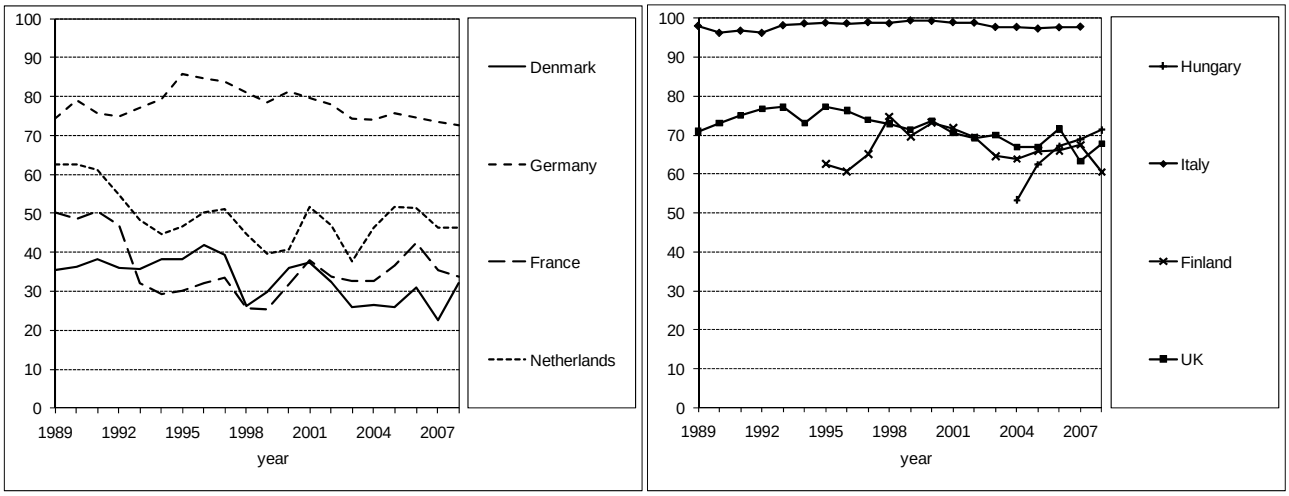
Source: Authors' own calculations.

The largest liabilities on dairy farms are €2,159,726 in Denmark and €666,167 in the Netherlands. Only Denmark still clearly differs from the rest of the countries as measured by the equity ratio, since on Danish dairy farms the majority of the financing comes from financial institutions and not from the farmer. The equity ratio on Danish dairy farms has varied between 32.7% and 44.7%. Again, Italian dairy farms operate almost solely based on their own capital, the equity ratio being as high as 98%.

Pig and poultry farms (granivores)

Farms with granivores have lower financial buffers than arable and dairy farms, as their average equity ratio is estimated at 61%, which is 15%-points lower than on dairy farms. In Denmark, France and the Netherlands, these farms mostly operate based on borrowed capital and their equity ratios have decreased to less than 50%. A decreasing trend in the equity ratio is also present in Germany and the UK. As above, Italy is an exception, since Italian farms operate almost solely based on their own capital.

Figure 13. Equity ratio (%) on granivore farms in 1989–2008



Source: Authors' own calculations.

2.5 Investments and lending rates

Farmers do not invest in agriculture with borrowed capital for two main reasons. Either they do not have *access* to the credit or it is too *costly* when compared to the risks and expected returns on assets to be invested. In section 2.5.3 below we concentrate on the lending rates

for agricultural loans in the EU. This variable describes all the costs paid by the farmer to obtain external financing for farming. These costs might occur because of short- or long-term financing. All fees, commission charges and interests paid are recognised; see Appendix 1 for the FADN definition and details (the indicator is in the profit and loss statement entitled: *Interests*). Non-price mechanisms such as collateral are counted in a way that explicit fees from collateral arrangements are accounted for if they have occurred. The workload of farmers related to the preparation of financial accounts and plans to satisfy the needs of lenders is to our knowledge not accounted for. These institutional settings and requirements are examined in other work packages of the Factor Market project.

The interest rate or the price of external capital is a crucial variable in the farmer's traditional profit maximising task. It has been shown that interest rates affect farmers' investment decisions so that there is a negative and significant effect of the effective lending rate on the demand for credit. Furthermore, the financial and investment decisions of the farm could be simultaneous, and financial decisions could therefore affect investments, and vice versa (Benjamin & Phimister, 1997). The interest rate elasticity of investments has been found to be elastic and close to unity (Briones, 2009). However, the differences in agricultural interest rates and fees within EU member states have not been investigated.

Obviously, a lender will adjust loan terms, including lending rates, depending on borrower characteristics correlated with the risk, the collateral used, trustworthiness and the ability to repay (see the review by Wilson et al., 2006). This causes intra-national variation, which could only be reached to a certain extent with aggregated FADN data. In European studies, Petric and Latruffe (2006*),* for instance, have shown with data on Poland that banks have preferences for easy-to-realise and liquid types of collateral, while they do not care about the purpose for which the loan is used.

Investments in productive agricultural assets are important. Large disinvestments may lead to temporarily decreasing productivity if the expansion of output incurs adjustment costs. The financial position of the firm may also be significantly changed by investments, since the financial outlays and costs are realised first and the increasing outputs begin to realise with a time lag.

A downward spiral including land tenure, disinvestments in land and decreasing or hindered productivity in agriculture also exists in developed countries. This situation is known as the low productivity trap (Nkonya et al., 2008). While the literature on agricultural economics in well-developed countries has not dealt with the low productivity trap, the literature on this problem from developing countries might provide suitable conceptualisation. Reardon and Vosti (1995) defined negative net investments in the context of agricultural land investments as "a situation where farmers are not able to make minimum investments in the resource base to enhance the sustainable quality of agricultural land or are not able to reverse resource degradation." Following Reardon and Vosti (1995), it could be argued that a household may choose to use the agricultural surplus for consumption, savings, or investments of other types than in the land due to external conditioning factors. When combined with substantial land tenure insecurity (see Table 1: Share of total rented land in UAA), investments elsewhere than in land improvement also seem to appear more attractive in the EU context.

2.5.1 Net investments

Definition

The variable describing net investment is produced by the FADN and computed simply as: net investment = gross investment – depreciation.

Positive net investments describe the situation in which investments outdo the depreciation. Here the definition of FADN farms should also be recalled, which underlines that FADN farms are commercial agricultural holdings defined by their economic size. Thus, the smallest farms, such as subsistence farms, are excluded from the data. Bearing these starting points in

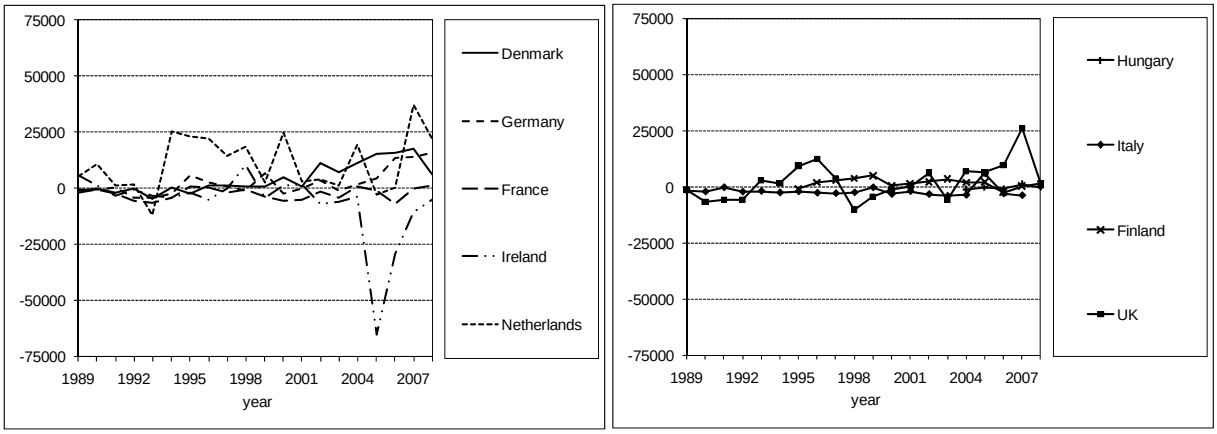
mind, the disinvestment trends would be alarming and in conflict with the EU Commission's latest suggestions for agricultural policy (European Commission, 2010).

Arable crop farms

Net investments on arable crop farms have on average been negative in France, Hungary, Ireland and Italy (Figure 14). Large positive net investments have been realised in the Netherlands, Denmark and Germany. When studying arable crop farms, it would be natural to predict that land productivity has also developed along with the net investments. However, the data do not show any significant time trend in net investments on arable farms. The only striking phenomenon is the considerable plunge in net investments to -€65,000 in 2005 and the disinvestments of Irish arable farms thereafter.

Net investments do not seem to play a role in contributing to increased asset values. Irish arable crop farms present an extreme case of this. While Irish arable farms disinvested in 2004–2007 by €110,000 per farm, the asset values per farm increased at the same time by €760,000 (Appendix 1).

Figure 14. Net investments on arable crop farms in 1989–2008



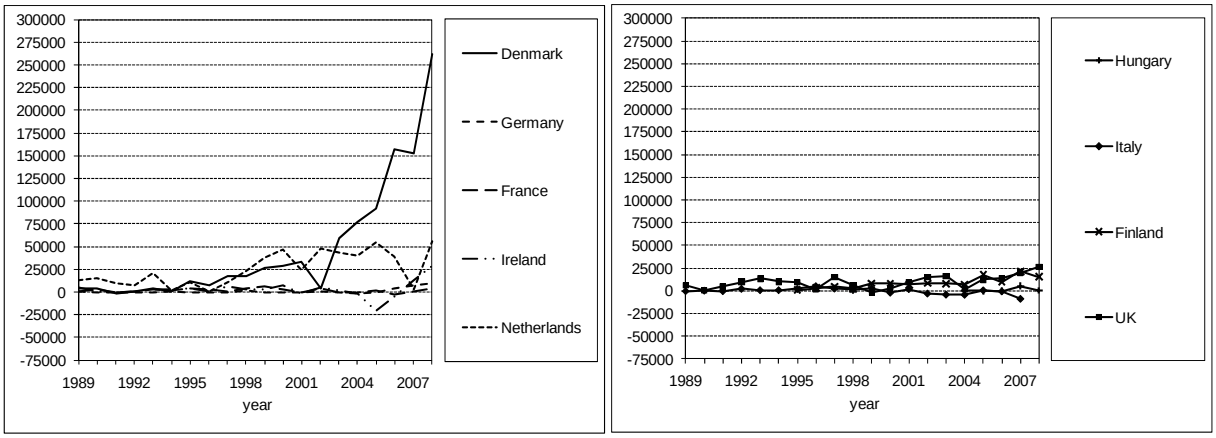
Source: Authors' own calculations.

Dairy farms

The FADN data reveal large variations between countries in net investments on dairy farms. For most of the countries the net investments varied around zero over the study period. In average terms, net investments have only been negative on Italian dairy farms (Figure 15). However, two countries deviate from the others, particularly Denmark. The net investments on Danish dairy farms rapidly increased from about zero in 2002 to more than €250 000 per farm in 2008. During 1989–2008 the net investments on Danish dairy farms totalled almost one million euros, and most of these investments were carried out within the last six years in the sample. Net investments have clearly also been positive on the Dutch dairy farms, but they have remained at less than half the level of the Danish farms.

The next group of countries with notable per farm net investments comprises the UK (€190,122 in 20 years), Finland (€120,860 in 14 years), Ireland (€54,954 in 20 years) and France (€32,101 in 20 years). These net investments would have increased the productive potential of dairy farms. At least in Finland, those dairy farmers who decided to carry on milk production after Finland joined to EU have considerably modernised their production facilities and improved their environmental and hygienic performance.

Figure 15. Net investments on dairy farms in 1989–2008

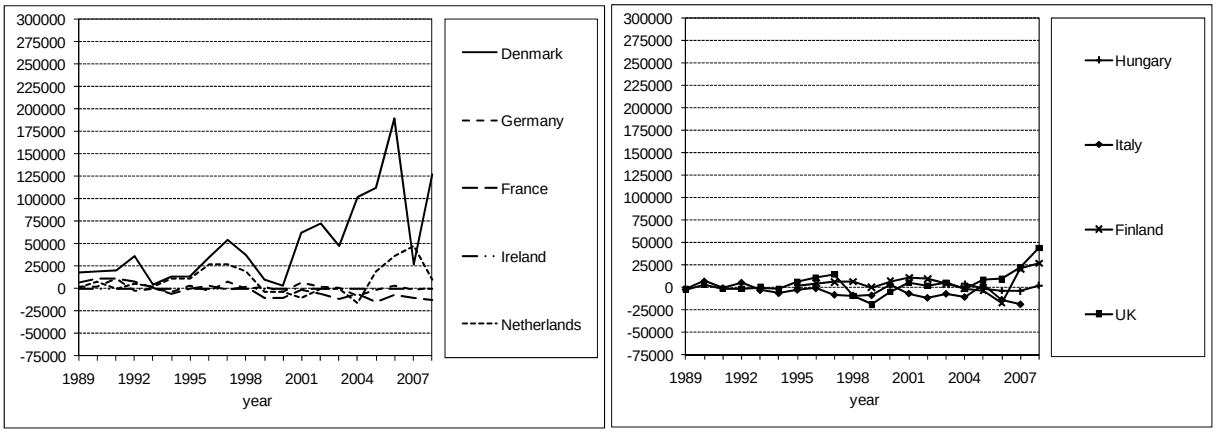


Source: Authors' own calculations.

Pig and poultry farms (granivores)

The net investments on granivore farms have on average been negative in France, Hungary and Italy and clearly positive in Denmark and the Netherlands (Figure 16). The data do not reveal cycles in the investments, but the patterns are better described as trampolines, as for instance in Denmark the investments have displayed a large annual variation. Net investments might be affected by investment subsidy programmes, taxation schemes and market price volatility. In cross-country studies of this kind it is difficult to find country-specific explanations for the behaviour observed.

Figure 16. Net investments on granivore farms in 1989–2008



Source: Authors' own calculations.

2.5.2 Investment aid by production line

Relatively new member states such as Finland (1995) and Hungary (2004) have received investment aids to incorporate their agriculture into the CAP. Investment aids have also been significant at the farm level and have helped farmers to close the productivity gap with the most intensive agricultural areas in Europe. Table 7 summarises the investment aids paid to EU countries in 1989–2008.

Investment aids for arable crop farms have been especially important in Hungary. Based on only four years of data, Hungarian arable farms have received investment aids totalling €170 per ESU, while arable farmers in old member states have received less investment aid per ESU.

Investment aids for dairy farms in new member states have been moderate compared to the older member states. Dairy farmers in the old member states such as France, Ireland and Italy received significantly larger investment aids than farmers in Hungary and Finland, measured according to the ESU in 1989–2008. However, the level of investment aids paid per year to Hungary, being a member of the EU only since 2004, are not fully comparable. When considering old member states, it is evident that the large net investments observed on Danish and Dutch dairy farms have not been encouraged by investment aids. In fact, the ESU-normalised investment aids for the dairy sector in these two countries have been the lowest when compared to other old member states. However, the per farm investment aids have also been notable in these countries and may therefore have played a role in encouraging new investments.

In the granivore sector the investment aids have been negligible in most countries, especially when the aids are ESU-normalised. It nevertheless appears that France differs substantially from other the countries in the sample.

Table 7. Summary of investment aids as recorded in profit and loss statements according to the production line in 1989–2008

	Arable farms		**Dairy farms**		**Granivores**	
	€/ farm	€/ESU	€/farm	€/ESU	€/farm	€/ESU
Denmark	1,685	41	7,374	65	1,285	63
Germany	2,147	28	3,486	70	1,935	26
France	9,353	138	22,485	484	19,316	231
Hungary	3,487	170	4,925	110	3,822	99
Ireland	5,216	131	22,177	517		
Italy	2,221	137	21,516	514	4,896	32
Netherlands	4,804	52	7,495	71	4,982	45
Finland	1,264	55	4,473	101	6,979	87
UK	5,204	43	16,391	167	6,188	53

Source: FADN.

2.5.3 Lending rates

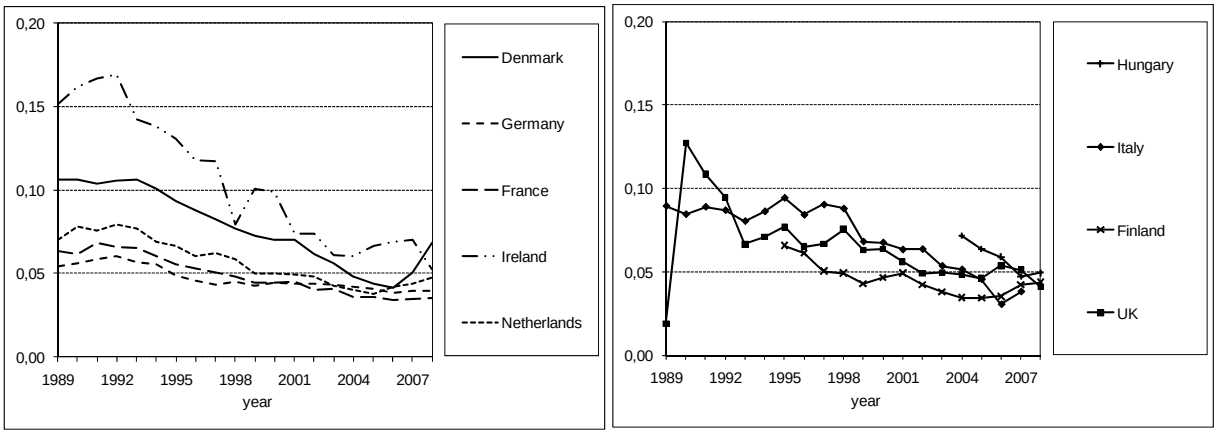
Definition

Agricultural loans are summarised in the FADN using two variables: 1) long- and medium-term loans and 2) short-term loans. Short-term loans have a maximum duration of 12 months. The two loan measures add up to the total debt. Total external factors are divided into three items: wages paid, rent paid and interest paid. Given these measures, we define the price of money by dividing the interest paid by the total debt, since the data are not informative enough to separate the paid interests and the interest rates accordingly according to the duration of the loans. Thus, under our definition, the imputed rate is an average interest rate paid for short- and long-term loans, including the fees.

Arable crop farms

Traditionally, Irish arable crop farms have clearly paid the highest price for their loans, but the interest rates have come down from above 15% and by 2008 reached the same rate of about 5% as most other countries. The recent financial crisis does not yet show in these loan rates, except possibly in Denmark, where the interest rates turned to an upward sloping trend in 2006. In the Danish case the increased sector-specific risks due to high leverage rates may also have been the key factor that turned the rates to an increasing trend. A similar but milder upturn is also observed in some other countries, such as the Netherlands, Italy and Finland. The lowest and the most stable loan rates are observed in Germany and France.

Figure 17. Lending rates for arable crop farms in 1989–2008

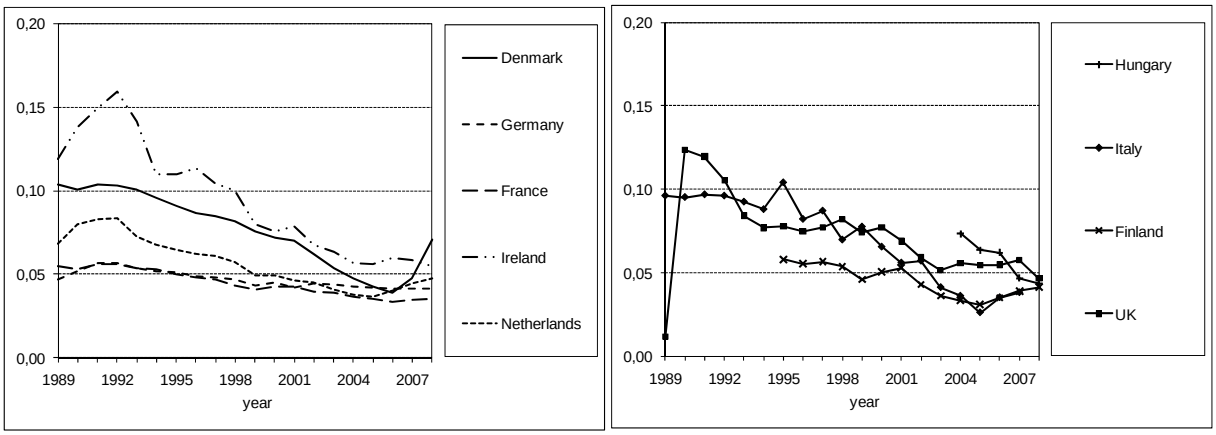


Source: Authors' own calculations.

Dairy farms

The loan rates of dairy farms have followed similar patterns to those on arable crop farms, described above. The rates converge close to each other over time, the upturn observed in Denmark being the exception to this development.

Figure 18. Lending rates for dairy farms in 1989–2008

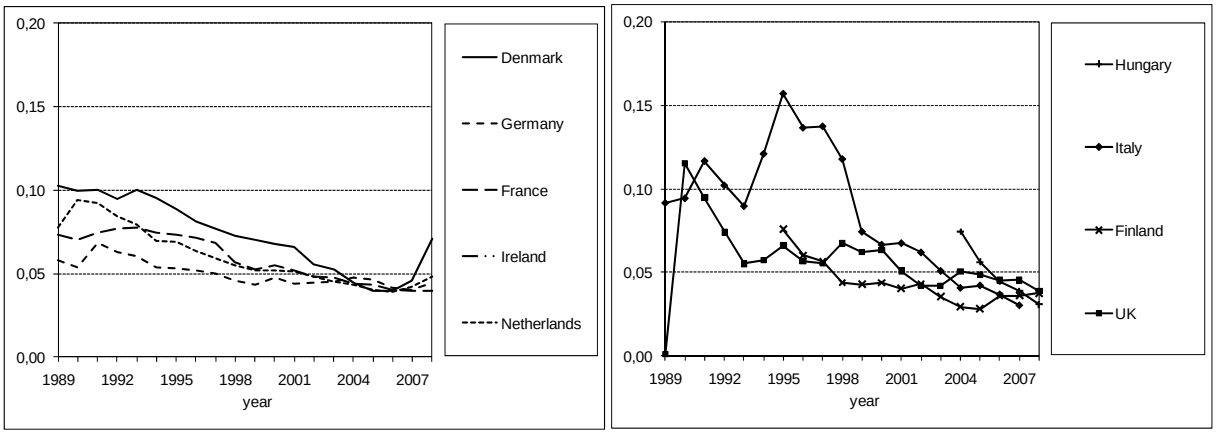


Source: Authors' own calculations.

Pig and poultry farms (granivores)

In the granivore sector the loan rates again follow the same patterns as above with other production lines. Here, however, the rates in Italy peaked in the mid-1990s to an extent not observed in other production lines or in other countries.

Figure 19. Lending rates for granivore farms in 1989–2008



Source: Authors' own calculations.

3. Conclusions

The data on the farm capital structures, financial positions and loan rates suggest that the European farming sector is a combination of quite different farm business strategies, capabilities to generate capital revenues, and segmented agricultural loan market regimes.

In some countries, such as Denmark, farmers have adopted quite aggressive farm expansion strategies, while in other countries such as Italy the farmer expansion strategies have been more modest. The different business strategies have substantial, and perhaps more substantial than expected, implications for the financial leverage of farms. Italian farms appear to operate fully on their own capital, with average equity ratios being between 97–98% depending on the production line. Their economic resilience does not, therefore, directly depend on the performance of the financial market, with possibly a few exceptions on farms with a high leverage. These high equity ratios may, however, also signal that the access of farmers to fair credit and/or farming assets may have been more constrained in Italy than in other countries. This issue is left here to be addressed in more quantitative credit market analyses.

Denmark is at the other end of the equity-ratio distribution. There, the average equity ratios of farms have fallen to 33–39% depending on the production line, the lowest equity ratios being on granivore farms. The financial risks have clearly increased in Danish agriculture and the loan rates already turned to an upward sloping trend in 2006, the first signal of the forthcoming financial crisis that may also directly and severely hit agricultural firms. The equity ratios are also low on French granivore farms, but the asset prices there are evaluated more modestly and the leverage position may not be quite as risky as in Denmark.

It is evident that countries have different approaches to evaluating agricultural assets, or the agricultural asset markets simply differ substantially among countries. In some countries, such as Ireland and Denmark, the increasing asset prices rather than the amount of net investments have played a dominant role in the development of total farm assets. The size of this phenomenon can be illustrated, for instance, by the case of Irish arable crop farms. The total asset values per farm on Irish arable crop farms increased by €760,000 within the three years from 2004–2007, while the farms disinvested by €110,000 per farm. Thus, taking the disinvestments out of the figures, the asset prices increased by €870,000 in three years.

The other end of the agricultural asset market and/or the accounting approaches is observed in France, where asset prices have remained more modest and have adjusted only slightly over time. The different approaches have implications for most of the indicators we used. In the French case, for example, the turnover ratios are clearly higher than in other countries,

suggesting that French farmers have been more efficient in generating capital income than their counterparts in other countries.

Now that instability in the European financial market is increasing, it remains to be seen how much the agricultural sector will eventually be hit by the crisis. Our sampling period, which ended in 2008, already provided signals that the resilience of farms towards financial instability differs greatly between countries. A significant question is how resilient farm expansions that have been based on increased lending and highly leveraged agricultural holdings are towards instability in the financial market.

The large variation in leverage positions and their development over time raises new issues to be addressed in more analytical studies. So far, most of the capital accumulation and investments models that exist in the literature have not quite accounted for the increasing financial risks that these farms are facing. The current, highly risky leverage positions and asset portfolios may also have a considerable impact on the decision options that are left for the farmers and on the thresholds that trigger new investments. The seemingly risky and aggressive investment behaviour may have been the only option to go forward and try to reduce the initially high risk exposure of these farms. In other words, the farmers may have been initially engaged in a risky 'portfolio kick' that has escalated further investments. The investment decision may be quite different for a farm that has an equity ratio of 33% and expectations of 10% annual capital gains under a 5% loan rate, as compared to a farm with a 99% equity ratio and more modest expectations concerning capital gains.

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Appendix 1. Balance sheet, profit and loss statement

Balance sheet

Total Assets	Only assets in ownership are taken into account. Capital indicators are based on the value of the various assets at the closing valuation. = Fixed assets + current assets.
Total Fixed Assets	= Agricultural land and farm buildings and forest capital + buildings + machinery and equipment + breeding livestock.
land perman. crops quotas	Agricultural land, permanent crops, improvements to land, quotas and other prescribed rights (including acquisition euro costs) and forest land.
buildings	Buildings and fixed equipment belonging to the holder.
machinery	Machines, tractors, cars and lorries, irrigation equipment (except when of little value or used only during one year).
breeding livestock	= Value at closing valuation of breeding heifers, dairy cows, other cows, breeding goats, ewes, breeding sows.
Total Current Assets	= Non-breeding livestock + circulating capital (stocks of agricultural products + other circulating capital).
non-breeding livestock	= Value at closing valuation of all livestock except breeding livestock
stock of agricult. products	= Value at closing valuation of all crop and livestock products (except young plantations).
other circulating capital	Advance for crops, holdings of agricultural shares, amounts receivable in the short term, cash balances in hand or at the bank (assets necessary for running the holding).
Total Liabilities and Debts	Value at the closing valuation of the total (long- , medium- or short-term) loans still to be repaid.
total liabilities	Only those parts of loans still outstanding are recorded. Loans taken as fixed interest debenture bonds are valued at cash value.
long medium-term loans	Loans contracted for a period of more than one year.
short-term loans	Loans of less than one year's duration, outstanding cash payments
Net worth	= Total assets - liabilities.

Profit and loss statement

Total output	Total of output of crops and crop products, livestock and livestock products and of other output. Sales and use of (crop and livestock) products and livestock + change in stocks of products (crop and livestock) + change in valuation of livestock - purchases of livestock + various non-exceptional products.
total output crops & crop production	Total output of crops and crop products = sales + farm use + farmhouse consumption + (closing valuation - opening valuation).
total output livestock & livestock products	= Livestock production + change in livestock value + animal products. Livestock production = Sales + Household consumption – Purchases. It is calculated for equines, cattle, sheep, goats, pigs, poultry and other animals. Change in livestock valuation = value at closing valuation - value at opening valuation. For animals that are present on the holding for more than one year, the value corresponding to the increase in volume is estimated. Animal products = sales + household consumption + farm use + (closing valuation – opening valuation). The products are: milk and milk products from cows, ewes and goats, wool, hens' eggs, other animal products (stud fees, manure, other eggs, etc.) and receipts from animals reared under a service contract (animals not owned by farmer) and honey.
other output	Leased land ready for sowing, receipts from occasional letting of fodder areas, adjustment, forestry products, contract work for others, hiring out of equipment, interest on liquid assets necessary for running the holding, receipts from tourism, receipts relating to previous accounting years, other products and receipts.
- total intermediate consumption	Total specific costs (including inputs produced on the holding) and overheads arising from production in the accounting year. = Specific costs + overheads.
variable costs	= Crop-specific inputs (seeds and seedlings, fertilizers, crop protection products, other specific crop costs), livestock-specific inputs (feed for grazing stock and granivores, other specific livestock costs) and specific forestry costs.
overheads	Supply costs linked to production activity but not linked to specific lines of production.
+ subsidies and taxes	
subsidies (excluding investment sub.)	Subsidies on current operations linked to production (not investments). Payments for the cessation of farming activities are therefore not included. Entry in the accounts is generally on the basis of entitlement and not receipt of payment, with a view to obtain coherent results (production/costs/subsidies) for a given accounting year.
VAT balance	The general rule is for all entries to be made exclusive of VAT; this poses no problems when the holder is subject to the normal VAT system. When the special agricultural system applies, the different VAT amounts should be recorded so that when the results are calculated any advantages of national agricultural VAT systems can be taken into account. = VAT balance on current operations

taxes	Farm taxes and other dues (not including VAT and the personal taxes of the holder), and taxes and other charges on land and buildings. Subsidies on taxes are deducted.
= Cross Farm Income	Output - intermediate consumption + balance of current subsidies & taxes.
- Depreciation	Entry in the accounts of depreciation of capital assets over the accounting year. It is determined on the basis of the replacement value. Concerns plantations of permanent crops, farm buildings and fixed equipment, land improvements, machinery and equipment and forest plantations. There is no depreciation of land or circulating capital.
= net value added	Remuneration for the fixed factors of production (work, land and capital), whether they be external or family factors. As a result, holdings can be compared irrespective of their family/non-family nature of the factors of production employed. This indicator is sensitive, however, to the production methods employed: the ratio (intermediate consumption + depreciation)/fixed factors may vary and therefore influence the FNVA level. For example, in the livestock sector, if production is mostly without the use of land (purchased feed) or extensive (purchase and renting of forage land).
+ investment aid and taxes	
investment aid	Subsidies on investments
close down compensations	This premium may be received in the form of a lump sum or be spread over several years.
VAT balance on investments	It was considered preferable, for the purposes of calculating income, to treat this amount separately from the overall VAT balance. It is generally a large amount and has no connection with the year's production. If it were taken into account in the VAT balance, it would distort the balance of subsidies and taxes on current operations.
- salaries, rents, interests	Remuneration of inputs (work, land and capital) that are not the property of the holder. = wages, rent and interest paid.
salaries	Wages and social security charges (and insurance) of wage earners. Amounts received by workers considered as unpaid workers (wages lower than a normal wage) are excluded.
rents	Rent paid for farm land and buildings and rental charges.
interests	Interest and financial charges paid on loans obtained for the purchase of land, buildings, machinery and equipment, livestock, circulating capital, interest and financial charges on debts.
= Entrepreneurial profit (net profit)	

Source: FADN.

Appendix 2. Total assets: Arable farms

Arable Frams
TOTAL ASSETS Euro/Farm, nominal prices

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Denmark	170 902	200 887	198 915	248 579	250 932	274 450	272 637	303 778	330 774	394 774	460 801	511 159	556 873	658 235	732 555	817 278	940 736	1 352 916	1 377 017	1 851 317
Germany	334 227	333 718	349 763	363 369	366 837	390 192	774 956	695 416	678 824	712 327	805 447	812 728	843 899	849 128	865 539	887 713	897 469	976 464	985 369	998 798
France	178 530	187 871	186 728	180 695	189 622	205 144	220 406	230 635	235 235	239 581	243 428	252 599	246 036	245 908	249 956	266 530	266 106	275 860	296 133	324 410
Hungary																122 154	157 683	166 360	175 438	175 923
Ireland	368 255	352 106	368 450	361 578	347 168	409 273	447 642	437 326	466 385	449 697	587 048	545 969	657 396	895 733	935 892	925 901	1 471 535	1 625 187	1 685 748	1 455 717
Italy	124 877	130 937	138 644	143 166	134 530	235 403	226 623	245 441	245 518	313 107	332 480	360 185	330 227	454 708	313 211	287 709	359 823	386 059	379 981	
Netherlands	494 085	490 030	493 900	481 924	524 829	664 146	720 479	686 006	729 067	800 211	967 879	998 325	1 251 175	1 354 219	1 282 792	1 299 211	1 459 271	1 499 788	1 628 831	1 794 343
Finland							177 601	172 257	181 249	225 304	245 536	231 442	229 706	229 780	226 199	242 546	256 313	282 355	309 727	320 290
UK	842 281	806 438	772 543	689 327	687 548	746 418	805 692	836 684	1 001 555	1 055 943	1 142 874	1 271 584	1 318 911	1 324 511	1 228 236	1 305 391	1 549 592	1 516 987	1 819 885	1 715 173
LAND																				
Denmark	53 263	54 192	53 524	66 523	68 731	74 133	72 694	79 955	83 369	101 862	125 737	130 369	141 549	168 931	184 420	221 434	259 666	393 095	841 689	1 314 676
Germany	183 797	186 446	197 459	208 014	209 865	225 379	536 139	484 876	480 316	510 096	534 922	553 774	568 440	595 518	607 699	617 165	622 313	661 048	667 932	659 348
France	55 080	58 893	56 365	52 966	56 175	61 129	63 947	62 606	58 404	56 037	58 934	58 870	56 008	56 401	54 836	54 203	53 981	53 768	54 389	69 222
Hungary																31 255	55 080	58 893	56 365	52 966
Ireland	265 780	249 333	259 284	275 791	271 207	330 452	365 735	352 050	371 434	375 240	511 816	450 537	534 488	763 207	805 882	825 845	1 383 916	1 538 219	1 578 776	1 331 627
Italy	93 367	95 199	100 512	103 055	95 602	195 146	188 182	198 666	201 549	207 338	246 108	266 729	271 468	391 545	242 661	221 891	269 110	293 845	287 139	
Netherlands	284 058	282 048	276 913	268 527	295 923	393 616	437 932	436 594	473 256	511 163	678 578	708 275	910 981	990 856	893 445	914 725	1 062 298	1 060 659	1 141 856	1 266 221
Finland							105 828	98 517	94 842	109 256	120 453	118 186	114 392	113 550	112 305	122 565	135 206	152 573	158 831	170 603
UK	523 003	505 730	479 879	425 056	437 773	470 919	520 212	587 935	711 262	761 227	841 978	924 286	968 862	974 764	898 613	955 683	1 144 418	1 129 902	1 388 860	1 317 569
OTHER FIXED ASSETS																				
Denmark	93 393	123 376	121 505	152 390	153 981	169 056	169 998	193 353	210 280	230 153	268 575	288 909	318 045	385 464	420 662	468 457	513 743	748 412	291 820	303 100
Germany	89 786	87 914	90 719	93 476	94 873	97 099	136 890	136 294	130 325	134 699	172 170	161 554	169 511	155 187	154 866	161 303	163 208	182 995	183 635	194 164
France	60 400	63 220	64 574	63 491	70 461	72 286	78 135	84 810	86 614	91 348	92 441	97 298	98 120	93 413	95 295	104 450	107 416	108 532	112 709	118 869
Hungary																50 761	60 400	63 220	64 574	63 491
Ireland	59 868	62 493	66 657	52 466	46 302	45 682	45 375	46 933	50 624	40 967	42 175	62 408	84 726	88 354	86 360	70 587	61 226	61 018	75 189	89 391
Italy	26 463	28 509	30 372	32 512	31 651	32 988	30 692	37 618	35 261	39 665	43 129	48 095	43 802	50 711	63 535	59 017	61 662	60 488	60 625	
Netherlands	144 116	140 750	150 217	154 071	162 066	182 942	193 541	177 252	184 968	194 698	211 480	212 376	182 655	210 270	224 723	232 307	221 672	220 763	244 219	276 805
Finland							36 586	38 848	49 883	75 138	77 897	72 766	77 953	78 517	78 724	83 977	84 334	89 247	97 004	99 247
UK	192 988	175 970	166 022	142 124	137 890	146 622	149 965	124 513	148 265	149 248	152 618	167 250	169 521	162 313	149 868	160 203	174 881	170 775	182 146	169 433
TOTAL CURRENT ASSETS																				
Denmark	24 246	23 319	23 886	29 666	28 220	31 261	29 945	30 470	37 125	62 759	66 489	91 881	97 279	103 840	127 473	127 387	167 327	211 409	243 508	233 541
Germany	60 644	59 358	61 585	61 879	62 099	67 714	101 927	74 246	68 183	67 532	98 355	97 400	105 948	98 423	102 974	109 245	111 948	132 421	133 802	145 286
France	63 050	65 758	65 789	64 238	62 986	71 729	78 324	83 219	90 217	92 196	92 053	96 431	91 908	96 094	99 825	107 877	104 709	113 560	129 035	136 319
Hungary																40 138	42 203	44 247	54 499	59 466
Ireland	42 607	40 280	42 509	33 321	29 659	33 139	36 532	38 343	44 327	33 490	33 057	33 024	38 182	44 172	43 650	29 469	26 393	25 950	31 783	34 699
Italy	5 047	7 229	7 760	7 599	7 277	7 269	7 749	9 157	8 708	66 104	43 243	45 361	14 957	12 452	7 015	6 801	29 051	31 726	32 217	
Netherlands	65 911	67 232	66 770	59 326	66 840	87 588	89 006	72 160	70 843	94 350	77 821	77 674	157 539	153 093	164 624	152 179	175 301	218 366	242 756	251 317
Finland							35 187	34 892	36 524	40 910	47 186	40 490	37 361	37 713	35 170	36 004	36 773	40 535	53 892	50 440
UK	126 290	124 738	126 642	122 147	111 885	128 877	135 515	124 236	142 028	145 468	148 278	180 048	180 528	187 434	179 755	189 505	230 293	216 310	248 879	228 171

ESU																				
Denmark	27	27	27	35	35	35	35	38	40	39	40	40	40	47	49	48	48	56	56	56
Germany	34	34	34	37	37	41	58	64	64	64	98	97	102	107	109	110	110	111	111	109
France	45	47	48	51	52	57	59	65	66	69	75	74	75	81	82	84	82	83	82	83
Hungary																19	19	23	21	21
Ireland	39	39	41	36	34	35	35	38	40	39	49	40	44	52	56	41	33	33	38	35
Italy	12	12	12	13	13	12	13	13	13	12	15	15	15	21	22	22	22	27	28	
Netherlands	76	76	75	79	79	94	95	96	98	101	109	109	108	94	91	91	93	96	97	101
Finland							20	22	22	23	23	24	23	22	22	24	24	23	24	25
UK	101	102	93	100	90	99	103	118	121	123	133	139	143	150	150	153	153	123	126	125

Source: FADN.

Appendix 3. Total Assets: Dairy farms

DAIRY FARMS

TOTAL ASSETS Euro/Farm, nominal prices

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Denmark	290 832	295 352	289 507	356 390	363 950	411 642	448 344	545 705	578 308	697 330	838 046	876 807	942 797	1 228 046	1 372 047	1 591 115	1 813 719	2 682 617	2 735 799	3 452 757
Germany	277 511	274 358	284 375	323 103	321 054	334 376	557 206	555 402	543 815	555 190	617 314	613 114	615 387	626 886	634 173	643 297	653 288	678 522	682 680	688 370
France	170 925	171 950	169 054	182 765	174 540	188 202	193 278	200 185	200 996	208 537	239 403	247 466	244 503	262 222	269 188	287 009	294 035	319 631	335 325	347 934
Hungary																278 194	181 553	199 326	205 962	248 587
Ireland	268 050	266 398	261 247	278 049	272 823	307 674	327 593	370 506	416 217	468 714	553 970	617 008	661 653	942 460	721 344	814 605	1 028 879	1 326 078	1 478 986	1 403 559
Italy	201 064	213 059	220 178	275 481	251 219	457 027	406 406	476 528	508 035	662 863	661 880	660 626	770 492	758 109	746 111	837 061	869 886	959 065	975 768	
Netherlands	597 113	600 563	596 335	674 366	781 959	829 825	864 842	898 840	909 098	962 698	1 119 507	1 726 610	1 888 607	2 097 090	2 183 905	2 274 425	2 404 388	2 137 845	2 083 400	2 197 195
Finland							129 031	129 499	128 381	194 013	226 168	241 771	256 403	255 972	276 312	307 165	355 938	363 170	391 330	407 558
UK	564 366	567 703	567 286	577 252	572 890	642 123	680 318	722 480	877 283	829 057	893 966	862 604	868 675	864 913	892 944	934 774	963 736	1 139 513	1 392 101	1 261 302
LAND																				
Denmark	42 318	43 935	43 323	53 946	55 674	60 573	65 466	79 043	83 083	221 264	261 470	289 097	322 255	379 443	475 540	498 095	714 976	993 436	1 470 562	2 041 279
Germany	102 871	102 874	109 828	124 024	122 874	126 555	343 395	344 275	336 065	345 586	365 140	361 713	363 505	370 342	374 348	374 331	378 638	382 869	381 206	380 792
France	29 941	30 459	28 677	30 388	29 896	29 898	29 942	30 731	28 881	27 278	29 538	30 458	28 849	29 652	29 674	30 032	30 115	29 265	29 442	34 864
Hungary																147 139	29 941	30 459	28 677	30 388
Ireland	154 052	153 116	147 368	157 965	156 449	177 532	193 162	225 776	266 500	336 781	414 100	449 711	489 805	760 103	540 386	605 668	805 648	1 095 159	1 197 679	1 069 942
Italy	100 252	100 885	104 322	130 440	115 035	297 054	259 106	304 918	328 565	456 324	460 098	445 700	521 803	537 551	409 430	461 872	468 894	537 996	532 940	
Netherlands	278 252	310 948	310 086	347 327	440 339	471 212	508 326	544 201	554 197	612 851	757 745	1 361 862	1 533 680	1 696 244	1 765 142	1 830 514	1 934 559	1 652 988	1 531 076	1 610 549
Finland							54 860	55 863	55 353	62 295	68 733	70 794	71 567	74 538	79 526	94 508	108 050	115 008	121 501	130 612
UK	355 048	365 480	367 429	365 269	357 222	418 171	457 860	499 756	633 286	606 123	665 923	623 504	609 404	597 693	622 576	637 926	632 168	730 164	915 871	844 469
OTHER FIXED ASSETS																				
Denmark	175 665	183 260	181 070	225 546	230 925	265 523	296 902	375 684	405 898	397 990	488 681	490 721	522 583	726 637	759 900	928 956	899 995	1 400 031	913 950	1 063 364
Germany	132 567	127 805	129 906	149 581	148 245	154 110	161 202	162 834	158 075	161 913	195 691	194 396	194 098	196 050	198 143	204 454	206 160	220 470	221 969	229 451
France	84 845	84 697	83 249	89 325	94 831	104 745	108 052	114 550	113 810	119 583	140 289	145 868	144 360	158 677	164 473	175 899	180 812	198 963	208 524	216 599
Hungary																78 801	84 845	84 697	83 249	89 325
Ireland	74 026	75 032	75 860	80 491	76 822	85 735	89 159	97 696	102 041	88 835	93 019	115 894	119 182	127 989	126 961	152 868	163 886	169 980	212 320	252 918
Italy	86 425	92 814	96 480	118 619	111 963	132 366	120 625	142 547	150 353	174 658	169 753	180 850	186 650	185 041	210 183	229 110	232 896	215 685	226 364	
Netherlands	222 570	217 010	216 798	249 049	262 362	272 854	272 946	274 088	273 531	269 905	275 423	278 579	219 837	261 865	271 264	287 024	309 339	315 238	350 593	394 880
Finland							56 179	56 552	56 552	83 917	97 803	105 625	116 367	129 069	140 143	156 240	182 712	186 538	201 744	209 453
UK	150 161	146 091	144 130	153 164	157 128	161 351	158 755	156 462	174 234	159 710	164 886	171 174	184 024	189 849	188 868	213 999	229 753	291 888	340 039	295 923
TOTAL CURRENT ASSETS																				
Denmark	72 849	68 157	65 114	76 898	77 351	85 546	85 976	90 978	89 327	78 076	87 895	96 989	97 959	121 966	136 607	164 064	198 748	289 150	351 287	348 114
Germany	42 073	43 679	44 641	49 498	49 935	53 711	52 609	48 293	49 675	47 691	56 483	57 005	57 784	60 494	61 682	64 512	68 490	75 183	79 505	78 127
France	56 139	56 794	57 128	63 052	49 813	53 559	55 284	54 904	58 305	61 676	69 576	71 140	71 294	73 893	75 041	81 078	83 108	91 403	97 359	96 471
Hungary																52 254	66 767	84 170	94 036	128 874
Ireland	39 972	38 250	38 019	39 593	39 552	44 407	45 272	47 034	47 676	43 098	46 851	51 403	52 666	54 368	53 997	56 069	59 345	60 939	68 987	80 699
Italy	14 387	19 360	19 376	26 422	24 221	27 607	26 675	29 063	29 117	31 881	32 029	34 076	62 039	35 517	126 498	146 079	168 096	205 384	216 464	
Netherlands	96 291	72 605	69 451	77 990	79 258	85 759	83 570	80 551	81 370	79 942	86 339	86 169	135 090	138 981	147 499	156 887	160 490	169 619	201 731	191 766
Finland							17 992	17 084	16 476	47 801	59 632	65 352	68 469	52 365	56 643	56 417	65 176	61 624	68 085	67 493
UK	59 157	56 132	55 727	58 819	58 540	62 601	63 703	66 262	69 763	63 224	63 157	67 926	75 247	77 371	81 500	82 849	101 815	117 461	136 191	120 910

ESU																				
Denmark	60	60	60	73	73	83	84	94	95	96	104	103	104	135	136	154	156	194	200	202
Germany	30	30	30	32	32	35	38	44	43	43	50	51	51	69	70	67	68	70	71	72
France	29	29	29	31	32	34	34	38	38	39	55	55	55	58	59	61	61	64	65	65
Hungary																30	33	47	51	64
Ireland	32	31	31	32	31	35	36	40	39	39	45	47	48	48	48	51	53	54	59	60
Italy	18	18	18	25	26	26	26	24	26	27	53	57	63	56	67	60	64	72	71	
Netherlands	71	72	71	90	90	102	103	115	114	114	111	111	115	118	121	118	120	121	122	125
Finland							21	39	40	42	42	44	46	42	43	51	56	52	52	52
UK	72	73	70	79	77	86	87	90	90	90	100	99	103	111	114	115	118	130	131	131

Source: FADN.

Appendix 4. Total Assets: Granivore farms

GRANIVORES

TOTAL ASSETS Euro/Farm, nominal prices

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Denmark	514 476	484 925	526 244	650 473	622 500	656 461	689 658	832 301	883 702	860 753	1 096 442	1 216 547	1 315 713	1 624 479	1 671 889	2 226 293	2 427 069	3 287 167	3 652 045	4 685 311
Germany	301 102	333 381	386 033	314 471	310 643	319 149	502 865	562 675	490 647	549 758	581 369	580 417	557 483	635 448	621 823	698 844	761 998	789 549	807 210	876 767
France	278 490	277 980	279 325	319 747	264 270	270 824	268 574	297 847	301 435	321 699	282 638	288 439	298 500	290 032	300 661	338 380	309 742	315 221	364 335	325 394
Hungary																264 461	240 531	230 329	244 621	301 912
Ireland																				
Italy	401 097	424 264	448 334	428 295	332 219	525 798	468 623	648 322	601 927	806 894	815 667	1 125 874	1 233 672	1 426 727	1 140 366	1 309 832	1 326 894	1 310 862	1 155 259	
Netherlands	412 721	408 264	447 480	468 919	506 548	605 543	628 805	660 400	700 438	705 917	759 106	771 440	1 169 633	1 115 626	930 993	1 166 768	1 229 271	1 434 072	1 512 455	1 597 290
Finland							200 832	200 672	211 840	327 432	395 657	398 982	419 380	465 970	504 060	543 621	582 776	684 467	690 727	725 218
UK	409 224	376 478	401 485	362 802	387 343	398 820	452 365	442 910	507 512	529 300	568 260	599 109	629 033	755 806	600 686	622 026	670 749	783 215	861 686	838 800
LAND																				
Denmark	49 676	51 517	53 792	70 250	69 122	72 447	76 279	85 089	87 733	108 994	139 993	151 103	172 144	214 634	225 710	340 864	396 680	617 810	1 485 829	2 418 623
Germany	88 598	83 853	77 751	100 261	108 031	97 163	265 109	286 534	249 150	281 962	291 303	277 601	260 320	308 663	287 741	307 625	368 338	376 888	406 090	425 623
France	21 730	20 741	22 936	25 941	25 693	24 221	23 672	22 662	18 286	19 580	18 180	20 669	17 878	19 903	18 341	22 010	16 339	17 502	19 320	18 200
Hungary																6 499	21 730	20 741	22 936	25 941
Ireland																				
Italy	98 846	90 391	121 026	97 927	94 975	204 919	194 801	300 573	265 983	379 046	388 194	573 427	573 784	744 790	494 163	570 989	600 997	609 561	548 785	
Netherlands	78 587	83 420	94 195	107 307	107 706	136 137	145 903	160 110	170 676	202 496	230 328	245 493	585 296	539 893	337 678	479 065	534 073	618 398	652 473	662 325
Finland							73 728	73 588	71 573	86 499	88 907	83 241	88 905	112 547	107 232	129 881	142 641	153 590	157 333	161 203
UK	151 271	145 349	159 441	164 286	172 660	163 106	190 188	202 456	248 835	299 124	309 906	321 773	342 606	436 105	322 017	348 607	365 586	439 166	425 173	452 368
OTHER FIXED ASSETS																				
Denmark	295 621	290 126	309 470	391 875	378 776	399 485	425 004	533 067	571 707	622 609	794 650	849 093	923 205	1 164 234	1 193 102	1 550 838	1 640 405	2 193 225	1 619 950	1 639 865
Germany	152 136	157 595	198 462	153 839	145 017	159 312	169 623	203 449	187 598	206 442	201 663	208 502	207 506	241 620	247 143	277 150	285 164	290 048	282 572	300 012
France	130 448	135 723	138 540	162 986	161 363	166 603	161 884	178 572	182 457	201 120	164 850	167 394	165 604	167 838	175 444	196 094	180 754	176 557	208 352	182 067
Hungary																151 521	130 448	135 723	138 540	162 986
Ireland																				
Italy	146 479	166 302	175 553	167 535	116 497	154 420	135 799	172 791	161 212	210 219	207 880	264 369	253 061	246 247	400 773	455 154	430 651	384 833	336 855	
Netherlands	237 158	242 144	258 491	274 210	300 938	359 506	363 635	365 042	407 504	406 494	414 531	420 398	411 575	423 057	445 173	514 137	505 600	577 246	630 211	659 305
Finland							75 291	77 744	88 268	151 758	201 658	201 099	209 358	265 802	302 950	328 289	337 503	416 360	402 969	439 124
UK	152 306	137 192	140 709	111 700	122 254	124 082	133 489	116 715	135 623	128 643	136 207	137 394	145 486	166 173	133 052	149 806	166 894	202 213	232 045	179 216
TOTAL CURRENT ASSETS																				
Denmark	169 179	143 282	162 982	188 348	174 602	184 529	188 375	214 145	224 262	129 150	161 799	216 351	220 364	245 611	253 077	334 591	389 984	476 132	546 266	626 823
Germany	60 368	91 933	109 820	60 371	57 595	62 674	68 133	72 692	53 899	61 354	88 403	94 314	89 657	85 165	86 939	114 069	108 496	122 613	118 548	151 132
France	126 312	121 516	117 849	130 820	77 214	80 000	83 018	96 613	100 692	100 999	99 608	100 376	115 018	102 291	106 876	120 276	112 649	121 162	136 663	125 127
Hungary																106 441	88 353	73 865	83 145	112 985
Ireland																				
Italy	155 772	167 571	151 755	162 833	120 747	166 459	138 023	174 958	174 732	217 629	219 593	288 078	406 827	435 690	245 430	283 689	295 246	316 468	269 619	
Netherlands	96 976	82 700	94 794	87 402	97 904	109 900	119 267	135 248	122 258	96 927	114 247	105 549	172 762	152 676	148 142	173 566	189 598	238 428	229 771	275 660
Finland							51 813	49 340	51 999	89 175	105 092	114 642	121 117	87 621	93 878	85 451	102 632	114 517	130 425	124 891
UK	105 647	93 937	101 335	86 816	92 429	111 632	128 688	123 739	123 054	101 533	122 147	139 942	140 941	153 528	145 617	123 613	138 269	141 836	204 468	207 216

ESU																				
Denmark	91	96	98	124	123	135	130	138	144	149	186	188	188	236	254	276	283	353	362	348
Germany	37	34	38	45	42	42	50	58	49	55	75	75	80	103	106	116	109	115	116	121
France	57	57	58	74	73	66	68	63	64	71	90	87	90	108	113	114	103	98	112	105
Hungary																48	41	37	35	33
Ireland																				
Italy	59	70	91	58	116	78	74	72	75	78	83	76	110	133	149	473	407	402	348	
Netherlands	64	67	65	75	79	98	99	115	116	122	128	128	138	114	111	129	127	148	151	149
Finland							55	67	74	80	71	70	75	72	82	93	101	102	86	93
UK	64	61	63	78	87	80	85	81	79	91	115	117	138	184	155	169	157	173	175	182

Source: FADN.

Appendix 5. Net Profit + Interests / total assets

Crop Farms

Net profit+Interests / total assets																				
Denmark	0.063	0.048	0.044	0.029	0.052	0.070	0.075	0.061	0.056	0.031	0.034	0.045	0.037	0.024	0.031	0.025	0.035	0.028	0.028	0.013
Germany	0.050	0.043	0.047	0.037	0.044	0.059	0.039	0.044	0.048	0.035	0.043	0.040	0.043	0.026	0.037	0.043	0.035	0.047	0.064	0.046
France	0.135	0.120	0.120	0.087	0.133	0.160	0.161	0.167	0.152	0.147	0.129	0.122	0.110	0.121	0.126	0.111	0.095	0.125	0.192	0.131
Hungary																0.093	0.055	0.066	0.099	0.111
Ireland	0.063	0.064	0.066	0.051	0.063	0.067	0.062	0.055	0.046	0.055	0.038	0.047	0.042	0.029	0.036	0.026	0.014	0.018	0.028	0.016
Italy	0.068	0.063	0.069	0.052	0.049	0.034	0.046	0.038	0.039	0.030	0.031	0.027	0.033	0.030	0.049	0.053	0.049	0.044	0.061	
Netherlands	0.102	0.093	0.068	0.037	0.060	0.113	0.081	0.047	0.064	0.071	0.027	0.027	0.051	0.028	0.045	0.018	0.036	0.048	0.048	0.035
Finland							0.101	0.118	0.094	0.059	0.055	0.082	0.071	0.072	0.056	0.046	0.040	0.041	0.085	0.039
UK	0.049	0.053	0.052	0.046	0.066	0.086	0.093	0.064	0.036	0.034	0.030	0.027	0.019	0.028	0.045	0.019	0.024	0.038	0.049	0.041

Dairy Farms

Net profit+Interests / total assets																				
Denmark	0.151	0.117	0.125	0.109	0.129	0.119	0.105	0.088	0.092	0.079	0.067	0.066	0.056	0.052	0.048	0.045	0.044	0.039	0.051	0.037
Germany	0.063	0.051	0.044	0.051	0.061	0.065	0.041	0.037	0.045	0.051	0.050	0.057	0.052	0.047	0.043	0.054	0.060	0.066	0.093	0.048
France	0.110	0.110	0.097	0.110	0.149	0.160	0.153	0.131	0.131	0.139	0.126	0.128	0.120	0.116	0.109	0.106	0.114	0.104	0.118	0.107
Hungary																0.038	0.105	0.124	0.126	0.145
Ireland	0.097	0.077	0.071	0.090	0.094	0.089	0.086	0.075	0.075	0.056	0.051	0.053	0.056	0.036	0.053	0.051	0.043	0.029	0.038	0.035
Italy	0.135	0.113	0.106	0.118	0.128	0.087	0.107	0.101	0.094	0.063	0.061	0.055	0.060	0.067	0.068	0.070	0.078	0.081	0.077	
Netherlands	0.101	0.083	0.086	0.091	0.073	0.073	0.061	0.044	0.060	0.048	0.040	0.037	0.034	0.029	0.028	0.028	0.033	0.035	0.047	0.037
Finland							0.209	0.201	0.194	0.110	0.117	0.123	0.124	0.132	0.127	0.117	0.098	0.088	0.102	0.116
UK	0.080	0.067	0.071	0.085	0.090	0.080	0.081	0.076	0.056	0.043	0.040	0.047	0.074	0.053	0.056	0.061	0.067	0.055	0.067	0.062

Granivores

Net profit+Interests / total assets																				
Denmark	0.175	0.118	0.173	0.098	0.073	0.113	0.121	0.133	0.124	0.011	0.054	0.111	0.115	0.034	0.022	0.038	0.039	0.047	0.003	-0.001
Germany	0.139	0.065	0.078	0.033	0.027	0.072	0.077	0.100	0.069	0.015	0.058	0.111	0.083	0.036	0.012	0.012	0.011	0.011	0.011	0.012
France	0.036	0.036	0.037	0.041	0.053	0.053	0.051	0.049	0.045	0.042	0.039	0.038	0.032	0.032	0.032	0.030	0.028	0.023	0.026	0.026
Hungary																0.035	0.021	0.015	0.012	0.009
Ireland																				
Italy	0.002	0.004	0.004	0.004	0.002	0.002	0.002	0.002	0.001	0.002	0.000	0.000	0.001	0.001	0.001	0.001	0.001	0.001	0.001	
Netherlands	0.029	0.035	0.036	0.038	0.041	0.039	0.037	0.031	0.029	0.030	0.031	0.031	0.025	0.026	0.028	0.023	0.019	0.019	0.023	0.026
Finland							0.028	0.024	0.020	0.011	0.013	0.012	0.011	0.013	0.013	0.011	0.010	0.012	0.012	0.015
UK	0.000	0.031	0.024	0.017	0.013	0.015	0.015	0.013	0.014	0.018	0.018	0.017	0.015	0.013	0.013	0.017	0.016	0.013	0.017	0.013

Source: FADN.

Comparative Analysis of Factor Markets for Agriculture across the Member States

245123-FP7-KBBE-2009-3

The Factor Markets project in a nutshell

Title	Comparative Analysis of Factor Markets for Agriculture across the Member States
Funding scheme	Collaborative Project (CP) / Small or medium scale focused research project
Coordinator	CEPS, Prof. Johan F.M. Swinnen
Duration	01/09/2010 – 31/08/2013 (36 months)
Short description	Well functioning factor markets are a crucial condition for the competitiveness and growth of agriculture and for rural development. At the same time, the functioning of the factor markets themselves are influenced by changes in agriculture and the rural economy, and in EU policies. Member state regulations and institutions affecting land, labour, and capital markets may cause important heterogeneity in the factor markets, which may have important effects on the functioning of the factor markets and on the interactions between factor markets and EU policies. The general objective of the FACTOR MARKETS project is to analyse the functioning of factor markets for agriculture in the EU-27, including the Candidate Countries. The FACTOR MARKETS project will compare the different markets, their institutional framework and their impact on agricultural development and structural change, as well as their impact on rural economies, for the Member States, Candidate Countries and the EU as a whole. The FACTOR MARKETS project will focus on capital, labour and land markets. The results of this study will contribute to a better understanding of the fundamental economic factors affecting EU agriculture, thus allowing better targeting of policies to improve the competitiveness of the sector.
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Website	www.factormarkets.eu
Partners	17 (13 countries)
EU funding	1,979,023 €
EC Scientific officer	Dr. Hans-Jörg Lutzeyer