Investment Activity and Ownership Structure of Czech Corporate Farms

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ABSTRACT[1]

This paper aims at assessing the relationship between ownership structure, performance and investment activity. In particular it studies how behavioural differences between farms related to ownership structure influence farms' investment activity and thus their further development potential resulting in farm structural changes. The paper analyses a sample of corporate farms over 7 years, 1997-2003, using structural model of three equations including investment accelerator model. This model considers the effect of ownership on (a) technical efficiency as proxy for the quality of operational management, (b) returns on capital as proxy for quality of financial management, (c) investment activity, and (d) investment sensitivity to internal funds as proxy for owners/managers opposition to credit financing. The empirical results provide evidence of a theoretically justifiable positive effect of ownership concentration on investment activity and farms' economic performance, and a theoretically consistent effect of external/employee ownership on technical performance. However, the authors are not able to confirm empirically the theoretically based effect of external/employee ownership on farm investment activity.

Key words: corporate ownership, employee ownership, external ownership, agency problem, investment behaviour, financial constraint

1   INTRODUCTION

Investment activity which secures sufficient technological progress or facilitates other competitive strategies is one of the most important preconditions for a firm economic viability. Investment activity could play a particularly vital role for efficient structural adjustment in the agricultural sectors in the New EU Member States (NMS) of the European Union (EU), which had been considered as undercapitalised during transition period (JANDA, SLENKOVA, VIGNER 1997) and which are facing high competition after EU accession, (BLANCHARD AND KREMER 1997, LIZAL AND SVEJNAR 2000).

As financial literature suggests, among the most important preconditions for efficient investment development is well functioning capital and credit institutions and markets with close to zero information asymmetries between the bank and the client and abolished effect of soft-budget constraints. Because of the little attention paid to soft-budget constraints in existing empirical analyses, and the fact that agriculture is limited in the use of capital market instruments, the credit market and information distribution can be assumed to have played the most important role as external factors in investment development. Czech farms were found to be credit constrained in a number of studies. BEZEMER (2002, 2003) identified that in the early years of transition newly established individual private farms were more credit constrained than successor farms of former collective and state farms. The main reasons for this observation were the information advantages and established networks of the large-scale farms. For the later years of transition, LATRUFFE, DAVIDOVA AND RATINGER (2005) and LATRUFFE AND DAVIDOVA (2007) derive from indebtedness/efficiency relationship analysis that credits, even if still constraining in their amount, are allocated predominantly on the basis of standardised criteria for economic valuation of the agricultural clients. MEDONOS (2007) supports their argument and provides an empirical evidence using an investment accelerator model for the years 1997 to 2003. These evidences indicate that economic efficiency has not only been determining current competitiveness of Czech farms but that, through its effect on investment potential, has been intensifying the difference in the farms future viability.

Important factor which can be assumed to have slowed down investment activity during transition in Czech agriculture has been high uncertainty[2] steaming from output price volatility, political instability, for a long time unknown design of Common Agricultural Policy (CAP) after EU accession and the overall effect of EU single market. Beside that, long-lasting ownership rights reforms, differences in involved actors' interests and discrepancies between legal framework and feasibility of the privatisation process likely represented further investment constraints. As property right and agency theories suggest, not only the unsettled ownership relationship, but firm ownership and governance structure alone have a close relationship to firm performance as well as investment activity and optimality. Despite the fact that around 70 % of Czech agricultural land and even higher share of agricultural assets fall under corporate farm governance, the possible effect of corporate ownership on investment activity has not been previously considered[3].

This paper aims at covering this research gap. The main research question followed is: What is the relationship between ownership structure, performance and investment activity? How will behavioural differences between farms related to ownership structure influence farms' investment activity and thus their further development potential and structural changes? The paper analyses 74 corporate farms over 7 years time period, 1997-2003, using a structural model of three equations including an investment accelerator model. This model considers the effect of ownership on (a) technical efficiency as proxy for the quality of operational management, (b) returns on capital as proxy for quality of financial management, (c) investment activity, and (d) investment sensitivity to internal funds as proxy for owners/managers opposition to credit financing.

The following section describes the main development in the Czech farm ownership structure and conditions for corporate governance. Section three provides a discourse into the theoretical literature dealing with the relationship between ownership, performance and investment behaviour. The methodology, data and model specification are described in section four. Section five presents the empirical results and their interpretation. Section six concludes the paper.

2   OWNERSHIP STRUCTURE AND INVESTMENT ACTIVITY OF CZECH CORPORATE FARMS

The Czech farm structure has developed into a dual farm structure with a large number of small-scale individual private farms (ca 43.5 thousand in 2005) cultivating approximately 30 % of total agricultural land, and a relatively small number of large-scale corporate farms (ca 2.9 thousand in 2005) cultivating the remaining agricultural land. With the significant dominance of corporate farming on total agricultural production, this farm structure in Czech agriculture has not only captured the privatisation policies and institutional framework established during the transition period, but also the historical large-scale farm tradition developed during the socialist time. Also historically imbedded characteristics, interests and unbalanced bargaining powers of actors assuming restituted property rights or being involved in the privatisation process have shaped the development of farm ownership structure during transition.

The privatisation objective was to individualize property rights and correct former injustices (RATINGER AND RABINOWICZ 1997). The significant position of corporate farming after the implementation of policy reforms was thus an unexpected development. The Czech corporate farms, which the study focuses on, are successors of former collective or state farms. Before transition, state farms cultivated 37 % and collective farms 62 % of Czech agricultural land (1 % was cultivated by individual farmers). The privatisation process differed between former state and collective farms. After settling original owners' restitution titles, state farms were privatised mainly by means of direct sales to acquirers who were selected based on a proposed privatisation project (49 % of privatised state farms), of gratuitous transfers

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[2]   The initial neoclassical view on investment/uncertainty relationship was such that increased uncertainty would boost investment (ABEL 1983). However, in a context of various market imperfections, such as investment irreversibility which increases adjustment costs asymmetries, uncertainty shows investment (ABEL AND EBERLY 1994, BARNETT AND SAKELLARIS 1998; CHIRINKO AND SCHALLER 2002). Also market power and returns to scale affect the level of investment under uncertainty (SAKELLARIS 1994). Finally, the Real Options Theory views the investment decision as embodying two options; uncertainty directly affects the value of these two options due to the interaction of irreversibility of capital and the 'arrival' of new information (DIXIT AND PINDYCK 1994; CABALLERO AND PINDYCK 1996).

[3]   The theoretically often discussed effect of ownership structure on firm investment behaviour has been captured only in very few empirical studies in general (CHO 1998). Few papers consider this partially by looking at the role of potential ownership-related agency problems in investment financing decision (see FAZZARI ET AL. 1988, MUELLER AND PEEV 2007).

(29 % of cases), and of competitive biddings (11 % of cases) (Report on the State of Agriculture in the Czech Republic for the year 2005 - "Green Report"). The remaining cases represented public auctions and direct establishment of a Joint Stock Company (JSC). Around 10 % from the original 316 state farms went bankruptcy or are still being liquidated. The established farms are mostly corporate farms of a Limited Liability Company (LLC) legal form.

The collective farms were privatised through restitutions of the original value of expropriated and collectivised assets to original owners (or their heirs) and distribution of accumulated collective assets during the socialist period to eligible persons (original owners and former workers). As a result, the reforms created a very fragmented ownership structure with almost 3.5 million eligible persons to (non-land) agricultural assets. The eligible persons had the right to decide on (a) withdrawal (financial or physical settlement) of their transformation claims, if they farmed or participated in a farming company or (b) on depositing their shares in the equity of a new corporate form (c) on waiting on the later rather financial settlement of their claims, leaving their shares with transforming collective farms for a time being[4]. High share of the eligible persons decided for the alternative of leaving their full or part of their titles as shares with the successor companies (b-c)[5]. The "newly" established corporate forms were predominantly cooperatives, but JSCs and LLCs appeared as well. As the eligible persons, who decided to retain their shares (or their parts) in the corporate farm, were not only original owners but also former workers of the collective farms, the transformed collective farms inherited a high share of employed shareholders and pensioners-shareholders. In 1994 the share of employed shareholders in the total agricultural assets retained by the corporate farms after restitutions was 38 %. External owners owned 27 % of the assets. The remaining value (35 %) was asset of eligible persons of the category (c) which we term residual owners (DIVILA 1996)[6]. Since corporate farms had not generated enough profits, monetary compensation had happened only rarely and residual owners, little protected by the existing legal system, remained waiting.

The residual owners to agricultural assets represented two problems to corporate farms. The first one was a legal issue and the second one an economic issue. As stated by the Transformation law, the property rights restitutions were to be concluded within 7 years from the presentment of the transformation project by each collective farm. This process pursued slowly and has often exceeded this deadline. The economic problem inhered in transformation indebtedness which often represented a constraint to credit access. Finding the solution for the settlement of the residual owners' ownership titles became a subject of strong bargaining – the residual owners on the one side and corporate farms' managers on the other. The most often pursued way of formalizing the relationship to residual owners was concluding contract of lease to assets of adequate value (mostly done by already existing LLCs) or to capitalise the residual ownership shares into shares and thus transforming the company into a JSC if not done yet. Between 1995 and 2003, corporate farms' transformation indebtedness dropped from 55 billion to 29 billion[7]. At the same time, the representation of legal forms of corporate farms significantly changed. In 1995 most of the agricultural land was cultivated by cooperative (47 %), followed by LLCs (20 %) and JSCs (7 %). Until 2005 the representation of JSCs on agricultural land increased to 22 % and of cooperatives decreased to 26 %. The share of LLCs on agricultural land remained almost unchanged. This indicated that the JSCs represent predominantly legally transformed cooperatives. The most important process from the ownership perspective is the significant increase of the external owners' share from 38 % in 1995 to 66 % in 2001 (the Czech Statistical Office, CzSO 2001). Obviously, the increase 28 percentage points can be accounted mainly to residual persons who were at the end convinced that capitalising the transformation claims into stocks thus facilitating their possible tradability was the only way how to retain and later obtain their

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[4] The successors of collective farms were allowed to delay the financial settlement of claims of non-farmers until the end of 1999.

[5] Contributing factors to this decision were lacking specific knowledge of the eligible persons required for starting an individual farm or their already established job security.

[6] The average value of the assets assigned to residual eligible persons is, on average, small. Two-fifths of the residual owners own assets below 10,000 Czech Crowns (330 Euros), with the "richer" fifth owning over 100,000 Czech Crowns (3,300 Euros) (Divila 2003).

[7] The transformation indebtedness level in 1995 was the highest in LLCs (56 %), second highest in cooperatives (37 %) and lowest in JSCs (13 %). From 1995 to 2005, the transformation indebtedness shifted dramatically. LLCs remained indebted by transformation debts from 29 % and cooperatives by 29 %. JSCs displayed far lowest transformation indebtedness equal to on average 3.6 %.

value paid off. The remaining 34 % is the share of internal (employed) owners, which makes the Czech corporate farms hybrid ownership form between labour-managed and investor-managed firm.

Restructuring of ownership balance in favour to external owners can have an effect on investment decisions of corporate farms. The agricultural corporate farms are significantly smaller than corporate firms in other industries, however, are still assigned by highly dispersed ownership with smaller share sizes. In general, capital market for agriculture is different to other sectors, because corporate farms can use only a limited spectrum of financial instruments. Because of the specific nature of the JSCs in agriculture, open capital market for their shares does not exist which constrains possibility of meeting between potential buyers and sellers. Thus most of the shares are either bought out by the farming companies or and first of all by individual or groups of other current owners who are interest in accumulating power. These processes can be well controlled by managers. The low experience of new owners with corporate governance possibly leads to low effectiveness of internal budgeting and monitoring systems against managerial discretion. Also, high level of trust to managers, high reliance on the experience and knowledge of former managers, higher average age and lower education level of agricultural workers representing one group of owners, possibly increase the scope for managerial discretion. In addition, the civil law legal system offers only a weak protection of shareholders' rights[8]. All these aspects related to corporate governance of Czech corporate farms contribute to the relevance of studying corporate governance as a possible determinant of farm investment and performance.

3   THEORETICAL CONSIDERATIONS

The relationship between corporate ownership structure, performance and investment activity (Figure 1, explained later) is closely akin to issue of corporate governance. Corporate governance is a system by which business corporations are directed and controlled. The corporate governance structure specifies the distribution of rights and responsibilities among different participants in the corporation, such as the board, managers and shareholders, and spells out the rules and procedures for making decisions on corporate affairs. By doing this, it also provides the structure through which the company objectives are set, and the means of attaining those objectives and monitoring performance (CADBURY 1992: 15, OECD 2004). SCHLEIFER AND VISHNY (1997: 737) consider corporate governance as a way in which suppliers of finance to corporations assure themselves of getting a return on their investment.

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[8]   For transition countries of Central and Eastern Europe in general, GUGLER ET AL. (2004) state that the less effective corporate governance institutions offer shareholders lesser protection against potential managers' pursuit of their own goals. For the description of effect of the differences in the capital market and legal system for shareholders' protection in transition and Western European Countries on investment behaviour see also MUELLER AND PEEV (2007). Stigliz (1999) also argues that the main reason for slower increase of firm-level efficiency in transition countries than what was expected from the developed economies experience is the fact that successful privatisation required an institutional infrastructure that supports markets and stresses the role of effective corporate governance.
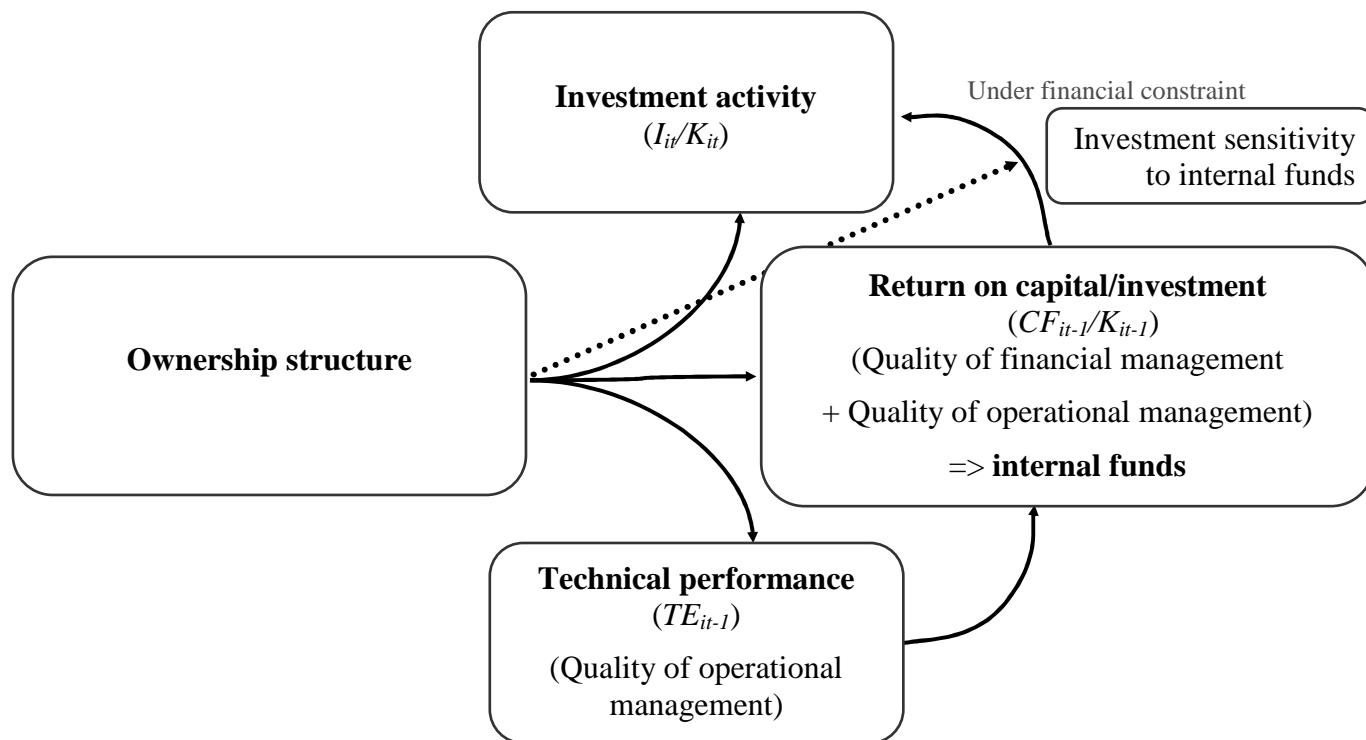
Figure 1 The conceptual framework of causal relations between corporate ownership and investment activity

The main problem related to corporate governance is the problem steaming from separation of ownership and control of the firm operation and finance. This separation provides scope for managerial discretion if there is a conflict of interest between shareholders (principals) and managers (agents) because of differing ideas, interests and goals. The conflicting ideas can relate to how the company should be run, what type of strategy to follow or how to finance investments. Investment decisions are considered to be optimal when the return on total investment is equal to the cost of capital[9]. In this situation, managers maximize shareholders wealth. However, as JENSEN AND MECKLING (1976:5) state:

"It is generally impossible for the principal or the agent at zero cost to ensure that the agent will make optimal decisions from the principal's viewpoint. In most agency relationships the principal and the agent will incur positive monitoring and bonding costs, and in addition there will be some divergence between the agent's decisions and those decisions which would maximise the welfare of the principal."

These relationships are the subject of agency theory and the costs related to these relationships are called agency costs. It investigates how incentive mechanisms[10] can help principals to get a return on their exchanges with the management. However, also transaction cost economics significantly contributes to framing the principal agent relationship. It deals with the institutions that may help to minimize the transaction costs of the managerial agency problem. The decisions making in a firm with delegated control, including meeting decisions on investment, will be influenced by transaction conditions such as asymmetric information, complexity and uncertainty, measurability, or asset specificity. Transaction cost theory identifies them as the environmental conditions. Beside these, also behavioural conditions, e.g. opportunism, bounded rationality and risk aversion, are considered as factors influencing the costs of the principal agent relationship and thus the investment decision optimality with regard to maximisation of owners' welfare.

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[9] The ratio of return on total investment to the cost of capital is the marginal return on capital. This measure should be equal to or greater than one, if managers maximise shareholder wealth. Infra-marginal returns on total investment will exceed one if there are diminishing returns to investment making the ratio of the returns on total investment to the cost of capital greater than one (MUELLER AND PEEV 2007).

[10] E.g., performance monitoring system, remuneration systems, bankruptcy systems, market for corporate control, market for management services, product market competition. Ownership structure is also considered as one form of the incentive mechanisms.

For the Czech corporate farms' case, more relevant description of the two parties in the principal agent relation is the BERGLÖF AND PAJUSTE (2005) description of the major corporate governance problem. They view it as a conflict between the controlling shareholder and the minority shareholder. The conflict steams from the interest and objective differences between these two groups of shareholders. For the aim of this study, we define following ownership categories: the share of employed owners versus the share of firm external owners, managerial ownership[11], ownership concentration[12] and total number of owners in the farm.

Share of employee ownership versus external ownership is expected to have an effect on investment decisions as there are differences in interests and concerns between these two categories of owners. The most important difference between the considerations of employed owners and external investors is that investment into capital-intensive technologies (without expansion of the firm which is limited in the Czech agriculture due to limited land access) or failure of the firm would affect employed owners' job security. Therefore, employees as shareholders are perceived as more risk averse affecting their attitude to investment projects. DOW (2003) titled this as "finance pessimism". Another problem of employee-managed firms closely allied with investment behaviour lies in what JENSEN AND MECKING (1979; see also FURUBOTN 1976) term "the horizon problem". This implies that when workers leave the firm after their work contract they lose their share of the value of any capital that has been accumulated by the firm and thus have insufficient incentives in projects with long payback periods[13]. As a result, employed owners prefer current consumption to investment (JONES ET AL. 2005). This can relate the employee ownership to lower investment activity, possibly to under investment.

Because firms with higher share of employee ownership tend to be conservative in investment which relates to less than optimal investment level, they are expected to achieve lower returns on investment. On the other hand, the returns on capital and investment can be influenced by the employee ownership effect on technical performance. As DOW (2003) argues, employee ownership aligns the incentives of insiders with companies' performance. This effect can be further considered as more important in more labour-intensive production (JONES AND KATO 1993), however, it decreases with the size of the company as a result of the high cost of collective decision-making (HANSMANN 1996). Lastly, the higher risk aversion of employed owners could also lead to preferring internal funds to external financing due to higher risk of bank calling their firm bankrupt in the case of investment failure. This would imply higher investment sensitivity to generated cash flows than in firms with higher share of external owners.

Hypothesis 1*: Higher share of employed shareholders (compared to external shareholders) is related to lower investment activity, lower return on investment due to less efficient financial decision, higher technical performance, and higher investment sensitivity to internal funds.*

Total number of farm shareholders is used to capture the decision-making complexity. Under the condition of information asymmetries and bounded rationality, this complexity creates a larger scope for managerial discretion and hence a space to carry through, to a higher degree, managers' interests. It thus creates conditions for managerial transaction costs. Transaction cost economics of corporate governance describes managerial transaction costs as costs of free cash flow dispersion, replacement resistance, resistance to profit liquidation or merger, power struggles, excessive risk taking, excessive diversification, excessive growth, etc. For example, GRABOWSKI AND MUELLER (1972) state that managers likely follow growth strategies investing in less profitable projects. Managers can succeed in promoting higher than optimal investment to owners because they can provide excessively optimistic projections of the project's benefits and owners do not dispose of sufficient information and expertise to effectively control such projects. Possible reason for less optimal managers behaviour is that, compared to owners, their personal wealth is not at stake (JENSEN 1986; ANG 1991). Regarding the use of internal versus external sources for investment financing, the less optimal investment projects make managers to prefer internal funds to external capital market, because they wish to avoid external scrutiny (MUELLER AND PEEV 2007).

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[11] A situation in which managers own higher than average ownership shares in the firm.
[12] Average shareholders' share on farm fixed capital (capital stock).
[13] It is a specific of Czech agriculture that ownership status of employed shareholders does not terminate in the moment of work contract termination. They can remain external shareholders. However, the work contract of people who decide to become shareholders of the company they work in mostly continue working in this company till their retirement age. In this age, they prefer to receive the value and consume their shares than to continue receiving only dividends, which are only an insufficient contribution to the pension.

As internal funds are important for investment activity, the ability of generating sufficient internal fund level is of further importance. The above discussed high managerial transaction costs of firms with higher number of shareholders imply overall higher agency costs which not only affect the investment decisions but also overall (financial and technical) performance of the firm. On the other hand, the high number of owners allows to reach such a size that brings benefits from economies of scale and the effect of agency costs on technical performance is likely abolished (HANSMANN 1996).

Hypothesis 2: Higher shareholders number (higher decision-making complexity) is related to higher investment activity, lower return on investment due to less optimal investment projects, higher technical performance due to economies of scale, and higher investment sensitivity to internal funds.

Ownership concentration defined a situation in which a group of investors decided to invest a higher value in the farm than the average share and hence characterises owners which have a higher interest and a higher trust in the performance of the business. As these investors invested higher capital in the farms, they can be assumed to be less risk averse than the small shareholders. The fact that they have more at stake stimulates them to a better managers monitoring. The higher ownership shares give shareholders higher decision-making power which reduces the costs of internal control and allows overwhelming interests of more risk-averse small shareholders. However, as ownership and control are still separated, this ownership characteristics leads to higher investment activity than if ownership and control are concentrated in the same hands. Nevertheless, more efficient control of managers' performance reduces managers' transaction costs and leads to more optimal investment decision. Due to lower managerial transaction costs and more effective control of the farm operation, farms with more concentrated ownership are expected to achieve higher technical performance than less capital concentrated farms. More optimal investment and higher technical performance means higher returns on capital and no fear from bank control of the investment projects. Because of the lower risk aversion, principal investment project optimality and higher performance, ownership concentration is expected to lead to a higher use of external financing for investment projects.

Hypothesis 3: Higher ownership concentration is related to higher investment activity due to lower risk aversion, higher returns on investment due to more optimal investment decisions, higher TE due to lower agency costs and lower investment sensitivity to internal funds.

Also a situation in which controlling managers own higher capital shares reduces agency costs (WRIGHT ET AL. 2001). The investment decision-making of managing shareholders is influenced by the fact that managers' personal wealth is more at stake than in the case of complete separation of control and ownership or of managers' negligible ownership shares. The investment activity can be considered as more optimal, however, if the managerial ownership will lead to higher or lower investment activity, will depend on the capitalisation level of the sector. If the sector is overcapitalised, higher managerial ownership will lead to lower investment activity than more separated ownership and control and vice versa. The managerial ownership and investment relationship will also be affected by the degree of existing uncertainties (expected change of policy support, market price volatility or legal uncertainties). Under high uncertainties managers with higher ownership shares are more risk averse than managers with no or lower ownership shares, and are thus more cautious in their investment decisions and vice versa.

Because of the above arguments, the managerial ownership reduces the tendencies to invest into less profitable investment projects (the invested amount is expected to be closer to the investment optimum) which reflects in higher returns on capital. Only high uncertainties could disturb this reasoning. Independence of the external effect of uncertainty, managers owning higher shares provides incentives for more optimal technical management and operation of the business. Due to better performance indicators, managerial ownership would lead to better credit access and without uncertain business conditions increasing owners risk aversion, managers would have no particular motivation for preferring internal to credit financing. This is further supported by the weaker control retained by the small shareholders providing space for financial redistribution of generated profits benefiting controlling shareholder-managers. Both arguments would lead to a lower sensitivity of investment to internal funds.

Hypothesis 4: Higher managerial ownership is related to more optimal investment activity, higher returns on investment, higher TE due to lower agency costs and lower investment sensitivity to internal funds.

4 METHODOLOGY AND DATA

The four hypotheses discussed above are compiled in Table 1 following the framework of the causal relationship between ownership, performance and investment activity displayed in Figure 1.

Table 1: Expected ownership effect on farm investment behaviour

	Ownership characteristics	Effect on			
		Investment activity	CF/K (financial performance)	TE (technical performance)	Investment sensitivity to CF/K
H1	Employee ownership	-	-	+[1]	+
H2	Shareholders' number	+	-	+[1]	+
H3	Ownership concentration	+	+	+	-
H4	Managerial ownership	+[2]/-[3] [4]	+/-[4]	+	-/+[4]

Note: '+' indicates a positive and '–' a negative effect.
[1] Conditioned on farm size.
[2] Under under-capitalisation of the sector.
[3] Under overcapitalisation of the sector.
[4] Possible under high business uncertainties.

The conceptual framework depicted in Figure 1 can be translated in the econometric model consisting of a system of three equations defined below. Equation (1) is based on an accelerator model in the context of credit market imperfections and agency problems. The original accelerator model specified by Clark, (1917) assumes that a firm's investment was mainly determined by the growth of sales. We modified it by replacing sales by value added believing that it fits better to the Czech agricultural situation when some of the investment might rather aim at saving cost than at increasing sales, particularly if investment in our consideration includes also (often mainly) replacement of the consumed capital. .To test for the existence of financing constraints (due to imperfect credit market or agency costs), FAZZARI ET AL. (1988) proposed to introduce in the model a proxy for cash flow, whose coefficient, if it is significant, would indicate that investment depends on farm's own resources and thus would suggest a presence of the problem. Equation (2) relates the cash flow variable to technical efficiency, as the former is considered as both: the own resource for financing investment and a proxy for investment performance. Finally, the determinants of the firms' technical efficiency are estimated in equation (3). In all three equations, ownership variables are included, as they are expected to explain investment activity, investment return and technical performance (see Figure 1). In order to prevent potential endogeneity problems, yearly variables such as the change in value added, the cash flow and the technical efficiency, are introduced as lagged variables in the determinants.

$$\frac{I_{i,t}}{K_{i,t-1}} = \alpha_0 + \alpha_1 \frac{\Delta VA_{i,t-1}}{K_{i,t-1}} + \alpha_2 \frac{CF_{i,t-1}}{K_{i,t-1}} + \alpha_3 CORPGOV_i + \alpha_4 \frac{\Delta VA_{i,t-1}}{K_{i,t-1}} * CORPGOV_i$$
$$+ \alpha_5 \frac{CF_{i,t-1}}{K_{i,t-1}} * CORPGOV_i + \alpha_6 REVENUES_i + \sum_{j=7}^{19} \alpha_j crossterms_{j,i,t-1} + \sum_{j=0}^{3} \alpha_{20+j} YEAR_j + v_{i,t} \tag{1}$$

$$\frac{CF_{i,t-1}}{K_{i,t-1}} = \beta_0 + \beta_1 CORPGOV_i + \beta_2 REVENUES_i + \sum_{j=3}^{10} \beta_j crossterms_{j,i,t-1}$$
$$+ \beta_{11} TE_{i,t-1} + \sum_{j=0}^{3} \beta_{12+j} YEAR_j + u_{i,t-1} \tag{2}$$

$$TE_{i,t-1} = \delta_0 + \delta_1 CORPGOV_i + \delta_2 REVENUES_i + \sum_{j=3}^{9} \delta_j crossterms_{j,i,t-1}$$
$$+ \delta_{10} DIREDUC_i + \delta_{11} DIRAGE_i + \sum_{j=0}^{3} \delta_{12+j} YEAR_j + \varepsilon_{i,t-1} \tag{3}$$

where

$K_{i,t-1}$ represents the stock of capital in period t-1; it includes all long-term tangible assets (e.g. agricultural land, buildings, machinery and tools, etc.), intangible assets (licences-milk quotas, software, etc.) and financial assets (investments in equity in other firms, estate property for non-business purposes). The normalisation by this variable eliminates size effects.

$I_{i,t}$ is the value of gross investment between period t-1 and t, that is calculated as the change in capital stock (representing net investment) plus depreciation and amortization.

$\Delta VA_{i,t-1}$ stands for the change in gross value added between period *t-2* a *t-1*, and it is the proxy variable for investment opportunities. Gross value added is calculated as all revenues from farm and non-farm activities including changes in manufactured products inventory minus intermediate consumption (material inputs and services).

$CF_{i,t-1}$ represents the value of the farm's cash flow that is available at the end of the period *t-1* for purchasing new capital stock at the beginning of period *t*. It substitutes the farm's income resources. The cash flow indicator is unavailable in the Czech double-entry accounting, therefore, it is calculated as retained earnings (profit or loss) plus depreciation and amortization.

$TE_{i,t-1}$ is the technical efficiency score of the *i*-th firm in the period *t-1* (see appendix for the calculation details).

CORPGOV$_i$ is a dummy variable (Corporate Governance) indicating corporate form of a farm. It is defined in two ways. Firstly, corporate governance is defined by more than 10 owners and, secondly, by other than limited liability legal form of the business, i.e. by JSCs and Cooperatives. Due to this, the above presented model will be estimated twice, using one or the other CORPGOV variable specification.

REVENUES$_i$ represents the farm total revenue and is deemed to represent the size of a farm (in CZK).

CAPCONC$_i$ is an average size of share in equity (fixed capital) per owner (in CZK). Higher values proxy higher concentration of capital.

MANOWN$_i$ is a dummy variable indicating if managers own on average higher ownership shares that the average ownership share (1 for management members own higher ownership shares, 0 otherwise).

EXTOWN$_i$ is a share of external investors on the total number of owners.

OWNNR$_i$ is a number of owners.

crossterms$_{i,t-1}$ are products of 2 or 3 variables listed above (see Table 2 of econometric results for the exact specification).

DIREDUC$_i$ is an ordinal variable of the education level of the top manager (1 represents advanced basic education without graduation examination, 2 high school education with graduation examination, 3 university education).

DIRAGE$_i$ is the age of the top manager.

YEAR is a dummy variable for a specific year.

$v_{i,t}, u_{i,t-1}, \varepsilon_{i,t-1}$ are error terms.

Data on farm economic performance, investment and capital were taken from the official balance sheet, income statements and supplementary forms of the FADN CZ survey for years 1997-2003. Ownership structure and further farm characteristic data were collected in the Czech Republic in 2004. This extensive data survey was organised by the Institute for Agricultural Development in Central and Eastern Europe (IAMO) and by the Research Institute for Agricultural Economics in Prague (VUZE). The sample for the analysis presented here includes 74 agricultural companies with a legal entity status (cooperatives, JSC and LLC). The firms in the sample can be mostly classified as farms with combined crop and animal production, but their crop/animal production proportions and size substantially varies.

The unbalanced panel data technique was used for the estimation of the econometric model. No deflation of data was applied. The values of farms' technical performance (technical efficiency) were calculated using Data Envelopment Analysis (see Appendix 1).

EMPIRICAL RESULTS

Following, parameters of the estimated structural model presented in Table 2 will be interpreted. Two almost identical models were estimated. They differ purely in the definition of the corporate governance variable (CORPGOV). In the first model, CORPGOV equal to one defines firms of another legal form than LLCs,[14] i.e. JSCs and Cooperatives; for LLCs, CORPGOV is equal to zero. In the second model, CORPGOV defines firms with more than 10 owners. First, we interpret Model 1. In the interpretation of Model 2, we will focus only on parameters which significantly differ from Model 1.

Estimated parameters of Model 1 imply that investment activity is determined by the level of generated cash flow per capital (the level of generated internal funds, CF_{t-1}/K_{t-1}), by the average capital share per shareholder (capital concentration, CAPCONC), managerial ownership (MANOWN), the ownership variables' cross terms with CF_{t-1}/K_{t-1} and with REVENUES (the proxy for firm's size and decision-making complexity).

Parameter α_3 indicates that corporate ownership structure, CORPGOV, decreases farm investment activity. This effect is significant at 10 % significance level. Assuming that management in a corporate setting generally tends to following growth and diversification strategies, this result indicates that dispersed ownership restricts management in its investment intentions, which implies that small owners are generally highly averse to investment risk or plan timely withdrawal of their share and are thus not interested in long-term farm performance development. This could relate to the fact that a high share of the corporate owners are former residual owners (owners long waiting for financial settlement of their transformation claims, retired persons, persons with little relationship to agriculture) and that corporate ownership is related to farm lower technical performance (parameter δ_1, significant at 1 % significance level). Owners' aversion to investment risk and share withdrawal interest (negative effect of corporate ownership on investment activity) could be reduced by improved farm performance. As previously discussed theories suggest, also firm size and decision-making complexity under which shareholders loose a degree of control over managers can decrease the investment effect of shareholders' risk aversion.

Following this argument, REVENUES as proxy for size has a direct positive effect on investment activity in Model 2, where CORPGOV represents more than 10 owners, however, not in Model 1. In both models, size has a positive impact on farm technical performance (δ_2) and a negative impact on financial performance (β_2). This implies that indeed, revenues improving technical performance has a positive effect on investment activity; not necessarily financial performance of the farm. Purely within the group of corporate farms, increasing size decreases farm technical efficiency (δ_6) likely due to the high monitoring costs of workers performance, and improves financial performance (β_6). This would indicate that increasing scope for managerial discretion (lesser scope for owners' control) improves financial performance of the farms; nevertheless, it does not increase investment activity. This corresponds with Chang and Wong's (2003) findings that managers' objectives can be better aligned with firm performance than those of principals. This interpretation implying that managerial discretion can have a positive effect on firms technical and financial performance is in contradiction to our hypothesis build on traditional principal agent theories.

Furthermore, number of corporate owners (OWNNR), proxy for the complexity of decision making, does not significantly change the effect of corporate governance on investment activity. Nevertheless, this variable has a negative effect on technical performance (δ_7) as well as on financial management (β_7). This would contradict the finding discussed in previous paragraph that more scope for managerial discretion improves financial performance in corporate farms, unless large number of shareholders does not provide as high a scope for positive managerial discretion as farm size does. This could be a relevant argument since managers have to be re-elected to retain their position in the future and farm managers are more reluctant to loosing their job than managers in other sectors.

The estimates further reveal that the negative investment effect of corporate ownership is reduced by higher capital concentration. The higher corporate farm average capital share per owner the higher is the investment activity (α_7). It implies that owners who are willing to invest more in the farm business are

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[14] In the analysed sample, LLCs have on average only 4 owners. Although LLCs are generally considered as one of the corporate legal forms, their governance structure is mostly very simple. Comparing the investment behaviour difference between LLCs and large-scale JSCs or cooperatives can provide interesting insight on the corporate governance investment effect.

less averse to investment risk and are more interested in the farm long-term performance than small owners which result corresponds with hypothesis 3. Corporate farms, where managers own higher shares than other shareholders on average, are, on the other hand, assigned by lower investment activity than other corporate farms (α_8). In other words, managerial ownership has a negative effect on the level of investment activity[15]. This would suggest that managers owning higher ownership shares are more conservative with regard to investment than where managers are less concerned with their ownership. In accordance with our hypothesis 3, this would imply that farming in a corporate form was considered by owners as highly risky, possibly due to the political instability, uncertainty steaming from unclear property rights legal framework, or the EU accession. Managers, who were at the same time owners of higher ownership shares were more investment cautious than other managers. This would thus support existence of managerial discretion where there was a larger separation of ownership and control, and would, in connection with above findings, suggest that, despite of being more optimally behaving than small non-controlling owners, managers owning small shares behave less optimally with regard to investment than managers owning higher capital shares.

Nevertheless, a deeper analysis of the MANOWN variable discloses that farms with higher managerial ownership are also characterised by significantly higher share of employees who are at the same time shareholders (65% compared to 56% in other companies; using the analysis of variance (ANOVA) significant at 5% significance level). This closer connection of employee owners, who are generally considered as more risk averse, to the business operation might have an effect on the decision making and behaviour of elected managers. Also, corporate farms with higher managerial ownership are led by older directors (53 years old directors compared to 50.5 years old directors in other companies; ANOVA significant at 1% significance level). Also this characteristic could be captured in the effect of the MANOWN variable[16]. The positive performance effect of managerial ownership is, however, confirmed also by the MANOWN variable effect on the farm technical performance (δ_4).

The share of external versus employee ownership was found to have only an insignificant effect on investment activity. The share of external ownership has a positive statistically significant effect only on technical efficiency (δ_5). This finding contradicts our hypothesis that employee ownership aligns firm performance with employees' interests and thus improves technical performance of the farm. The direction of the parameter δ_5 would rather suggest the validity of HANSMANN's (1996) argument that external ownership allows for achieving such a firm size which brings benefits from economies of scale. The positive performance effect of the share of employee ownership on firm performance was found in another variable, the variable OWNEMPL (share of owners in the total number of workers) (δ_8). This positive effect, however, diminishes with firm size (δ_9), possibly due to the increasing costs of collective decision-making (HANSMANN 1996).

We previously intentionally skipped parameter α_2, as the above results discussion makes its interpretation easier. This parameter indicates that investment activity of corporate farms including LLC companies have been constrained in their access to external financing or the farms have been more averse to external financing due to other business uncertainties. In both cases, corporate farms have relied to a high degree on internal funds than what theories suggest for perfect credit and other market conditions.

Further parameters indicate that the investment sensitivity to internal funds varies with corporate governance modes. As parameter, α_5, implies, investment sensitivity to generated internal funds is higher in farms with corporate governance structure. This would indicate that management of farms with corporate ownership is limited in its investment decisions by the owners' aversion to credit financing or managers them self want to avoid external control of their investment projects. Nevertheless, this effect was proven to be statistically insignificant. The investment sensitivity to internal funds, however, changes with concrete corporate governance characteristics. Firstly, increasing size of average ownership share

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[15] This effect, however, was not proven to be significant in Model 2, which defines corporate governance as more than 10 owners. This suggests that farms with 10 and less owners are specific with respect to managerial ownership. Nonparametric Mann-Whitney test showed that in this group of farms, managerial ownership appears with significantly lower frequency than in farms with more than 10 owners. Only including the group of farms with 10 and less owners among the corporate farms shows the significance of this effect.

[16] Other characteristics related to the MANOWN variable, such as average ownership share, share of external ownership, number of owners are introduced into the model as separate variables and hence should not be captuder in the MANOWN variable. Dispite the ANOVA significance of the differences in the listed variables between farms with MANOWN = 1 and MANOWN = 0, the bivariate correlation between these variables are not higher than 0.3.

Table 2 Estimation results from the system of equations

		Model 1 CORPGOV = Other than LLCs		Model 2 CORPGOV = >10 owners	
Equation 1: I_t/K_{t-1}		**Coeficient**	**Std. Error**	**Coeficient**	**Std. Error**
Constant	α_0	0.162**	0.073	0.114*	0.044
$(VA_{t-1}-VA_{t-2})/K_{t-1}$	α_1	-0.083	0.113	-0.063	0.075
CF_{t-1}/K_{t-1}	α_2	0.262**	0.119	0.301**	0.090
CORPGOV	α_3	-0.122*	0.073	-0.077*	0.044
$(VA_{t-1}-VA_{t-2})/K_{t-1}$* CORPGOV	α_4	0.052	0.119	0.017	0.081
(CF_{t-1}/K_{t-1})* CORPGOV	α_5	0.080	0.151	0.059	0.131
REVENUES	α_6	0.003	0.002	*0.002**	0.001
CAPCONC* CORPGOV	α_7	0.019*	0.011	0.020*	0.011
MANOWN* CORPGOV	α_8	*-0.042**	0.024	-0.036	0.024
EXTOWN* CORPGOV	α_9	-0.002	0.051	-0.011	0.053
REVENUES* CORPGOV	α_{10}	-0.003	0.002	-0.002	0.001
OWNNR* CORPGOV	α_{11}	0.002	0.005	0.002	0.005
(CF_{t-1}/K_{t-1})*CAPCONC* CORPGOV	α_{12}	-0.002***	0.001	-0.002***	0.001
(CF_{t-1}/K_{t-1})*MANOWN* CORPGOV	α_{13}	0.446***	0.170	0.414***	0.173
(CF_{t-1}/K_{t-1})*EXTOWN* CORPGOV	α_{14}	0.035	0.352	0.304	0.389
(CF_{t-1}/K_{t-1})*REVENUES* CORPGOV	α_{15}	0.002	0.004	0.001	0.004
(CF_{t-1}/K_{t-1})*OWNNR* CORPGOV	α_{16}	0.009	0.038	0.002	0.038
(CF_{t-1}/K_{t-1})*REVENUES*CAPCONC* CORPGOV	α_{17}	0.000	0.002	0.000	0.002
(CF_{t-1}/K_{t-1})*REVENUES*MANOWN* CORPGOV	α_{18}	-0.004*	0.003	-0.004	0.003
(CF_{t-1}/K_{t-1})*REVENUES*EXTOWN* CORPGOV	α_{19}	-0.009	0.007	-0.010	0.007
YEAR0	α_{20}	0.015	0.023	0.014	0.022
YEAR1	α_{21}	0.003	0.023	0.003	0.023
YEAR2	α_{22}	0.032	0.021	0.031	0.021
YEAR3	α_{23}	0.016	0.020	0.010	0.020
Equation 2: CF_{t-1}/K_{t-1}					
Constant	β_0	-0.046	0.085	0.083	0.091
CORPGOV	β_1	-0.044	0.049	-0.143***	0.049
REVENUES	β_2	-0.003*	0.002	0.001	0.002
CAPCONC* CORPGOV	β_3	-0.005	0.006	-0.005	0.007
MANOWN* CORPGOV	β_4	-0.014	0.013	-0.014	0.013
EXTOWN* CORPGOV	β_5	-0.010	0.026	-0.004	0.027
REVENUES* CORPGOV	β_6	*0.004**	0.002	0.000	0.002
OWNNR* CORPGOV	β_7	-0.009***	0.003	-0.010***	0.003
REVENUES*CAPCONC* CORPGOV	β_8	0.000	0.000	-0.010	0.024
REVENUES*MANOWN* CORPGOV	β_9	0.034	0.048	0.038	0.050
REVENUES*EXTOWN* CORPGOV	β_{10}	-0.001	0.001	-0.002	0.001
TE_{t-1}	β_{11}	0.216***	0.058	0.183***	0.063
YEAR0	β_{12}	0.011	0.016	0.011	0.017
YEAR1	β_{13}	0.076***	0.016	0.074***	0.017
YEAR2	β_{14}	*0.028**	0.016	0.026	0.017
YEAR3	β_{15}	-0.024	0.016	-0.026	0.017
Equation 3: TE_{t-1}					
Constant	δ_0	1.147***	0.050	1.198***	0.046
CORPGOV	δ_1	-0.317***	0.043	-0.324***	0.037
REVENUES	δ_2	0.013***	0.001	0.013***	0.001
CAPCONC* CORPGOV	δ_3	-0.004	0.006	-0.008	0.005
MANOWN* CORPGOV	δ_4	0.037***	0.012	0.036***	0.011
EXTOWN* CORPGOV	δ_5	0.061***	0.024	0.072***	0.023
REVENUES* CORPGOV	δ_6	-0.011***	0.001	-0.012***	0.001
OWNNR* CORPGOV	δ_7	-0.009***	0.003	-0.009***	0.003
OWNEMPL* CORPGOV	δ_8	0.042***	0.017	0.034**	0.016
REVENUES *OWNEMPL* CORPGOV	δ_9	-0.001**	0.001	-0.001*	0.000
DIREDUC	δ_{10}	*0.020**	0.010	0.005	0.010
DIRAGE	δ_{11}	0.011	0.075	0.001	0.001
YEAR0	δ_{12}	0.011	0.016	0.010	0.015
YEAR1	δ_{13}	-0.038**	0.016	-0.039***	0.015
YEAR2	δ_{14}	-0.018	0.016	-0.018	0.015
YEAR3	δ_{15}	-0.020	0.016	-0.020	0.015

decreases investment sensitivity to internal funds (parameter α_{12}). The higher flexibility of farms with higher ownership concentration in using credit financing and hence in realizing investment projects could relate to their better financial performance indicator discussed in the previous paragraph. This finding also supports a statement that owners with small ownership shares, mostly owners, who are waiting for financial settlement of their original transformation claims, are not only more risk averse in relation to investment as such but also more averse to credit financing of such an investment. This finding corresponds with the theoretical hypothesis 3.

Parameter α_{13} captures the investment effect of the cross term between CF_{t-1}/K_{t-1}, corporate governance and managerial ownership. The parameter sign indicates that managerial ownership increases farms investment sensitivity to internal funds. As above results suggested, managers with higher ownership shares react more sensitively to business uncertainties than other managers. This is thus likely reflected also in their use of credit financing of their investment projects. As parameter α_{18} indicates, this effect changes with increasing farm size which generates benefits from economies of scale and hence reduces the farm dependence on external conditions.

5   CONCLUSIONS

Farm ownership was found to have a significant impact on investment activity and farm economic performance. The data provided the evidence of the positive effect of ownership concentration on investment activity and farms' economic performance: farms with high ownership shares and less dispersed ownership have a higher development potential than farms with less concentrated ownership. The analysis allowed for insights in the effect of managerial ownership, thought it also raised new questions and a need for further studying this form of ownership. Furthermore, the authors could not confirm the theoretically expected effect of external/employee ownership on farm investment activity. However, they found a theoretically consistent effect of external/employee ownership on technical performance from the available sample of Czech corporate farms. The provided discussion suggests that this is mostly due to the transition-specific nature and interests of small shareholders to agricultural assets and high uncertainties steaming from market as well as legal environment.

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APPENDIX 1 CALCULATION OF TECHNICAL EFFICIENCY

A firm's technical efficiency captures its ability to use in the best way the existing technology, in terms of input and output quantities (i.e. regardless of their price). Technical efficiency scores are calculated with the non-parametric method Data Envelopment Analysis (DEA) that constructs the efficient frontier with the best performing farm of the sample. Farm lying on the frontier are fully efficient and are attributed a score of 1. Farms enveloped by the frontier are inefficient, and the distance to the frontier gives their efficiency score that is between 0 and 1 (excluded), with lower scores indicating higher inefficiency. The difference between 1 and the efficiency score of a firm indicates the proportional reduction of all inputs it could implement without having to reduce its output (input-orientation of the DEA model), or the proportional increase of all outputs it could reach without having to use more inputs (output-orientation) (for more details on the method, see COELLI ET AL., 2005).

A linear programming model is used to construct the efficient frontier and calculate the efficiency score of each farm. An output-oriented frame under constant returns to scale is chosen (this assumption enables to consider inefficiencies not only due to bad management practices but also to suboptimal size). Three outputs (crop output, livestock output, other output) and four inputs (land, labour, capital, intermediate consumption) are used in the model.

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