

EXPLAINING THE CHANGING INSTITUTIONAL ORGANISATION OF DUTCH FARMS: THE ROLE OF FARMER'S ATTITUDE, ADVISORY NETWORK AND STRUCTURAL FACTORS

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Abstract

Although the family farm remains the dominant organisational form for farms there are changes in the legal mode of organisation. Applying the new institutional economics and economic organisation theory the different organisation modes are explained, mainly in terms of control and income rights. Important factors are (limited) liability, risk-bearing costs, transaction costs, and residual control and income rights. In an empirical follow-up, based on a sample among 3100 farmers in the Netherlands, the impact of farmers' attitudes, farm advisory network, and structural variables on organisation choice are analysed. Especially the financial advisors appear to play a significant role in the choice of organisation mode. Other factors are age, branche (horticulture, factory farming), and farm size.

Keywords: farm organisation, ownership and management, liability, risk, residual control and income rights, attitudes, advisory network,
JEL classification: Q12

1. Introduction

One of the salient characteristics of the history of industry is the transition from family firms to large factory-style corporations. Large corporations dominate modern economies. For a long time agriculture has largely resisted the transition to large corporate ownership. Household-firms still dominate agriculture, but there has been a remarkable shift in organisational form. Possible factors underlying this organisational change include structural characteristics relating to the farmer and the farm, and the attitudes, managerial ability and decision-making behaviour of the farmer.

In this paper we would like to investigate the factors behind the shift in the organisational form of farms. For that reason we have carried out a survey among all the farmers in the Netherlands. With the results of the survey we would like to obtain an insight into:

- What attitudes have farmers towards farming and farmership?
- What types of farmers/entrepreneurs can we distinguish?
- What motivates farmers to choose particular organisational forms?

The paper is structured as follows. Section 2 consists of two parts. First, it provides a brief overview of the development of the different types of organisational forms of farms in the Netherlands. Second, it gives a description of the sample. In section 3 we discuss the dominance of the family farm in agriculture and horticulture and we give the theoretical background to the different organisational forms. Section 4 contains the results of the factor analysis of farmers' attitudes. In section 5 we analyse a number of additional explanatory variables that could explain the farmer's choice of farm organisation mode. Section 6 presents and discusses the estimation results of the explanatory logit models concerning the four organisational forms: single owner family farm, partnership, partnership firm (VOF) and limited partnership (CV) together and private limited company. Finally, the paper closes with a concluding section (Section 7).

2. Different types of farm organisation forms in the Netherlands

Development

Table 1 provides an overview of the development of different types of organisational forms in the Netherlands (estimates based on Munneke (2003:31) who relies on the Central Bureau of Statistics (CBS)). Due to the small numbers, we have left out of consideration the number of public limited companies (about 10). As is shown by Table 1, the agricultural sector is characterised by a broad spectrum of organisational modes: at one end the single owner and at the other end the private limited company.

Table 1. Farm types in Dutch agriculture

	Total	Non-legal entities			Legal entities	
		Single owner	Partnership	Partnership firm/limited partnership	Private limited company	Public limited company
1993	100	73.0	23.0	1.3	0.8	0
1994	100	70.4	25.2	1.4	0.9	0
1995	100	69.0	26.4	1.5	0.9	
1996	100	67.3	27.4	1.6	0.9	
1997	100	66.0	28.8	1.8	1.0	
1998	100	63.6	30.6	2.0	1.0	
1999	100	61.8	31.7	2.2	1.1	
2000	100	61.2	31.9	2.5	1.3	10
2001	100	60.1	32.7	2.7	1.3	

Source: Munnike, 2003:312

For the year 2002 Oosterbosch (2003), relying on a stratified sample of all the farmers in the Netherlands, estimates the shares of single owners, partnerships, partnership firms, private limited companies and public limited companies to be 12.8%, 43.9%, 30.1% and 13.2% respectively¹. Additional estimates for the same year from Hoon (2003: 63) relate only to greenhouse growers and suggest that organisational form is not the same across all branches within the agricultural sector and also that it is strongly dependant on the size of the holding. Based on a survey among 1000 large greenhouse holdings, she estimated the shares of single owners, partnerships, partnership firms, private limited companies and public limited companies to be 4.7%, 15.6%, 37.5% and 42.9% respectively². Comparing the results of Oosterbosch (2003) and Hoon (2003) suggests that the farm size and farm sector (e.g. intensive livestock, horticulture, arable) influence the choice of organisational form. Among greenhouse growers the share of private limited companies is much higher than in agriculture in general. The estimations of the share of the different organisational modes according to the three sources differ a lot. However they have in common the following:

- the numbers and share of single owners in the agriculture sector is decreasing;
 - the share of private limited companies is increasing;
 - in between both we see that partnership firms or limited partnerships become more important.
- These figures indicate an apparent shift in the organisational form of agricultural enterprises.

Sample

A survey was used to obtain information about the relevant variables. The used sampling strategy was random sampling among all farms in the Netherlands, including glasshouse growers. The sample consisted of 3100 farms. A questionnaire was developed and pre-tested by individual farmers. After pre-testing the questionnaire was adapted. The highly structured questionnaire prevented deviations from the central research questions. The mail survey was one of the first and most intensive surveys concerning organisational forms of farms across the Netherlands. After about three weeks, all farmers to whom a questionnaire had been sent received a reminder letter. In total, 765 out of 3110 Dutch farmers sent back the filled-in questionnaire; a response rate of almost 25 per cent. After incomplete questionnaires were discarded a sample of 744 farmers remained.

This paper uses a further subset of this sample in order to explore the factors influencing changes in organisational structure in agriculture. Following cleaning of the data, the sub-sample concerns 205 farms who switched organisational form in the last five years or who were planning to change within the next few years.

When looking at farm type and farm scale (number of hectares) it appears that the sub-sample does not correspond to national averages, and thus is not fully representative. The relative shares of dairy farms and arable farms at national level are about 27 per cent and 15 per cent respectively (calculation based on LEI, 2004). For the survey sub-sample these relative shares are 49 per cent for dairy and 26 per cent for arable farming. These two types of farming are clearly overrepresented in the survey sample. Given the nature of the sub-sample, this could also suggest that arable and dairy farms are more likely to have changed organisational form in the last 5 years. The corresponding national

average number of hectares of these farm types are estimated to be 39 ha for dairy and 54 hectare for arable farms (idem LEI, 2004). In the survey sub-sample, the average number of hectares for these farm types are 45 and 89 hectares respectively. The farms present in the sample are relatively large farms in comparison to the whole population, particularly for arable farms. Again, this could suggest that larger farms (in terms of area) are more likely to have changed organisational form in the last 5 years.

Table 2 shows the changes in organisation form amongst farms in the sample. The majority of businesses were originally either a single owner or partnership. The sample shows that the new organisational form is primarily a partnership or partnership firm/limited partnership (hereafter PF/LP) and very few single owners. No public limited companies were present in the final sub-sample, and this organisational form is not considered further in the empirical models.

Table 2: Changing institutional forms for farms in the survey sample

Old institutional form	New institutional form				
	Single owner	Partnership	Partnership firm or limited partnership	Private limited company	Total old forms
Single owner	3	54	22	4	83
Partnership	9	13	49	8	79
Partnership firm or limited partnership	2	10	3	10	25
Private limited company	3	6	10	3	22
Total new forms	17	83	84	25	209*

* The number of total forms is higher than the number of observations in the sub-sample since some farmers reported having more than one institutional form. Since this is technically possible, these observations have not been excluded.

Of the 83 single owner forms, 54 shifted to a partnership and 22 to a PF/LP form within the last five years. Of the 79 original partnerships in the sample, 49 shifted to a PF/LP form, 8 to a private limited company and 9 shifted back to a single owner form. Most of the new single owner businesses were originally partnerships, although this group is small. The transition from single owner to partnership and then for some firms back to single owner form suggests a farm succession cycle, with the retiring farmer and successor working together for some time to facilitate succession.

Recent data for the Netherlands indicate that for businesses where the oldest farm head is older than 50 years (60 per cent of all agricultural and horticultural businesses), only 33 per cent had a successor in 2004 (LEI, 2005). This percentage was considerably higher for dairy farms (55 per cent) and slightly lower for arable farms. Farm succession in the Netherlands is usually arranged within the family sphere (93 per cent; outside agriculture only 35 per cent) and uses the partnership as a succession-device (87 per cent) (van Hassel, 2004: 60).

The transition of 49 businesses from partnership to PF/LP may also relate to succession, with the retiring farmer in the succession partnership becoming a 'sleeping' partner. Most new private limited companies were originally either PF/LPs or partnerships. The diagonal elements represent businesses that underwent a shift in organisation within the same form (e.g. new partner in a partnership, new director in a private limited company).

3. Theoretical background and findings in the literature

The form of farm organisation can vary from a single owner or simple partnership, where labour is paid by residual claims, to a public corporation with many anonymous co-owners and specialised wage labour. We distinguish six organisational forms: single owner, partnership, partnership firm, limited partnership, private limited company and public limited company. We focus here on a typology that is based on legal definitions of organisational modes. Other typologies and classifications are possible (e.g. according to specialisation in labour, decision-making and control). In the model used in this paper, we aggregate partnership firm and limited partnership into one category and we do not discuss public limited companies further since they only occur in exceptional

circumstances in the agricultural sector. In this section these organisational forms are put into a theoretical perspective and relevant findings in the literature are discussed.

The property rights approach has been developed over the last fifteen years to explain the optimal allocation of asset property used in firms, organisations or contractual relations (Milgrom and Roberts, 1992). This approach is labelled the new property rights theory (Foss and Foss, 2001: 21) or incomplete contract theory. Contracts are incomplete due to the difficulty in writing complete (cover all possible circumstances) and enforceable contracts. In this theory having the residual control rights and the right to the residual income is taken as a definition of ownership (Hart, 1995: 30). Residual control rights are defined as the right to decide all usages of an asset in any way not inconsistent with a prior contract, custom or law (Hart, 1995: 30).

In the case of a firm or organisation, where often different stakeholders are involved and different assets are brought in, it is not always simple to indicate who has the residual control rights and who can capture/appropriate the residual income. In reality, ownership of a firm can be a vague concept. When there are multiple owners of an asset or firm, they will typically delegate some of the residual control rights to agents such as directors, managers, board of directors etc. Residual control or decision rights are like any other good; there will be an optimal allocation of them (Hart, 2002: 185).

Incomplete contracts lead to a number of economic implications, including hidden information and hidden action (moral hazard). Hidden information is an *ex-ante* problem where one agent has information not available to the other. In terms of hiring labour, the employer may not know whether the potential employee has the ability to perform the tasks required (this information is known to the applicant). This problem can lead to adverse selection. Hidden information can be reduced through screening and/or self-selection conditions. Hidden action (moral hazard) is an *ex-post* problem, where the principal cannot observe the agent's true behaviour. Where an agent does not share in the firm's residual income, the agent's self interest may not coincide with the best interests of the firm. Hidden action can be controlled by monitoring and incentive contracts.

Against this theoretical background, the selected organisational forms are further reviewed below and results are summarized in Table 3.

Single owner

A 'pure' family farm is the simplest case, where a single farmer owns the output and controls all farm assets, including all labour assets. The most important characteristic of a single owner is the presence of only one farm head. Other persons present at the farm are always employed by the owner. The farm head is personally liable for all of the farm's debts (cf. Kerkmeester and Holzhauer, 2002: 63). The farm head has full control rights, full income rights, full transfer rights and also the residual rights of control and to appropriate residual income.

The simplest family farm (= single owner family farm) avoids hidden information and hidden actions of labour, because the farmer is complete residual claimant. The transaction costs of recruiting, screening and contracting personnel are relatively low for a single owner, because there are generally very few personnel (employees). If there are personnel, incentive costs and monitoring costs will exist.

Partnership

A partnership (*maatschap*) is a non-legal entity; all the members of the partnership bring in something of their own, such as land, buildings, labour or capital. Each member is personally liable for an equal share of the farm's debts and losses. Each member is entitled to carry out duties concerning normal farming activities. The members must decide together over important management decisions concerning means of production (labour, capital and non-factor inputs), investments and means of the partnership. Partnership is often chosen as an organisational mode when there are a number of farm heads, who are often family related. A partnership is also a suitable organisational mode to use for family succession.

An important difference with the single owner family farm is sharing of the residual rights of control and the residual income and the existence of the incentive problem. The profits are usually divided by the members according to their share in the partnership. The profits are taxed according to the (progressive) income tax rates. The best incentive for each member to work hard is to divide the profits according to their share in the partnership. However, it is often difficult to measure each individual's contribution (hidden action). More complex rewarding systems are more difficult to

implement and lead to a rise in decision-making costs. As the number of members of a partnership increases, incentive problems also increase.

Partnership firm

A partnership firm is a partnership that is operating under a common name, and must be registered by the Chamber of Commerce. The ownership and management (including directorship) are shared by all members of the firm; they are co-owners. Contrary to a partnership, all of the members of the partnership firm are personally liable for their entire (personal) estate, and not for an equal share of the firm's debts and losses.

In terms of residual income, residual control rights and the existence of the incentive problem, the partnership firm is similar to the partnership described above. The same problems as for partnership hold for sharing profit, paying taxes, measurement problems of each individual contribution, rewarding systems, decision-making costs and incentive problems.

The economic organisational motives to choose for a partnership firm are largely the same as those for a partnership. The monitoring costs will increase with the number of partners, because each member is allowed to act on behalf of the partnership firm and because each member is liable for his entire estate. This implies that all risks are shared equally by the members of the partnership firm (Kerkmeester en Holzhauser, 2000: 68-69).

Bangma and Ridder (2004: 15) document that until 2002 the partnership firm allowed partners to divide the profits of the firm freely over both spouses, which created a tax benefit for man-woman partnerships. They see this as the reason for the popularity of this firm type in the 1990s (increase in men-woman partnership firms).

Limited partnership

A limited partnership is a special form of a partnership firm with one (or more) active partners and one (or more) silent or limited partners. The silent partners are not allowed to be actively involved in the management of the partnership and are therefore only liable for their brought-in capital. The active partners are responsible for daily decision-making within the partnership and are liable for their entire (personal) estate. Within families, a limited partnership is sometimes used when younger generations want to take over the farm and the older generation acts as a silent partner who brings in buildings and/or land (Koppenol, 2000: 40).

The profits are shared and taxed in a similar way as in the case of a partnership firm, with the exception that the silent partners can also be taxed according to corporation tax. The economic organisational motives to choose for a limited partnership are largely the same as those for a partnership (firm). For the silent partners a favourable aspect of the limited partnership is their entitlement to a share of the profits instead of a fixed interest percentage. To limit agency costs the active partners are allowed to share in the partnership's profits (Kerkmeester and Holzhauser, 2000: 70).

Private limited company

A private limited company is a legal entity and can be viewed as institutionalised form of cooperation which is recognised as a legal personality by law. A legal entity has its own capital, and accompanying rights and obligations. A private limited company is a legal entity with its share capital divided by the shareholders. The company is not permitted to offer its shares for sale to the public and shares are listed to a certain shareholder, so they cannot be traded publicly. A private limited company must have a shared capital of at least € 18.000. The company has to be founded before a Notary Public and the company and its statutes have to be registered legally. Because a private limited company is a legal entity, it has its own possessions and debts. In exchange for a share in the firm, shareholders make means of production, like capital and land, available to the firm. The shareholders are only liable for their share in the capital of the private limited company.

The advantage of limited liability is that it increases the possibilities for more large scale activities. A single owner with unlimited liability would be expected to undertake fewer or smaller scale activities than would be the case for a private limited company. Even if the available activities were identical in the two cases, the additional risks faced by the single owner will induce him or her to apply a higher discount rate, and fewer of the activities will yield expected returns which exceed the

‘cost of capital’. Thus the cost of capital to the firm is likely to be lower in the private limited company; this is just another way of saying that risk-bearing costs are lower for the decision makers (Ricketts, 2002:110).

The shareholders are the legal owners (= owners in a juridical sense) of the company and are responsible for appointing the board of directors. Often a private limited company involves separation of ownership and management. However, farms with a private limited company as organisational mode often have one shareholder (but more are also possible) who also acts as director. In case of non-separation of ownership and management, incentive problems are generally not an issue. In the case of separation of ownership and management, the implications for residual control rights and residual income are similar to that of a public limited company.

Profits are divided over the shareholders according to their share in the company. The profits are taxed according to the corporation tax rate of 34.5 per cent. The dividends received by the shareholders are also taxed.

Summary of organisational forms

Table 3 provides a summary of the five organisational forms according to six criteria above. The typology of organisational forms can also be seen as spectrum ranging from single owner to private limited company.

Table 3. Summary of the five organisational modes

	Single owner	Partnership	Partnership firm	Limited partnership	Private limited company
Ownership	One farm head	Co-ownership; more farm heads; organisation mode for succession	Co-ownership; more farm heads	Difference between silent and active partners	Separation of ownership and management; shares not traded publicly
Corporate status	Non-legal entity	Non-legal entity	Non-legal entity	Non-legal entity	Legal entity
Liability	Farm head personally liable	Farm heads personally liable for their share	All farm heads personally liable for their entire estate	Silent partners for their brought-in capital. Active partners for their entire estate	Shareholders only liable for their brought-in capital
Fiscal aspects	Profit taxed by income tax	Profit taxed by income tax	Profit taxed by income tax	Profit taxed by income tax or corporation tax	Profits taxed by corporation tax Dividends also taxed
Transaction costs	Relatively low	Increase with more members	Increase with more members	Sharing partnership’s profits by active partners limits agency cost	Incentive problems if ownership and management separated
Cost of capital for the farm	Relative high	Relative high	Relative high	Relative high, but partly lower because of silent partners	Lower; risk-bearing costs are lower

Based on the theory and Table 3 the following general conclusions can be drawn concerning the spectrum of organisational forms. These conclusions should be interpreted as ranging from left to right across the spectrum, i.e. separation of ownership and management will increase as the organisational form shifts from single owner towards a private limited company.

- co-ownership offers the possibility of building up reputation;
- separation of ownership and management will increase;
- who has residual control rights and who is able to capture the residual income become less clear;
- transaction costs increase because of (1) reducing the problems of adverse selection and moral hazard and (2) giving incentives, both caused by making use of workers and managers;

- more possibilities of sharing risk. An important difference between a private limited company and other organisational forms (to the left of the spectrum) is the reduced liability and therefore risk, which in turn implies a lower cost of capital and possibilities for more large scale activities;
- more possibilities for specialisation of work and management;
- more possibilities to spread fixed costs over more transactions;
- the governance structure becomes more complex and more robust.

Findings in the literature: All sectors

Two recent empirical studies address the choice of firm type among businesses (all sectors) in the Netherlands (Bangma and Ridder, 2004 and Braaksma and Bangma, 2004). Both studies are based on a survey among 1800 businesses. Although not specific to agriculture, they highlight a number of important issues and specific circumstances in the Netherlands that influence the choice of organisational form. These findings are summarised below:

- With the 2001 tax reform in the Netherlands the differences between the income and corporate tax schemes have become less important and less pronounced. Despite this reform, fiscal considerations still play a dominant role in the choice of farm type (Bangma and Ridder, 2004:15 and Braaksma and Bangma, 2004: 2).
- In particular, private limited companies have still some tax benefits (even already realized with low profits) which make them attractive from a fiscal point of view (Bangma and Ridder, 2004:15).
- In other sectors (excluding agriculture) the popularity of private limited companies is increasing (Bangma and Ridder, 2004: 15).
- A private limited company is attractive when firm profits (after subtracting salary costs for the entrepreneur and co-working family members) are higher than 60 thousand euro. (Bangma and Ridder, 2004:28).
- The administrative burden of private limited companies is higher than the partnership firm or limited partnership forms.
- Possibilities for building up pensions differ across farm types. The private limited company has better facilities (Bangma and de Ridder, 2004: 20).
- Although the private limited company is known as a device to reduce personal liability, Braaksma and Bangma (2004: 3) found that banks often ask for a personal guarantee before lending money (particularly for small companies). In reality this re-introduces personal liability.
- The scale/magnitude of the business is very significant in determining the firm type. Larger firms opt for private limited companies (Bangma and de Ridder, 2004: 15).
- The image of a particular firm type plays an important but secondary role in farm choice. There appears to be a particularly positive image for the private limited company form.

Findings in the literature relating to agriculture: structural characteristics

In their model explaining the domination of the family farm organisational form, Allen and Lueck (1998: 347-349) specify three groups of characteristics that determine the organisational form: nature of the agrarian production process; economic-organisational factors and costs of production factors.

The **nature of the production process** influences the possibilities for advantages of scale. The advantages of scale are limited by the spatial extent of land-bounded agriculture. This rapidly leads to relatively high internal transport costs. A second explanation is the season-bounded character of the different phases of agricultural production processes (Allen and Lueck, 1998: 346-347). Uncertainty from seasonal influences plays an important role in agricultural production. According to Allen and Lueck (1998: 347) if the random and systematic effects of nature cannot be controlled, farming is dominated by family farm production. Seasonal influences are especially noticeable for arable farming and vegetable and fruit growing in the open. In those cases where seasonal uncertainty can be controlled, agricultural production tends to be organised in large-scale firms as in much of the modern economy (Allen & Lueck, 1998: 347). This is the case with glasshouse farming and factory farming, where technological advances and new means of production limit seasonal influences on production processes and reduce transaction costs.

When complexity of production processes decreases, the transaction costs of labour will also decrease. In glasshouse holdings and factory farms, activities tend to be routine and simple;

transaction costs at these farms will be relatively low compared to farms with complex activities. According to Allen and Lueck (1998: 361) family farming is less preferable when the number of (routine) activities per product increases (glasshouse horticulture and factory farming fulfil this condition).

A similar situation holds for the number of production cycles per year. When this increases, activities tend to become routine and it is easier to hire employees to perform these activities. This leads to a high level of specialisation, which (in combination with routine activities) enables the realisation of economies of size. With an increase in farm size, limited partnership, a partnership firm or a (private or public) limited company tend to be more suitable organisational forms. When the number of cycles is low, like in arable farming, the advantages of specialisation will be limited (Allen and Lueck, 1998: 363) and an organisational mode of a single owner or a partnership is more suitable.

Economic-organisational factors relate to the connections between successive phases of the agricultural production process. It is not always technically possible to separate phases with transactions using markets or contracts, especially for land-bounded activities. If it is technically possible; it often involves high transaction costs. In order to overcome high transaction costs, successive phases of the agricultural production process can be coordinated within one firm and not via the market or contracts. This is a matter of vertical integration. Holdings that are able to specialise, will increase in size more easily than those that are less able to specialise.

Cost of production factors are the third category that can be distinguished. Farmers (temporarily) bring own labour, capital and land to their company for a much lower price than the common market price. An explanation for this can be found in: (1) the preference to be a farmer or market gardener; (2) mobility bounded values and norms of the group to which farmers belong; and (3) the production factors are for an important part asset specific - the costs of these production factors have become sunk costs, they have low opportunity cost, or a low salvage value. Lock-in effects also play a role; lock-in effects arise when there are either real or perceived costs that make it more attractive to remain in the original institutional form.

Findings in the literature relating to agriculture: attitudes and goals of farmers

Allen and Lueck's approach largely ignores the characteristics of the human decision-maker; while other approaches indicate the importance of this aspect. Williamson (1998: 30-31) suggests that the determinants of the comparative advantages of different governance structures are (1) the characteristics of the decision maker, and (2) environmental characteristics of transactions. There is a growing body of literature that focuses on the characteristics of human decision-makers and the implications for farm change and farm performance (see for example Ondersteijn *et al.*, 2003 and Bergevoet *et al.*, 2004 for applications of the importance of farmer characteristics, goals, attitudes and strategies in determining environmental and economic performance and farm size on dairy farms in the Netherlands). Characteristics of human decision-makers include biographical factors (age, education, the phase in lifecycle of family farm), attitudes and motivations and abilities.

Summary of explanatory variables

Combining these elements from the literature on the structure of the farm, the determinants of farm decision-making behaviour and incomplete contract theory, the following variables could be important for determining farmer choice of organisational form: age, stage in life-cycle of family farm, farm size, type of farming (in particular due to effects of seasonality, production cycles and production process), information use, goals and attitudes of the farmer, tax considerations, liability considerations and labour organisation. This provides the basis for variable selection in our model.

4 Comprising farmer's attitudes

In the survey a host of questions were asked to farmers regarding their attitudes toward farming and social capital⁴. In order to single out a limited number of attitudinal characteristics factor analysis was applied to these questions. This technique, which can be considered as a kind of data-reduction, makes it possible to measure the answers given to the original questions on a limited number of 'new dimensions'. These 'new dimensions' can subsequently be interpreted as common denominators reflecting shared underlying factors. The basic idea in factor analysis is that from a set of N variables

(answers to specific survey questions) a set of N correlated descriptors (principle components) can be described. Each principal component is a suitable linear combination of the original variables. The first principal component accounts for the maximum variance in the original set of survey questions; the second is uncorrelated with the first and has the second largest variance and so on. Only those components with variances above a critical level are retained, thus reducing the original data set to a few variables (Wichern and Johnson, 2002).

A rotated factor analysis was performed on the data concerning the attitude of farmers using the STATA/SE-package (2003). The Kaiser criterion was used to select the number of underlying M factors or principal components explaining the data. As a consequence, only factors with eigenvalues larger than 1.5 were retained in the analysis.

From this factor analysis, we retained four orthogonal factors reflecting independent reasons that could explain the farmer's choice for an organisational form. The obtained eigenvalues for these factors were 4.69, 3.13, 2.57, 1.97 and 1.92 respectively. Eigenvalues can be used to evaluate the explanatory power of the extracted factors. Collectively the distinguished factors accounted for 37.6 per cent of the variance. This indicates that the answers given to survey questions provide a somewhat dispersed picture, which cannot be comprised in one or two underlying attitude-characteristics. After a varimax rotation and inspection of the pattern of factor loadings, the five factors were labelled as 'farmership', 'land (ownership)', 'trust', 'land as a form of equity' and 'expansion drive'. Table 4 gives the detailed results of the factor analysis.

Table 4. Five aspects of the attitude of farmers

	Component				
	Farmership	Land ownership	Trust in government	Land as a form of equity	Expansion drive
A farmer without land is not a farmer	-0.024	-0.761	-0.003	0.008	0.050
Without land I don't feel like a farmer	0.074	-0.794	0.049	-0.031	-0.013
Land ownership has a positive influence on the farm's solvability	-0.022	-0.059	0.003	-0.704	0.026
Land as a buffer against financial risks	0.014	-0.041	0.011	-0.637	0.001
Assets have positive influence on the farm's solvability	0.046	-0.060	-0.009	-0.649	0.028
Striving for a larger farm/holding	-0.041	-0.260	-0.046	0.052	0.694
Desire for business growth	0.102	-0.042	0.039	0.083	0.723
Being free and independent	0.716	-0.088	-0.094	-0.104	-0.020
Being your own boss	0.750	-0.141	-0.114	-0.081	-0.019
Enjoy farmer life	0.711	0.087	0.130	0.058	0.159
Being proud of the farmer's profession	0.628	0.075	0.066	0.043	0.237
Trust in the local government	0.035	-0.020	0.711	0.002	0.011
Trust in the national government	-0.038	-0.066	0.790	0.054	0.023
Trust in the EU government	-0.098	-0.060	0.730	0.009	0.088

In the first column and eight row of Table 4 there is a value of 0.71591, which represents the correlation between the seventh variable and the first factor. The factor loading of 0.71591 indicates that the seventh variable is strongly correlated with the first factor. So for a farmer who has a positive attitude towards farmership, the issue of being free and independent is relevant. Moreover, the positive sign (0.716) indicates that in principle there is a (significant) positive relation between the answer given on the seventh question and the 'farmership' attitude. A farmer who finds being free and independent very important (and who would have marked this question with a '5' on a five point scale) will typically be a 'farmership' type of farmer. This seems plausible. Farmers who enjoy the life of a farmer will find aspects of freedom and independence an important part of farmer life.

For each selected factor, indicators (original variables) with factor loadings of around (\pm)0.60 or more are included (see numbers printed in bold). The factors showing high loadings (high correlation) are the most interesting (and influential) ones. Questions which had a factor loading lower (or higher) than (\pm)0.60 on all of the four factors were not included in Table 4. Having explained the principles for reading and interpreting Table 4, subsequently the focus is on discussing the attitudinal factors.

The first factor is a measure for the attitude to 'farmership'. Variables with high loadings include the statements that *being free and independent* and *being your own boss* are important aspects of

farmer life. The first factor also scores highly on the statements that farmers are *proud of their profession* and the way they *enjoy farmer life*. All of these variables reflect the special characteristics which represent ‘farmership’.

The second factor is a measure for the attitude towards ‘land ownership’. Variables with significant loadings (correlations) include the statements that *a farmer without land is not a farmer* and *without land I don’t feel like a farmer*. Both of the factor loadings concerning land ownership are negative. This implies that the scores on the factor land ownership will have to be interpreted the other way around. In other words, farmers who find both of these aspects important will have a low (or negative) score on the factor land ownership. Farmers who find the aspects of land ownership not important will tend to have a high score on this factor.

The third factor is labelled as ‘trust in government’ of farmers. Variables heavily loading on this factor are the trust of farmers in the local government, the national government and the EU government respectively. The fourth factor is a measure for the attitude of farmers towards considering ‘land as a form of equity’. Variables heavily loading on this factor are the following: *land ownership has a positive influence on the farm’s solvability*, *land as a buffer against financial risks*, and *assets have positive influence on the farm’s solvability*. Similar to the factor land ownership, the factor loadings for ‘land as a form of equity’ are negative. This implies that the scores on this factor will have to be interpreted the other way around. In other words, farmers who find all of these three aspects important will have a low (or negative) score on the factor land as a form of equity. Farmers who find the aspects of land as a form of equity not important will tend to have a high score on this factor. The fifth and last factor, labelled as ‘expansion drive’, is interpreted as a measure of the farmer’s desire to expand his farm. It includes the farmer’s *desire for business growth* and *strive for a larger farm/holding* in the near future.

5. Measuring advisory network

From the factor analysis of the questions focusing on the advice given to farmers by their environment we retained three orthogonal factors reflecting the people in the environment of the farmer who influence his decision to change organisation form. The obtained eigen values are stated in Table 6. Only factors with eigen values larger than 1.0 were retained in the analysis. Collectively these factors accounted for 63,0 per cent of the variance. After a varimax rotation and inspection of the pattern of factor loadings, the three factors were labelled as ‘advice colleagues’, ‘internal advice’, and ‘advice financial advisors’ respectively. The associated eigenvalues were 2.33 (colleagues), 1.53 (internal) and 1.18 (financial).

Detailed results are provided in Table 5 where the variables and their factor loadings are stated. For each selected factor, indicators (original variables) with factor loadings of around (\pm)0.70 or more are included (see numbers printed in bold). The first factor is interpreted as the contribution of the ‘advice of colleagues’ on the decision of changing organisation mode. It includes the *influence of other farmers* and the *influence of advisory experts* on the choice of organisation mode.

Table 5. Component matrix advice environment

	Advice colleagues	Internal advice	Advice financial advisors
Influence of farm head himself	-0.098	0.809	0.015
Influence of other farm heads	0.018	0.783	-0.078
Influence of accountant	0.039	-0.087	0.877
Influence of tax advisor	0.198	0.276	0.742
Influence of advisory expert	0.815	-0.083	0.111
Influence of colleagues / other farmers	0.799	-0.159	0.110

The second factor concerning the advisory aspect is labelled as ‘internal advice’. This factor includes the *influence of the farm head himself* and the *influence of other farm heads* on the decision to change organisation mode. The third and last factor is a measure of the influence of financial advisors on the choice of organisation mode, and is labelled as ‘advice financial advisors’. This factor includes the variables *influence of accountant* and *influence of tax advisor*.

The result of this analysis shows that different advisory groups can be distinguished with respect to the decision on organisation mode. It is possible now to distinguish their individual contributions to the decision making process. The farmer uses his advisory network and reference groups as an input for his decision making process, but not as the only input. Therefore we try to explain the farmer's own role in the decision-making process by using the attitude factors. Moreover, we would like to account for other farmer and farm characteristics.

6. Explaining organisational forms of farms

Four binary logit models are used to explain the institutional structure of Dutch farms. Each model contains farmer attitude characteristics and the role of the advisory environment as explanatory variables as well as the selected other variables such as age, education level, specialization in glasshouse and factory farming, farm size (measured in Dutch size units), the contracting out of activities, family income and liability (importance attached to protect private property)⁵. The dependent variables in the four models are dummy variables that represent the four types of organisation mode that are distinguished. These are: (1) single owner, (2) partnership, (3) partnership firm (vennootschap onder firma) or limited partnership (= commanditaire vennootschap) and (4) private limited company (besloten vennootschap). A binomial regression procedure was applied on each model.

The Maximum Likelihood Method (MLE) was used to estimate several specifications for the model to explain organisation mode. We started with a model specification which included all the variables simultaneously. Subsequently we tried to simplify the model by eliminating variables based on their theoretical and statistical significance. The statistical significance was based on the test results of the null hypothesis that the effect of an individual explanatory variable is not different from zero, using p-values. For a consistent analysis, all four models used to explain organisation mode include the same set of explanatory variables. The criteria to include an explanatory variable in the models are (1) theoretical relevance and (2) statistical significance of the variable in one of the models. The models failed to include a number of variables thought to be relevant to the decision on organisation form. These included a dummy variable for continuation (whether the firm had a successor or not) and a variable representing the importance of access to capital in determining the choice of organisational form. In some cases the results of the survey allowed several specifications for one variable (e.g. as a dummy variable or continuous variable) and several specifications were tried. The estimation results of the binomial regressions for the four models are reported in Table 7.

The goodness of fit for the four models is also highlighted in Table 6. The pseudo R^2 for the models varies between 0.152 (partnership) and 0.449 (private limited company), which is still rather low. It appears that organisation modes are hard to explain given the choice of explanatory variables. Although the models do not include several variables expected to have influence on the presence of organisation modes, their goodness of fit remains fairly reasonable. All four models have significant Chi-squares, indicating that all variables are jointly different from zero for each model. This confirms the relationship between the dependent and explanatory variables in the model. Overall between 72 per cent (PF/LP) and 92 per cent (private limited company) of all the farms were correctly classified by the models as having a certain type of organisational form or not.

Table 6. Summary of the four model estimates for organisation modes

	Single owner	Partnership	Partnership firm or limited partnership	Private limited company
Intercept	3.992	-3.977***	1.966	-0.466
1 Farmership	-0.336	0.135	0.017	-0.180
2 Land ownership	0.724**	-0.178	-0.009	0.834**
3 Trust in government	0.422	0.105	-0.084	-0.309
4 Land as a form of equity	0.308	-0.246	0.029	0.415
5 Expansion drive	-0.476	0.311	-0.187	0.016
6 Advice colleagues	-0.282	0.243	-0.106	-0.359
7 Internal advice	0.283	0.395**	-0.349*	-0.131
8 Advice financial advisors	-0.662**	-0.497***	0.638***	0.828**
9 Average age farm heads	-0.096**	0.068***	-0.054**	0.036
10 Education level	-0.669**	-0.053	0.092	-0.194
11 Specialisation greenhouse	1.054	-0.286	-1.081*	1.274
12 Specialisation factory farming	1.706	0.922	-1.892**	2.703**
13 Farm size (DSU)	-0.005	-0.002	0.000	0.002*
14 Contracting out activities	0.385	0.053	-0.774**	1.087
15 Average family income	0.253	0.194	-0.024	-0.883**
16 Liability (private property)	-0.255	0.154	0.100	-1.029**
Chi square	30.02	41.57	43.44	66.08
Count R2	0.905	0.746	0.716	0.920
Pseudo R2 (McFadden)	0.258	0.152	0.159	0.449

Legend: * significant at the 10% level, ** significant at the 5 % level, *** significant at the 1 % level.

7. Discussion

The results presented in Table 6 are discussed for each organisational form. This is followed by some discussion across all models and linkages to theory and the findings in the literature.

Single owner

In determining the decision to choose a single owner form our results suggest that the attitude variable regarding land ownership, advice from financial advisers, the average age of farm heads and education level are important factors. Land ownership is the only significant attitude variable, and suggests that farmers who feel it is important as a farmer to be a personal land-owner are more likely to choose a single owner form. Advice from financial advisers influences the choice for a single owner form; farmers who value this advice highly are less likely to choose a single owner form. If the age of the farmer is relatively high the probability of choosing for single ownership declines. Older farmers are more likely to have a succession agreement with a successor (often a farm family member) and more likely to choose a more suitable form (i.e. partnership) for succession than the single owner form. Apart from an age effect (capturing farm succession) there also is an education effect. The more farmers are educated the higher the probability that they will choose another farm type than a single ownership (*ceteris paribus*).

Although non-significant, some of the other variables also signal some interesting points. The more a farmer values land as a form of equity the higher the probability of choosing a single ownership form. A farmer who is focused on farm expansion is less likely to choose a single ownership farm type. Farm expansion requires access to sufficient capital and labor, which are not strong distinguishing characteristics of the single ownership farm type.

Regarding tax concerns liability, it appears that farmers who would like to protect their private wealth from business risks are likely to choose another farm type than a single ownership. As Table 3 showed this is for obvious reasons. The average farm income level variable captures the tax-effect. With incomes below €50.000 the income tax regime is to be preferred above the corporate tax regime (Bangma and De Ridder, 2004: 56). If the farm income is relatively low the single ownership, which is

subject to the income tax regime, is an attractive farm type choice. This is what the estimated parameter reflects (high variable-value represents low income class).

Partnership

The significant factors explaining the choice for a partnership are the average age of farm heads and the role of internal and external advisors. The older the average age of the farm heads (could be the farmer, his wife and co-working son) the higher the likelihood of choosing a partnership. This is not surprising, given the possibilities within the partnership type to arrange farm succession (possibility to shift wealth from parents to child or successor while avoiding tax claims). Of course these kind of constructions require detailed agreements, which explains the role of internal (discussions within the farm family) and external advisors. Although less pronounced than with single ownership, farmers who pay a high value to external advisors are still less likely to choose a partnership. It seems that external advisors favor a partnership firm or limited partnership above the simple partnership.

The attitude variables are non-significant but most signs are as expected. Farmers who find personal land ownership highly important will not choose for a partnership (where often only one of the partners owns the main share of the farm's land). Farmers who think (owned) land is an important source of equity are less likely to have a partnership. The expansion drive attitude gets a positive sign in the partnership equation. This implies that farmers who would like to expand their business are more likely to have a partnership. In comparison with a single ownership, a partnership offers relatively favorable conditions for business-expansion (the partnership has access to equity from at least two persons, rather than only one).

The partnership offers better opportunities for reducing personal liability than the single ownership form. Farmers who would like to exclude liability or find reducing risk important prefer a partnership above a single ownership. The income variable operates in the same way as for the single ownership. This is not surprising since both legal entities are subject to the income tax scheme.

The higher the education level the less likely is a choice for a partnership, although this effect is stronger with respect to single ownership. The coefficients for the farm size variable are increasing from left to right. This implies that with increasing farm sizes the probability on a partnership increases as compared to a single ownership. However, if the farm size further increases, it becomes more likely that the farm will opt for other farm types, like limited partnership or partnership form, or even for a private limited company.

Partnership Firm/Limited Partnership

The significant factors that determine the choice for a PF/LP form are specialisation in either factor farming or greenhouse production, internal and external advice, the age of farm heads and the contracting out of activities. Farmers who value external advice highly have a higher probability to end up in a limited partnership. This suggests that financial advisors recommend this legal farm type. The main reasons for this advice appear to be the tax exemptions which hold for this type and not for a normal partnership. Moreover, a limited partnership provides better protection of the position of the 'rich partner' in limiting his liabilities.

In contrast with the external advisors, the role of internal advice negatively affects the probability on a limited partnership. A reason could be that when securing farm continuation by means of a partnership, families find that the older generation should have solidarity with the young generation and not limit the active involvement and liabilities of one partner. A higher average age of farm heads decreases the probability that a PF/LP is chosen. As with the single owner and partnership forms, this could also suggest farm succession. Following succession (and a sudden decrease in the average age of the farm heads), a PF/LP form might be chosen, with the retiring farmer becoming a silent partner. Specialization in both greenhouse production and factor farming decreases the probability of choosing a PF/LP form. This is somewhat puzzling. An explanation could be that the specialization variables pick up farm size for these specific operations, which is often of such a scale that a private limited company is a preferential organization form.

Similar to the partnership form, attitudes do not play a significant role in the choice for a PF/LP. Regarding these variables, the following remarks can be made. The farmship variable is difficult to explain, but has a positive coefficient in both the partnership and PF/LP models. The coefficients for farmship as well as for land ownership are very small, indicating that they are hardly discriminating

either in favor or disfavor. The variable 'trust in the government' has a negative coefficient in the PF/LP model. There is not a clear explanation, but it could be that for some forms (PF/LP and private limited company) government policies play a more important role (e.g. social security and health systems relating to hired labour).

The limited partnership is seen as an attractive option to reduce personal liability, although this effect is not significant and also not very different from the normal partnership. We expected that this factor would discriminate between a partnership and a limited partnership. The income variable has a negative coefficient, which implies that farmers with high incomes (low values on this variable) are more likely to have a limited partnership rather than a partnership or single ownership. The limited partnership is known for its attractiveness with respect to taxation. Education level and farm size have a positive coefficient, implying that the higher the education level or the larger the farm the more likely to have a limited partnership rather than a single ownership or a partnership.

Private limited company

A wider range of factors appear to play a role in choosing a private limited company. The significant factors are: attitude towards land ownership, role of external advisors, specialisation in glasshouse production or factory farming, farm size, liability and farm income.

As in the single owner model, the attitude variable representing land ownership is significant. A limited company can play a role in protecting the farmer's own wealth (house, land property). This role is sometimes realised by creating more than one private limited company at the same time (one of which is an operation which hires the external labour and rents these out to the other one which owns the land and other farm assets and has the farmer on its employee-list). In case of severe difficulties one can then let one limited company go bankrupt while keeping the remaining part 'alive'.

The specialisation variables play a significant and expected role here. Farms specialised in factory farming (intensive livestock, etc) or to a lesser extent in glasshouse production are more likely to choose a private limited company. This confirms what is seen in reality, where it are in particular these farms, which are in general large farms that rely on a substantial amount of external labour, which are limited private companies. This is confirmed by the significance of the farm size variable for the private limited company.

The income variable indicates that farms with high earnings prefer this farm type because it gives them the option to avoid the (progressive) income tax regime (see Table 3). Farmers who value the advice of financial advisors (accountant, tax consultant, etc.) are more likely to have a private limited company rather than any other farm type. Given a number of farm characteristics, a private limited company is very attractive in terms of tax, liability and risk reduction. Good advice is particularly important for this form it because it is not easy for 'laymen' to see how this legal form can best be arranged.

With respect to the non-significant attitude variables, farmership (being free and independent) and 'trust in government' appear to have negative coefficients: farmers who value these things are not likely to opt for a limited company. The attitude 'land as a form of equity' has a positive sign. Usually the debt-to-equity ratio of limited companies is higher for this farm type than for any other type. As such the equity-base of the farm operation is more critical and the use of owned land as a means to attract loans or working capital understandable (this type of farm is often large in size and at the same time small in number of hectares; although the value of their land is usually quite high, sometimes close to the urban property market). Farmers with an expansion drive have (ceteris paribus) a higher probability to opt for a private limited company than for any other farm type. This is not surprising since this type lends itself best for attracting capital, coping with risks and expanding the business operation.

Regarding the other non-significant variables the following remarks can be made. Farmers who value internal advice (of farm family or families) highly and advice of colleagues are less likely to choose this farm type. This could be because this farm type places the farm operation at a distance the farmer and farm family (the farmer becomes a manager rather than the sole owner, the organizational stress increases, etc.). For example, the farmer becomes an employee/director from his farm in which there are at the same time a number of other acknowledged stakeholders (bank, workers, etc.).

The private limited company has a positive coefficient for the average age of the farm heads. Given that this farm type is not specifically used as a succession device and that the average age of

farmers for this form is rather high, it is not surprising to find a positive coefficient here. Usually partners in the limited private company stay in for a long time. The contracting out of activities also has a positive coefficient. Contracting out is an often occurring phenomenon in these farm operations (think of cleaning of intensive livestock stables or greenhouses to lay up a new operation round); in general there are relatively intensive labour peaks in these farms when comparing them to more standard dairy and arable or mixed farm operations.

General discussion

Our results confirm the general finding in the literature (e.g. Hoon, 2003; Oosterbosch, 2003; Allen and Lueck, 1998) that farm size and farm sector influence the choice of farm type. Small farms are more likely to choose a single owner or partnership form, while larger farms are more likely to choose a private limited company form. Allen and Lueck (1998) found that farms where seasonal uncertainty is controlled, and where a well-organised production process exists with a high degree of routine activities, are more likely to be large scale enterprises and no longer typical family farms. The specialisation variables in our model confirm these results.

Allen and Lueck's suggestion that farmers bring in own labor and land into their company for prices below the market price can be seen as confirmed. In fact this is the background of using the partnership as a device for farm succession. There it becomes clear that this is not only temporary the case but also definite: farmers can transfer their assets to the next generation at values below market prices.

With respect to partnership, limited partnership and partnership firm there seem to exist certain preferences which are difficult to explain. See for example the (significant) negative coefficients for specialization in the limited partnership equation. This finding was also found in Bangma and Ridder (2004: 16). In their analysis of small and medium-sized enterprises they found a preference for the limited partnership in the trade, business services, hospitality and building industries and a preference for partnerships in the agriculture and health sectors.

Conclusion

The attitude factors that were captured in our analysis appear to be relatively unimportant in determining the choice of organisation mode. This could indicate that attitude factors in general are unimportant, or that we failed to capture the right attitudes.

A striking finding is the importance of advisors in determining the choice of organisational mode. Financial advisors are particularly influential. Our results suggest that financial advisors recommend partnership firm or limited partnership and private limited companies as organisational forms. This advice could be motivated by self-interest (work creation, income generation) on the part of advisors.

Our research confirms the findings in the existing literature regarding business size and business type (factory farming etc.). Besides the aspects emphasized by the institutional economics theory (property rights, incomplete contracts, hidden action, transaction costs, etc.) also fiscal motives and liability issues are important as explanatory factors. The choice for a private limited company or partnership firm/limited partnership is motivated by more factors than the choice of a single owner or partnership mode. Our results provide support for the conclusion (see van Hassel, 2004) that the choice for a partnership mode is often motivated by farm succession.

In general, there appears to be a number of influences for choice of organisation mode that are not captured in our model. This appears especially relevant for the results in the partnership firm/limited partnership and private limited company models. Further research is needed here.

References

- Alchian, A.A. and H. Demsetz, 1972. Production, Information Costs, and Economic Organisation. *American Economic Review*, Vol. 62 (December 1972): 777-795
- Allen, W.D. and D.L. Lueck, 1998 The nature of the farm. *Journal of Law and Economics*, Vol. XLI (October 1998): 343 - 386
- Bangma, K.L. and de Ridder, A. (2004) *Rechtsvormen in het MKB: Motieven en Achtergronden bij de Keuze van de Rechtsvorm*. Zoetermeer: EIM.

- Bergevoet, R.H.M., Ondersteijn, C.J.M., Saatkamp, H.W., van Woerkum, C.M.J and Huirne, R.B.M. (2004) Entrepreneurial behaviour of Dutch dairy farmers under a milk quota system: Goals, objectives and attitudes. *Agricultural Systems* 80: 1-21.
- Braaksma, R. and Bangma, K.L. (2004) *Het MKB en de BV; Achtergronden van de Keuze van Ondernemers*. Zoetermeer, EIM.
- Foss, K and N. Foss, 2001. Assets, Attributes and Ownership. *International Journal of the Economics of Business*, Vol.8, No. 1, 2001: 19- 37
- Hart, O., 1995. *Firms, Contracts, and Financial Structure*. Oxford University Press, Oxford, 228 p.
- Hart, O.A., 2002. Norms and the Theory of the firm. In: Brousseau, E. and J-M. Glachant (eds), *The Economics of Contracts; Theories and Applications*. Cambridge University Press, Cambridge, p.180- 192
- van Hassel, A.J.J.M. (2004). Analyse van Bedrijfsovername in de Agrarisch Sector. MSC thesis Business Economics. Wageningen: Wageningen University.
- Hendrikse, G.W.J., 2003 *Economics and Management of Organisations; Co-ordination, Motivation and Strategy*. The McGraw-Hill Companies, London, 507p.
- Hoon, M.de, 2003 Gascontracten in de Glastuinbouw; Onderzoek naar gascontracten in de glastuinbouw noodzakelijk door de liberalisering van de energiemarkt. Doctoraalscriptie, Leerstoelgroep Agrarische Economie en Plattelandsbeleid, Wageningen Universiteit, 146 p.
- STATA 2003
- Kerkmeester, H.O. en R.W. Holzhauser, 2000 *De economische structuur van het ondernemingsrecht, Een inleiding in de economische theorie van de onderneming*. Rechtseconomische Verkenningen 9, Gouda Quint, Deventer 113 p.
- Koppenol, C.L., 2000 *Ondernemingsrecht en faillissementsrecht*. Vijfde Druk, Wolters-Noordhoff, Groningen.
- LEI, 2004 *Landbouw Economisch Bericht 2004*. The Hague, Agricultural Economics Institute.
- LEI, 2005 *Landbouw Economisch Bericht 2005*. The Hague, Agricultural Economics Institute.
- Milgrom, P. and J. Roberts, 1992 *Economics, Organisation and Management*. Prentice Hall International, Englewood Cliffs, New New Jersey, 621p.
- Munneke, F.J., 2003 Structuurontwikkeling Nederlandse land- en tuinbouwbedrijven; Een onderzoek naar de toekomstige bedrijfsstructuur. Doctoraalscriptie Leerstoelgroep Agrarische Economie en Plattelandsbeleid, Wageningen Universiteit, Rabobank, 109 p.
- Ondersteijn, C.J.M., Giesen, G.W.J. and Huirne, R.B.M. (2003) Identification of farmer characteristics and farm strategies explaining changes in environmental management and environmental and economic performance of dairy farms. *Agricultural Systems* 78: 31-55.
- Oosterbosch, H.E.J, 2003 Organisatievormen in verandering; Onderzoek naar economische organisatievormen op land- en tuinbouwbedrijven. Leerstoelgroep Agrarische Economie en Plattelandsbeleid, Wageningen Universiteit, 157 p.
- Ricketts, M, 2002 *The Economics of Business of Enterprise; An introduction to economic organisation and the theory of the firm*. Third Edition, Edward Elgar, Cheltenham, UK, 590 P.
- Wichern, D.W. and Johnson, R.A. (2002) *Applied Multivariate Statistical Analysis* (5th edition). New Jersey: Prentice Hall.
- Williamson, O.E., 1998 Transaction Cost Economics: How it Works; Where it Headed. *De Economist*, Vol. 146, No. 1 (April 1998): 23-58

Endnotes

¹ The stratification was carried out to make sure that for each organisation mode a sufficient number of farmers were represented in the survey. For this reason the survey gives an underestimation of the number of single owners and an overestimation of the number of private limited companies.

² These (large) holdings, having more than 1.5 ha glass (sample average was 3.5ha glass), using more than 800.000 m³ natural gas a year.

⁴ Details of the survey are available from the authors on request.

⁵ A detailed list about these variables (definition and measurement) is available upon request from the authors.