ORGANIZATIONAL FORM AND INVESTMENT IN UKRAINIAN FOOD PROCESSING

by

Igor Buinyi

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Thesis Supervisor: _____ Professor Volodymyr Vakhitov

Approved by _____
Head of the KSE Defense Committee, Professor Roy Gardner

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Date _____

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Abstract

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The average treatment effects of the organizational forms on the ratio of investment over fixed assets are estimated according to the accelerator-cash flow model for the data from 2001-2007 on enterprises in the Ukrainian food processing industry. Several estimation procedures, including the nearest neighbor matching to deal with the endogeneity issue, present robust evidence on the fact the limited liability companies (LLCs) invested higher percentage of their fixed assets than public corporations and close corporations, the estimates for the latter two being statistically indistinguishable. Our estimates can be explained by higher borrowing power of corporations, more efficient planning and operation of LLCs, or higher risk for corporations due to illegal corporate raidering. Since the latter factor is very likely to be an important determinant of investment decisions, the results present an argument in support of stronger property rights and more effective corporate legislation in Ukraine. The results can be a benchmark for the analysis of other industries as well as future studies to reveal the impact of the new Law on Joint Stock Companies in Ukraine, which was became partly effective since 2009.

TABLE OF CONTENTS

Chapter 1. Introduction 1

Chapter 2. Literature Review 4

Chapter 3. Methodology and Data Description 8

Chapter 4. Empirical Results 20

Chapter 5. Discussion and Conclusion 24

Works Cited 27

Appendix A 30

Appendix B 32

LIST OF FIGURES

Number ..... *Page*
Figure 1. Breakdown of net sales in the dataset. 14

Figure 2. Breakdown of investment in the dataset. 14

Figure 3. Nonparametric kernel density distributions of residual value of fixed assets K in all the data (left) and working sample (right), h =0.5 17

Figure 4. Nonparametric kernel density distributions of number of employees in all the data (left) and working sample (right), h =0.5 17

Figure 5. Nonparametric kernel density distributions of investment I in all the data (left) and working sample (right), h =0.5 17

Figure 6. Nonparametric kernel density distributions of I/K by the organizational form in the working sample, h =0.1 19

Figure B1. Nonparametric kernel density distributions of I/K by groups of output, h =0.15 32

Figure B2. Breakdown of observations, net sales, and investment by groups of output. 32

Figure B3. Nonparametric kernel density distributions of CF/K in the working sample, h=0.1 34

Figure B4. Nonparametric kernel density distributions of $\Delta Y/K$ in all the data (left) and working sample (right), h=0.2 34

LIST OF TABLES

Number *Page*

Table 1. Sample construction 10

Table 2. Number of times firms enter the working sample 11

Table 3. Descriptive statistics 12

Table 4. The average treatment effects from the nearest neighbor matching procedure 20

Table 5. Estimation results 22

Table 6. The average treatment effects from the random effect estimates 23

Table B1. Li test on closeness of density distributions of I/K by groups of output, h =0.15 33

Table B2. Breakdown of changes of the organizational form 33

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LIST OF ABBREVIATIONS

DEA. Data envelopment analysis.

FIG. Financial industrial group.

IV. Instrumental variables.

KVED. Ukrainian Industrial Classification.

LLC. Limited liability company.

SFA. Stochastic frontier analysis.

Chapter 1

INTRODUCTION

Agriculture is one of Ukraine's economic sectors with strong competitive potential in the world market (World Bank 2008). Mostly, its advantages come from rich natural endowment of fertile soil, favorable climate, and access to the sea, which allows cheap transportation of products to consumers throughout the world. On the other hand, technology is a weak point of many domestic producers. As Ukraine inherited inefficient agricultural technologies from the USSR, the sector needs huge amount of investments for modernization to improve technological efficiency (Zorya 2006).

Before the financial crisis of 2008, Ukraine had experienced rapid growth in both foreign and domestic investment. According to the State Statistic Committee of Ukraine, the compound annual growth rate of capital investments in the real terms was 19.5% during 2001-2007. Overall positive prospects on the economic growth were among the main drivers for the inflow of funds into emerging markets after the 1998 financial crisis. In addition, agricultural investments were attractive due to the growing demand, especially from China and India, and continuously increasing food prices in the world markets. During this time, Ukraine experienced a new stage of the agricultural reform caused by the Land Code of 2001, which changed significantly the ownership structure of arable land. Between 2000 and 2001, the share of collective-owned land assets plunged from 44.3% to 1.8%, and the private share increased correspondingly from 7.2% to 48.2%, the rest remained in the state ownership (Pugachov and Kobets 2004).

Although farms were the main target of the land reform, it was a distinctive point in reorganization of the entire industry (Lerman, Sedik, Pugachov, and Goncharuk 2007, p. 20). Private land ownership stimulated developing new business models and value chain restructuring. Creating and modernizing food processing facilities, and even expanding retail chains, resulted in increased value added and profit margins within the sector. And food processing is an important link between farmers and consumers since it, on the one hand, is responsible for supply of finished products and, on the other hand, creates domestic demand for inputs and increases employment, which is of critical importance for Ukrainian rural areas.

Food processing attracted significant amount of investments during the period between 2001 and 2007. As a result, cumulative annual growth rate of its total output in real terms was 12.8% compared to 9.4% for the Ukrainian manufacturing during the period. Moreover, the share of food processing in the total Ukrainian export increased from 7.0% in 2001, 7.1% in 2002 to 9.3% in 2007 and 8.1% in 2008. To compare, its share in the total import remained almost unchanged between 5.3% and 5.9% for the same years.

An important feature of the transition process within Ukrainian food processing is the variety of *organizational forms* or *legal forms*. As a result of privatization, the number of state and collective enterprises has decreased dramatically, but many sole proprietorships, corporations and limited liability companies (LLCs) appeared. Since investment is crucial for modernization of firms and improving technological processes, possible influence of the organizational form on investment decisions of processing enterprises may be very important for sustainability and competiveness of the agricultural sector in general.

This research presents an investigation on how investment of Ukrainian food processing enterprises depend on their organizational form. Specifically, it tests whether there is a difference in investment behavior of the firms. A conjecture behind the analysis is that governance type attributable to organizational form should affect investment decisions of the companies since they have different opportunities to raise money or face more or less favorable legal regulation (Shleifer and Vishny 1997).

The nature of investment decisions, which are stimulated by an increase in output and availability of financing, is captured with the help of accelerator-cash flow investment model. This study is different from similar works in several ways. First, it uses a comprehensive dataset on enterprise annual financial statements from the State Statistics Committee for the period between 2001 and 2007. In addition to food processing, other sectors can be analyzed in a similar way to compare the results. Second, the impact of several organizational forms such as state ownership, public corporation, close corporation, and LLC is considered instead of dealing with only one treatment group that is usually found in the literature. Several treatment groups complicate our analysis but allow capturing more information from the available data. Moreover, several econometric techniques including the nearest neighbor matching, pooled OLS regression, random effect estimation, and truncated regression model are employed to ensure robustness of the results obtained.

The structure of the thesis is the following. Literature review is presented in Chapter 2, then the methodology employed and data used in the study are described in Chapter 3. After that empirical results are given in Chapter 4. And finally results and implications of the analysis are summarized and discussed in Chapter 5.

Chapter 2

LITERATURE REVIEW

Many researchers investigated the effect of the organizational structure on firms' characteristics. Most of them study the impact on performance, but many papers are also devoted to strategic behavior and firm's investment.

There are several reasons why the organizational structure is an important factor of firm's activities. First of all, although one of the efficient forms of enterprise requires separation of ownership and management (Fama 1980), management is not completely independent from owners even in large publicly traded companies. Moreover, owners of small companies often run their private enterprises themselves. In case of business partnerships, interaction of managers and owners gives rise to the agency problems and leads to complicated behavior of the firm (Schleifer 1997). Since managers and owners normally have different strategic goals, firms' decisions and performance may reflect the balance of power between them which is different for various organizational structures. Maskin *et al.* (2000) point out that organizational forms differ in mechanisms of creating incentives for managers. Also, ownership structure may affect negotiation opportunities of firms and their legal privileges and obligations. For example, other characteristics being equal, banks may assign different risk levels to firms of different legal form associated with different litigation costs. This fact affects opportunities to raise financing and many other characteristics such as the leverage ratio and growth rate.

Studies of the effects of the organizational structure can be divided into three groups. First, much attention has been devoted to the impact of

privatization or, more broadly, changes of the organizational structure. Vickers and Yarrow (1991) analyzed how privatization adjusts objectives of enterprises in line with their owners' interest. They also discussed the effect of competition and presented empirical information about privatization programs in Great Britain, Chile, and Poland. Their conclusion is that outcomes of privatization strongly depend on "complex interactions among ownership, market structure, regulatory, and political variables". Brown, Earle, and Telegdy (2006) found the privatization in Hungary, Romania and Ukraine increased productivity in the short term perspective, while Russian firms benefited from privatization with a substantial time lag of about 5 years.

Second, there are a significant number of papers focused on the effects of affiliation of industrial groups on firms' behavior. Hoshi, Kashyap, and Scharfstein (1991) found that investment of Japanese firms depends on the fact whether they are members of *keiretsu*, or industrial groups. Since *keiretsu* unite companies and banks, they are able to employ synergies and direct capital flows without information costs. Investment decisions of non-members turned out to be more dependent on liquidity, which proves the financial group ownership to have an effect on firms' investment opportunities. Similar studies for Russia and Ukraine focused on the role of powerful owners on firms' performance. Guriev and Rachinsky (2005) evaluated performance of Russian firms owned by oligarchs and found that oligarch ownership, when controlled for endogeneity issue, increases efficiency. A similar study for Ukrainian industry also found out that enterprises owned by oligarchs are more productive (Gorodnichenko and Grigorenko 2008). The authors introduced a partial equilibrium model and tested it for a data set on 2000 open joint stock companies. They also found that powerful owners invest more than others in order to increase productivity. The same result was obtained by Volchkova (2001), who compared Russian firms which are members and non-members of financial industrial groups (FIGs)

employing the accelerator-cash flow investment model. FIG members were found to invest more than similar non-member companies. On the contrary, Parashchiy (2004) did not found that FIG ownership significantly increase productivity in Ukraine's sugar industry. The author concluded that this fact may be an evidence of either unimportance of FIGs or their usage of tax evasion schemes.

Third, some studies investigate behavior of open publicly traded companies in order to estimate how different ownership concentrations affect behavior of firms. Such studies use specific data on ownership stakes of different types of investors, such as insiders, strategic and portfolio investors, and evaluate the effect of marginal change in their stakes. Cho (1998) and Gedajlovich *et al.* (2006) found that investment and dividend policy differs among the firms with different ownership concentrations. However, Cho (1998) presented evidence that ownership is not a causal determinant since it is endogenously determined.

In the context of agriculture, Lerman and Sedik (2007) compared performance of individual and corporate farms in Ukraine by analyzing the cross section data set from 2005 United Nations Food and Agriculture Organization survey. Employing stochastic frontier analysis (SFA), they did not found persuasive evidence on higher efficiency of individual farms. They also concluded that size was not an important determinant of production efficiency. In fact, a similar result was obtained by Teryomenko (2008), who deliberately investigated the dependence of productivity on farm size using data envelopment analysis (DEA) and SFA. She showed that productivity changes nonlinearly with the farm size, middle-sized farms being more efficient than the others.

Nivyevskyi (2004) analyzed efficiency of sunflower seed producers and compared performance characteristics of farms with private, private limited, state and collective ownership. Applying DEA and SFA approaches for evaluation of

kernel estimated densities from scale efficiency score, he did not find evidence for superior efficiency of any type of enterprise.

In addition to evaluating performance, Parashchiy (2004) used an investment cash-flow model in order to compare investment behavior of Ukrainian sugar plants. Remarkably, investments were not found to increase productivity or decrease the average costs of production. However, sensitivity of investment to cash flows was found significantly lower for FIG-owned plants than non-privatized plants. This result supports the evidence presented by Hoshi *et. al.* (1991) that affiliation with industrial groups is beneficial for a firm because investment decisions become less dependent on the internal liquidity.

In this research, investment decisions of enterprises in the Ukrainian food processing sector are analyzed with the help of the accelerator-cash flow model to reveal the difference in investment behavior of enterprises having different organizational forms. A sample of firms from the entire sector is analyzed, contrary to Nivievsky (2004) and Parashchiy (2004) who investigated only sunflower seed and sugar producers, correspondingly. Although such a broad focus may cause problems for estimation since firms producing different output are likely to be different, it will provide an opportunity to incorporate much information in order to obtain reliable large-scale results. A detailed discussion of the employed methodology is presented in the following chapter.

Chapter 3

METHODOLOGY AND DATA DESCRIPTION

In the literature several models are used to study investment decisions (Clark *et al.* 1979). Accelerator-type models link investment to changes in production. In addition, accelerator-cash flow models relate investment to cash flows, which can be either a proxy for future profits or a measure of availability of the internal financing. Further, such models can be enhanced to account for other variables such as the amount of the borrowed capital (Bond and Meghir 1994). More advanced neoclassical models incorporate the price of capital necessary for investments since it can be an important determinant of investment decisions (Clark *et al.* 1979). A very different from those is Tobin's Q model. It predicts that investments are driven by high ratio of asset capitalization to replacement costs.

In this study the accelerator-cash flow model is used to capture the information from the available data. The model can be specified as:

$$\left(\frac{I}{K}\right)_{it} = c + \sum_{s=0}^{N_1} \beta_s \left(\frac{\Delta Y}{K}\right)_{i,t-s} + \sum_{s=1}^{N_2} \gamma_s \left(\frac{CF}{K}\right)_{i,t-s}, \qquad (1)$$

where I is investment, ΔY is the change in net sales, CF is cash flow, K stands for fixed assets at the beginning of the period, i identifies a particular firm, while t refers to time period. Intuitively, the model predicts that investment is positively related to an increase in output, which demands installing new equipment, and availability of free cash flow, which makes investments feasible.

The data comes from the comprehensive enterprise statistics from the State Statistics Committee of Ukraine for the period between 2001 and 2007[1]. Food processing enterprises are taken from division 15 of the Ukrainian Industrial Classification (KVED). In our estimation, variables from financial statements F1, F2, and F1-"Pidpryemnytstvo" are used.

Information on residual value of fixed assets (it is referred to as fixed assets further in the text), investment, net sales as well as categorical specification of organizational form, area, and group of output is available for each firm. However, the direct measure of cash flow, defined as net income plus depreciation, is not available since net income is not provided in the dataset. Net income is approximated with gross income from operational activity which is available for enterprises that report information in the unabridged F2 statement. On the other hand, abridged F2 statement is mostly reported by small firms, which together make a small contribution in the total production and investment, which is presented further. That is why small firms can be safely excluded from the working sample.

Although such approximation of cash flow does not take into account cash flows from financing activity and financial investments, it seems to be a reasonable determinant of investment decisions. First of all, financial investment is unimportant for the most of Ukrainian enterprises, especially in the food processing sector. Second, there could be no a long term discrepancy between raised money from financing activity and operational profit for a representative firm since money is raised in anticipation of future profits. Our panel dataset for the period of seven years should well absorb the short-term divergence between

[1] The dataset is available at the Kyiv School of Economics. For more information, please contact data@eerc.kiev.ua.

them. That is why our proxy for cash flow should substantially correlate with the true cash flow.

Cleaned dataset includes observations with non-empty data on net sales, gross sales, depreciation, number of employees, and fixed assets. To omit tiny enterprises that do not contribute significantly to the total output and investment, the minimum threshold for fixed assets is set at UAH 25 ths. Also, firms that report twice or more KVED from other division than 15 are dropped in order to get rid of possible influence of firms that appeared in division 15 coincidentally. Then firms with at least 3 available consecutive observations are identified since they can provide at least one observation of lagged $\Delta Y/K$ to enter the regression model. Finally, observations for which I/K, or absolute values of CF/K and $\Delta Y/K$ exceed the corresponding 98.5 percentile values are identified as outliers and do no included into regressions. The process of sample construction is summarized in Table 1.

Only four organizational forms are analyzed further. They are public corporation (Public Corp), closed corporation (Closed Corp), and limited liability companies (Ltd), which are the most representative among large enterprises that

Table 1. Sample construction

Enterprises	**Observations**	
12,747	43,977	enter the database with KVED=15 at least once
2,762	12,291	large enterprises (report data using a statement for large enterprises only)
1,655	9,805	have at least 3 available observations with KVED=15 without gaps, enter the available sample with KVED<>15 not more than once, total assets > UAH 25 ths.
1,356	8,108	State, Public Corp, Close Corp, and Ltd
1,317	7,961	without outliers (observations which I/K or absolute values of CF/K and ΔY/K exceed the corresponding 98.5 percentile values)

enter our final sample. State-owned companies are also included as an important benchmark (Table 2), although they are not very important in terms of their contribution in the total production and investment. 80% of them produce beverages, and there are more state-owned firms in this business than the other organizational forms, but their contribution into the total output and investment is modest even within beverage production only. The final sample consists of 1,317 firms with 7,961 observations that produce 64.8% of the total output and are responsible for 67.4% of the total investment in the food processing industry (Figure 1 and 2). Therefore, the sample includes firms that are the most relevant for the industry under consideration. Descriptive statistics is shown in Table 3. It is presented only for those observations that enter the regression, so the first two observations for each firm are not considered since they have no information about lagged values of cash flow and change in sales.

In order to account for the effect of organizational form and other categorical variables, model (1) can be adjusted in the following way:

$$\left(\frac{I}{K}\right)_{it} = c_0 + \sum_{s=0}^{1}\beta_s\left(\frac{\Delta Y}{K}\right)_{i,t-s} + \sum_{s=1}^{2}\gamma_s\left(\frac{CF}{K}\right)_{i,t-s} + \sum_{n=1}^{M-1}c_n \cdot form_{nit} + \varphi \cdot D_{it} + \varepsilon_{it} \quad (2)$$

Table 2. Number of times firms enter the working sample

	Firms*		**Observations**	
Organizational form	Freq.	Percent	Freq.	Percent
State	121	9.2	760	9.5
Public Corp	580	44.0	3,557	44.7
Close Corp	271	20.6	1,631	20.5
Ltd	375	28.5	2,013	25.3
Total	1,317		7,961	100.0

* A firm can change the organizational form over time. Therefore, the sum of frequencies is greater than the total number

Table 3. Descriptive statistics

Variable	Obs	Mean	Std.Dev.	Min	Max
					State
Investment (I), UAH ths	482	949.4	1,423.1	1.0	18,292.0
Gross Profit (GP), UAH ths	523	2,385.1	4,660.8	-71,694.8	21,206.5
Depreciation (D), UAH ths	523	506.1	409.9	12.2	3,147.3
Net sales (Y), UAH ths	523	18,146.5	23,983.4	2.9	202,748.6
Total assets (K), UAH ths	523	6,488.0	6,681.7	275.2	41,366.3
Employees	523	183.8	103.0	3.0	609.0
I/K	482	0.18	0.24	0.00	2.46
CF/K =(GP+D)/K	523	0.56	0.69	-6.92	4.02
ΔY/K	523	0.51	1.97	-6.59	12.73
					Public Corp
Investment (I), UAH ths	2,191	4,182.6	19,335.5	0.6	550,104.5
Gross Profit (GP), UAH ths	2,390	5,567.5	21,942.3	-16,272.5	585,494.3
Depreciation (D), UAH ths	2,390	1,282.0	3,937.2	0.0	95,164.5
Net sales (Y), UAH ths	2,390	35,414.0	72,265.4	0.5	1,222,256.0
Total assets (K), UAH ths	2,390	11,491.3	29,314.8	61.0	547,497.3
Employees	2,390	308.4	360.4	1.0	4,623.0
I/K	2,191	0.30	0.41	0.00	3.53
CF/K =(GP+D)/K	2,390	0.68	0.73	-4.22	9.72
ΔY/K	2,390	0.64	2.41	-13.26	16.96
					Close Corp
Investment (I), UAH ths	1,040	8,726.1	41,599.2	0.7	821,933.7
Gross Profit (GP), UAH ths	1,101	15,168.8	62,683.7	-29,949.7	930,987.0
Depreciation (D), UAH ths	1,101	2,884.0	10,220.6	0.0	199,135.0
Net sales (Y), UAH ths	1,101	72,172.5	177,258.6	1.4	2,254,712.0
Total assets (K), UAH ths	1,101	19,577.9	50,200.4	37.2	724,912.0
Employees	1,101	398.2	525.4	2.0	5,441.0
I/K	1,040	0.32	0.40	0.00	3.48
CF/K =(GP+D)/K	1,101	0.76	0.80	-2.70	7.56
ΔY/K	1,101	0.78	2.39	-13.20	16.12
					Ltd
Investment (I), UAH ths	1,090	3,202.7	13,714.3	0.1	279,337.0
Gross Profit (GP), UAH ths	1,230	4,740.2	17,146.9	-67,599.9	324,256.9
Depreciation (D), UAH ths	1,230	1,051.8	3,309.8	0.0	77,791.4
Net sales (Y), UAH ths	1,230	35,000.6	89,469.4	2.0	1,528,209.0
Total assets (K), UAH ths	1,230	7,277.8	19,573.3	30.0	377,653.3
Employees	1,230	216.4	280.4	5.0	2,351.0
I/K	1,090	0.43	0.51	0.00	3.10
CF/K =(GP+D)/K	1,230	0.88	0.96	-2.61	7.54
ΔY/K	1,230	0.94	2.96	-14.70	17.27
					State + Public Corp + Close Corp + Ltd
Investment (I), UAH ths	4,803	4,619.5	24,358.4	0.1	821,933.7
Gross Profit (GP), UAH ths	5,244	7,071.9	33,661.5	-71,694.8	930,987.0
Depreciation (D), UAH ths	5,244	1,487.0	5,668.6	0.0	199,135.0
Net sales (Y), UAH ths	5,244	41,312.5	105,754.9	0.5	2,254,712.0
Total assets (K), UAH ths	5,244	11,701.8	32,169.8	30.0	724,912.0
Employees	5,244	293.2	376.3	1.0	5,441.0
I/K	4,803	0.32	0.42	0.00	3.53
CF/K =(GP+D)/K	5,244	0.73	0.81	-6.92	9.72
ΔY/K	5,244	0.73	2.51	-14.70	17.27

where $form_{nit}$ stands for organizational form, M =4; D_{it} is a set of other categorical variables such as area, year, or group of output with the appropriate set of coefficients φ. Older values of change in net sales and cash flow are not included into the model since they are less likely to affect the current investment. Furthermore, the current value of the ratio of cash flow over fixed assets should not be included since it is endogenously affected by investment.

It is appropriate to include categorical variables for different groups of output. It is striking that only firms producing grain mill, starch, and animal feeds, have considerably different nonparametric density distributions (Appendix A) of I/K than other firms in the working sample (Figure B1), although the groups by type of output appear to be considerably different (Figure B2). This fact is also confirmed by Li test on closeness of density distributions (Table B1). On average, those firms tend to invest lower amounts of money conditional on the residual value of fixed assets.

There are several econometric methods that allow estimating model (2). The most straightforward is using OLS which provides an important benchmark for comparison with other techniques. A limitation of OLS is that it does not account for specific properties of the panel data that can be captured by fixed effects and random effects.

For our purpose, however, fixed effect is inappropriate because observations that capture the influence of changing organizational form account for about one percent of their total number only (Table B2). Moreover, it is more likely to observe a change of the organizational form if a firm needs some kind of restructuring, while this condition applies with higher probability to firms in distress. As a result, investigating the effect of change of the organizational form may not be applicable to static dependence between the organizational form and

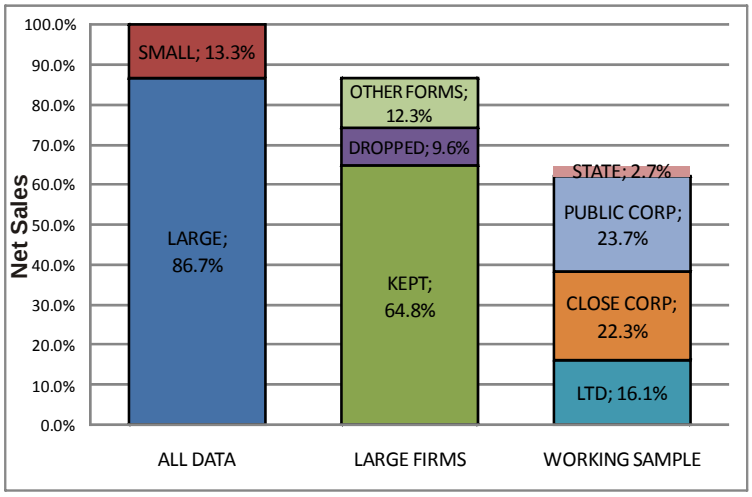

Figure 1. Breakdown of net sales in the dataset.

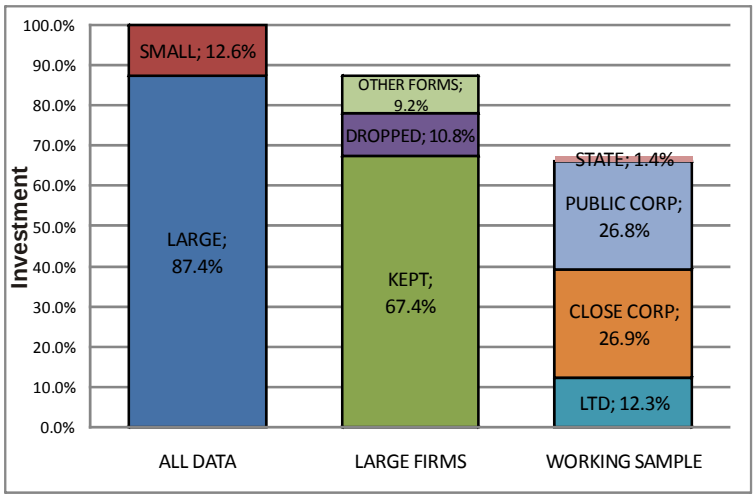

Figure 2. Breakdown of investment in the dataset.

investment decisions. Because of these reasons, estimating fixed effects cannot produce results that are reliable and relevant to this study.

On the other hand, random effects estimators are applicable for our purpose. The core assumption behind the random effects estimators is that unobserved effects for each firm are uncorrelated with the set of explanatory variables (Wooldridge 2002, p. 252). Random effects estimation also requires strict exogeneity assumption on the set of explanatory variables. However, in the literature there is consistent evidence on the fact that the organizational form is endogenously determined by firm's performance (Cho 1998, Guriev and Rachinsky 2005, Gorodnichenko and Grigorenko 2008), thus special techniques should be used to obtain unbiased results. The problem arises due to the fact that organizational form can be deliberately chosen based on unobserved characteristics that affect investment decisions. Furthermore, the dataset is likely to be prone to the selection bias associated with the fact that a firm with particular characteristics can only be observed having a specific organizational form.

Several methods exist that allow eliminating these problems and obtaining consistent estimators. One of them is the instrumental variables (IV) procedure. For example, Brown et al. (2006) and Grygorenko and Gorodnichenko (2008) used 5-year and 9-year lagged information on the firm size, correspondingly, to predict the current organizational structure. Another one is Heckman procedure (Heckman 1979) to deal with the selection bias. Also, propensity score matching is a useful tool to reduce bias while estimating various treatment effects (Rosenbaum and Rubin 1983, Heckman, Ichimura and Todd 1998, Caliendo and Kopeinig 2005). These procedures are efficient when few different treatment groups are sorted out and logit, probit, or their multinomial analogs are applicable for estimating first stage equation, selection equation, or propensity score,

respectively. In our case there are four groups of firms with different organizational types, so estimation using multinomial probit or multinomial logit procedures may lead to irrelevant results because it is unlikely to find a set of instrumental variables that could reasonably predict the existing variety of the organizational forms.

Fortunately, a series of pairwise matching models can be estimated (Lechner 2001) instead of applying the matching technique to the whole sample simultaneously. The nearest neighbor matching procedure in the common support region (Caliendo and Kopeinig, 2005) is implemented. The idea of matching is to identify firms that have the most similar relevant characteristics except the dependent variable (investment over fixed assets, I/K, in our case) and treatment variable (organizational form). Since the relevant characteristics of firms are automatically controlled, the difference in the dependent variable for firms can be attributed to the effect of the treatment variable only. This procedure transforms our sample into a quasi-experimental set of observations to get unbiased results in the presence of endogeneity. In our case, the firms are matched based on $\Delta Y/K$, lagged value of $\Delta Y/K$, first and second lags of CF/K, area, year, group of output, as well as logs of number of employees, fixed assets and net sales.

Remarkably, kernel density distributions of fixed assets, the number of employees, and investment shown in Figure 3, 4 and 5, correspondingly, confirm the fact that firms with different organizational forms are more similarly distributed in our working sample compared to the complete sample with many smaller firms. In particular, distributions for LLCs are profoundly closer to corporate firms. Therefore, firms with different organizational forms are likely to have similar distribution of unobserved factors. That is why endogeneity problem is at least alleviated in our working sample compared to all the data since the

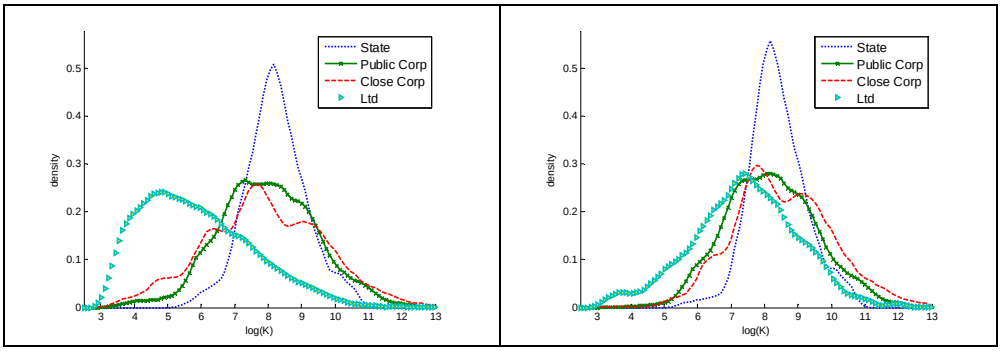

Figure 3. Nonparametric kernel density distributions of residual value of fixed assets K in all the data (left) and working sample (right), h =0.5

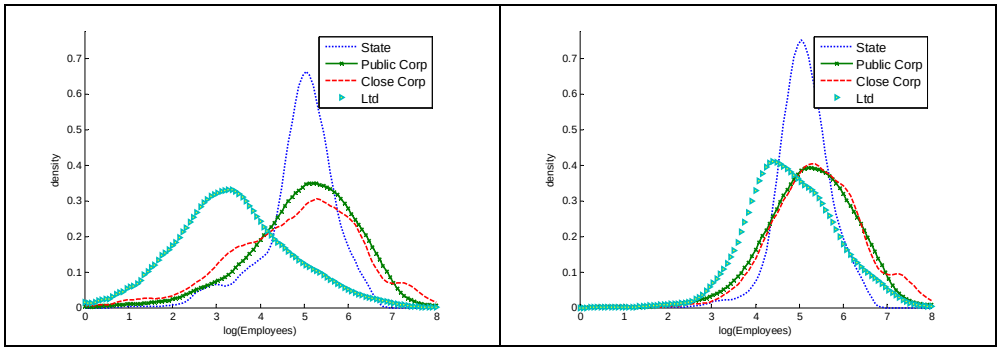

Figure 4. Nonparametric kernel density distributions of number of employees in all the data (left) and working sample (right), h =0.5

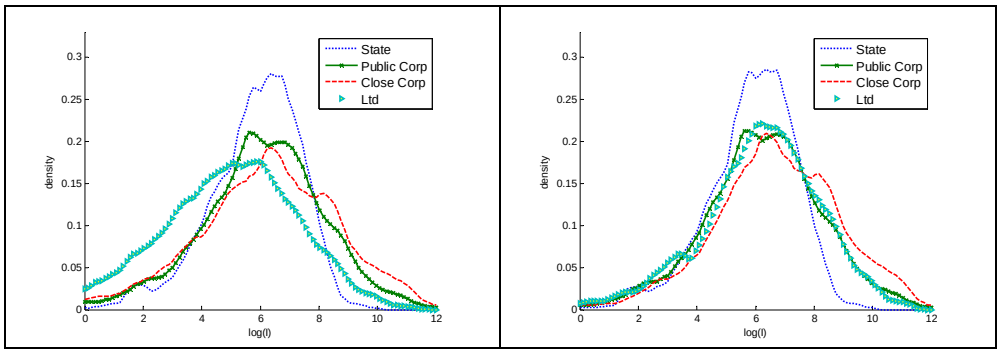

Figure 5. Nonparametric kernel density distributions of investment I in all the data (left) and working sample (right), h =0.5

correlation of the categorical variables for the organizational form with the error term is reduced. State enterprises are more different in their distributions than others, but they account for a small number of observations and do not alter the regression results considerably.

Therefore, regression results of model (2) on our working sample are worth comparing with the average treatment effect from the matching procedure. Moreover, it is very instructive to look not only at the average treatment effects corresponding to particular ownership forms, but also coefficients at other explanatory variable to make a conclusion whether the model reasonably describes the data.

Although investment is partly continuous, a significant number of firms from the working sample did not invest in some years. Therefore, model (2) is censored and should be estimated using techniques which are appropriate for censored regression models (Wooldridge, 2002). A simple one is the Tobit regression model that could be specified as

$$\begin{aligned} y_{it}^{*} &= \mathbf{x}_{it}\boldsymbol{\beta} + u_{it}, \quad u_{it} \mid \mathbf{x}_{it} \sim \text{Normal}\left(0, \sigma^2\right) \\ y_{it} &= \max\left(0, y_{it}^{*}\right) \end{aligned} \tag{3}$$

where y corresponds to the dependent variable, x denotes a set of regressors. Estimation can be performed using the maximum likelihood. Another way is to eliminate observations with no investments from the sample and estimate random effects or OLS models in order to compare them with Tobit results.

Thus, in addition to the nearest neighbor matching procedure, random effects Tobit, random effects and pooled OLS are estimated to test robustness of our results. Moreover, models with and without including first lag of $\Delta Y/K$ and second lag of CF/K as explanatory variables are estimated to ensure that results

are not sensitive to the model specification. More lags should not be included since the older information is less likely to significantly affect investment decisions.

Before estimation results are presented, is it reasonable to look at the distribution of our dependent variable, I/K, for different organizational forms (Figure 6). It can be seen that a greater fraction of state enterprises invest lower proportions of their fixed assets compared to the other firms. On the other hand, LLCs appear to invest greater proportions of their fixed assets than others. And finally, public corporations and close corporations have similar distributions.

In addition, kernel density distributions of explanory variables $\Delta Y/K$ and CF/K are presented in Appendix B in Figure B3 and B4.

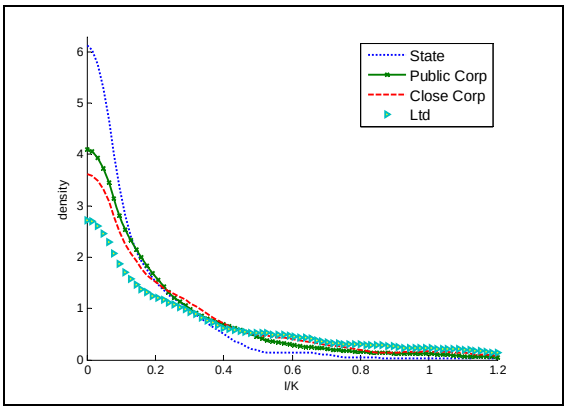

Figure 6. Nonparametric kernel density distributions of I/K by the organizational form in the working sample, h =0.1

Chapter 4

EMPIRICAL RESULTS

According to the results of the nearest neighbor matching procedure presented in Table 4, LLCs invested significantly greater proportions of their fixed assets as compared to public and close corporations. On the other hand, a distinction cannot be made between close and public corporations in their investment behavior. These results are robust irrespective of the choice of the treatment and control organizational form in our pairwise matching models.

Estimates for state companies, however, are not robust, which can be explained by the small number of observations with the state ownership. But two significant estimates are in favor of the hypothesis that state-owned enterprises invested less than others.

Table 4. The average treatment effects from the nearest neighbor matching procedure

Treatment	Control			
	State	Public Corp	Close Corp	Ltd
State		-0.148** (0.052)	-0.020 (0.037)	-0.191** (0.072)
Public Corp	-0.035 (0.083)		-0.013 (0.023)	-0.061* (0.031)
Close Corp	0.144 (0.126)	-0.016 (0.026)		-0.096** (0.034)
Ltd	0.087 (0.104)	0.065* (0.028)	0.099*** (0.028)	

Standard errors in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Then, random effects Tobit, and heteroskedasticity corrected random effects and pooled OLS estimates are obtained and presented in Table 5. It can be clearly seen that the estimates follow consistent pattern which is a piece of evidence that our results are robust. Moreover, inclusion of additional lags does not alter the estimates in a profound way. That is why estimates for the three models with the maximum number of explanatory variables are discussed further.

Both the first and the second lags of cash flow have significant coefficients, as well as the current and lagged values of change in net sales. Moreover, the coefficients at the second lag of cash flow and lagged change in net sales are lower than at the first lag and the current value, correspondingly. This is in the perfect accordance with the fact that more recent information should affect investment with higher intensity than older information.

All coefficients at organizational forms are significant. To compare them with the average treatment effects from the matching procedure, the average treatment effects can be calculated as

$$c_{ij} = \frac{c_i - c_j}{\sqrt{\mathrm{se}_i \cdot \mathrm{se}_j}}, \qquad (5)$$

where c stands for coefficients at categorical variables for organizational form; indices i and j define treatment and control forms, correspondingly; se stands for the standard errors. It can be seen from Table 6 that the average treatment effects for LLCs, public corporations and close corporations cannot be statistically distinguished from the matching estimates. Regression results are sharper in case of state enterprises predicting their lower level of investment, which is only partly supported by the matching treatment effects. It should be noted that Tobit estimates indicate less difference in investment for different organizational forms. However, the nature of the results remains the same.

Table 5. Estimation results

		RE Tobit	RE	OLS	RE Tobit	RE	OLS
		I/K	I/K	I/K	I/K	I/K	I/K
	L1. CF/K	0.142***	0.127***	0.131***	0.100***	0.092***	0.083***
		(0.009)	(0.013)	(0.011)	(0.012)	(0.015)	(0.015)
	L2. CF/K				0.043***	0.035**	0.046***
					(0.010)	(0.013)	(0.013)
	ΔY/K	0.034***	0.032***	0.036***	0.034***	0.032***	0.035***
		(0.002)	(0.003)	(0.003)	(0.002)	(0.003)	(0.003)
	L1. ΔY/K				0.012***	0.011**	0.013***
					(0.002)	(0.004)	(0.004)
Constant terms (baseline = Ltd)	State	-0.158***	-0.197***	-0.206***	-0.148***	-0.189***	-0.196***
		(0.033)	(0.031)	(0.022)	(0.033)	(0.031)	(0.022)
	Public Corp	-0.053**	-0.085***	-0.089***	-0.043*	-0.076**	-0.080***
		(0.020)	(0.024)	(0.017)	(0.020)	(0.024)	(0.017)
	Close Corp	-0.045	-0.089***	-0.088***	-0.038	-0.082**	-0.081***
		(0.023)	(0.026)	(0.019)	(0.023)	(0.026)	(0.019)
Type of output (Baseline = Other products)	Meat	-0.010	0.006	0.006	-0.014	0.004	0.003
		(0.029)	(0.031)	(0.023)	(0.029)	(0.032)	(0.023)
	Fish	-0.006	-0.015	-0.026	-0.016	-0.024	-0.033
		(0.071)	(0.078)	(0.059)	(0.070)	(0.078)	(0.059)
	Fruits & Vegetables	-0.010	0.057	0.064	-0.006	0.059	0.066
		(0.038)	(0.050)	(0.037)	(0.038)	(0.049)	(0.037)
	Oil & Fats	0.012	0.012	0.010	0.012	0.012	0.008
		(0.045)	(0.045)	(0.032)	(0.045)	(0.045)	(0.033)
	Dairy products	0.043	0.051*	0.046**	0.039	0.047	0.041*
		(0.022)	(0.024)	(0.017)	(0.022)	(0.024)	(0.017)
	Grain mill & Starch	-0.054	-0.042	-0.037	-0.049	-0.039	-0.035
		(0.032)	(0.028)	(0.020)	(0.031)	(0.028)	(0.020)
	Animal feeds	-0.020	-0.028	-0.022	-0.014	-0.023	-0.018
		(0.046)	(0.052)	(0.037)	(0.046)	(0.051)	(0.037)
	Beverages	0.046	0.047	0.051**	0.048	0.049	0.052**
		(0.025)	(0.027)	(0.020)	(0.025)	(0.027)	(0.019)
Area (Baseline = East)	Kyiv	-0.026	-0.030	-0.026	-0.026	-0.031	-0.025
		(0.042)	(0.045)	(0.034)	(0.041)	(0.045)	(0.034)
	North	-0.022	-0.019	-0.018	-0.025	-0.022	-0.021
		(0.025)	(0.025)	(0.017)	(0.025)	(0.025)	(0.017)
	Center	0.052*	0.053*	0.057**	0.052*	0.051	0.056**
		(0.025)	(0.027)	(0.019)	(0.025)	(0.026)	(0.019)
	South	-0.007	0.005	0.014	-0.007	0.004	0.012
		(0.027)	(0.029)	(0.020)	(0.026)	(0.028)	(0.020)
	West	-0.005	-0.003	-0.003	-0.004	-0.002	-0.002
		(0.023)	(0.024)	(0.017)	(0.023)	(0.024)	(0.017)
	_cons	0.185***	0.261***	0.256***	0.165***	0.243***	0.240***
		(0.027)	(0.032)	(0.025)	(0.027)	(0.032)	(0.025)
	Year	Yes	Yes	Yes	Yes	Yes	Yes
	R2			0.143			0.150
	R2 overall		0.143			0.150	
	p-value	0.000	0.000	0.000	0.000	0.000	0.000
	Observations	5244	4803	4803	5244	4803	4803
	Firms	1317	1233		1317	1233	

Standard errors in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 6. The average treatment effects from the random effect estimates

Treatment	Control			
	State	Public Corp	Close Corp	Ltd
State		-0.113*** (0.027)	-0.107*** (0.028)	-0.189*** (0.031)
Public Corp	0.113*** (0.027)		0.006 (0.025)	-0.076** (0.028)
Close Corp	0.107*** (0.028)	-0.006 (0.025)		-0.082** (0.029)
Ltd	0.189*** (0.031)	0.076** (0.028)	0.082** (0.029)	

Standard errors in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Chapter 5

DISCUSSION AND CONCLUSION

In this thesis the dependence between investment of Ukrainian food processing firms and their organizational form is studied. A comprehensive dataset on enterprise annual financial statements from the State Statistics Committee of Ukraine for the period between 2001 and 2007 is analyzed. The nature of investment decisions is captured with the help of the accelerator-cash flow investment model. The average treatment effects are estimated using the nearest neighbor matching procedure for large enterprises that have similar kernel density distributions of the relevant firm's characteristics across different organizational forms. Then the estimates are tested by the pooled OLS, random effects and Tobit random effects estimates.

Robust evidence is obtained in support of the fact that LLCs, on average, invested greater proportions of their fixed assets than close corporations and public corporations. On the one hand, those three organizational forms are quite similar in their implications for *economic activity* and *taxation* according to Ukrainian legislation. This can be also seen from our working sample, where large companies with these organizational forms have similar density distributions of fixed assets, net sales and the number of employees.

However, several important differences can explain our findings. First of all, corporations and LLCs are likely to differ in their opportunities to raise financing. According to the Ukrainian legislation, corporations are more open legal entities than LLCs, so they are more transparent to contractors. This may lead to higher borrowing power of corporations compared to LLCs. Therefore,

the estimates for corporations may be closer to LLCs if the information on borrowing is included into our model.

Another fundamental reason is liability to *illegal corporate raidering*, which is considered as a widespread phenomenon and fundamental problem in Ukraine. The term describes illegal and hostile acquisition of companies that may be formally performed in line with the legislation due to loopholes in it. In many cases, legal requirements are contradictory, which creates opportunities to disregard property rights for those who manage to benefit in the corrupt business environment.

According to the Chamber of Commerce in Ukraine, "corporate legislation creates obstacles for effective business activity and for the attraction of needed investments"[2]. Since investment, on average, is negatively related to risk, firms facing additional risk of corporate raidering should invest less. So, the fact that public and close corporations invested lower percentage of their fixed assets is in accordance with higher closeness of LLCs, which are required, for example, to take into account the interest of not only the majority of owners, but all their owners. In addition, disposal of property rights to third parties may be restricted or prohibited in the statute of LLCs. All this makes LLCs less prone to illegal acquisition and reduces the risk.

Moreover, the requirement to respect interests of all owners in LLCs may lead to higher concentration of ownership and enhanced cooperation of owners. It may result in more efficient planning and operation, which is associated with higher investments in the long run. In addition, possible difference in the extent of adherence to accounting principles among organizational forms, although

[2] The Chamber of Commerce in Ukraine, accessed at http://www.chamber.ua/wg/41, on May 29, 2010.

unlikely it could be, cannot be completely rejected while explaining the results of this study.

On the other hand, the estimation results on the effect of the state ownership are not robust. The main reason for this is likely to be the small amount of observations since statistically significant estimates are not against a plausible hypothesis about lower investment of state companies due to the lack of incentives or deficit of resources. However, state ownership is not of profound importance for the food processing industry since it localized in production of beverages now.

To make this study stronger, it is reasonable to look at other industries or countries with similar legislation and compare the average treatment effect of the organizational forms on investment. Moreover, it is important to obtain similar estimates in several years to argue about the time changes of the interaction between the organizational form and investment.

On September 17, 2008, Ukrainian Parliament adopted a new Law on Joint stock companies to replace the Law on Business Associations from 1991. The new law became partly effective since 29 April 2009, and the old law fully ceases to exist since 29 April 2011. Although not perfect, the new law is considered to be more close to efficient corporate legislation used in the Western Europe and USA. So, it will be interesting to compare our results with future estimates of investment behavior. At this point in time illegal corporate raidering is a very likely explanation of the investment gap between LLCs and corporations. So, our estimations results can be an argument to support stronger property rights and effective corporate legislation. It will be great if the legal environment in Ukraine become strong enough in several years to ensure similar investment behavior of LLCs and corporations, or at least remove raidering from the list of crucial obstacles for doing business.

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APPENDIX A

For preliminary analysis of our data, nonparametric estimation of kernel density distributions is extensively used. It allows identifying peculiarities of the data and comparing the data on firms with different organizational forms and from different groups of output. Kernel density is estimated according to Pagan and Ullah (1999):

$$\hat{f}_h(x) = \frac{1}{nh}\sum_{i=1}^{n} K\left(\frac{x - x_i}{h}\right) \tag{A1}$$

where $K(z)$ is Epanechnikov kernel function: $K(z) = \frac{3}{4}(1 - z^2)$ if $|z| < 1$ and zero otherwise. Bandwidth h is chosen deliberately based on properties of a particular data variable. Kernel density of the ratio I/K is estimated using reflection method by Schuster (1985) and Silverman (1986) for densities with boundaries. Zero values of investment are not included into the kernel density estimation procedure.

To argue about closeness of different distributions, the test developed by Li (1996) is employed. Intuitively, it considers an estimator for the value of the integral

$$I_{ij} = \int \left(f_{h,i}(x) - f_{h,i}(x)\right)^2 \mathrm{d}x \tag{A2}$$

and a consistent estimator of the corresponding standard error (Simar and Zelenyuk, 2006)

$$\hat{\sigma}_{ij} = 2\left(\int \left(\hat{f}_{h,i}(x) + \lambda_{ij}\,\hat{f}_{h,i}(x)\right)^2 \mathrm{d}x\right) \cdot \left(\int K^2(x)\mathrm{d}x\right) \tag{A3}$$

to calculate the value of the statistics that is distributed as the standard normal:

$$\frac{n_i h^{1/2} \hat{I}_{ij}}{\hat{\sigma}_{ij}} \to N(0,1), \tag{A4}$$

where $\lambda_{ij} = n_i / n_j$ is the ratio of the corresponding numbers of observations.

APPENDIX B

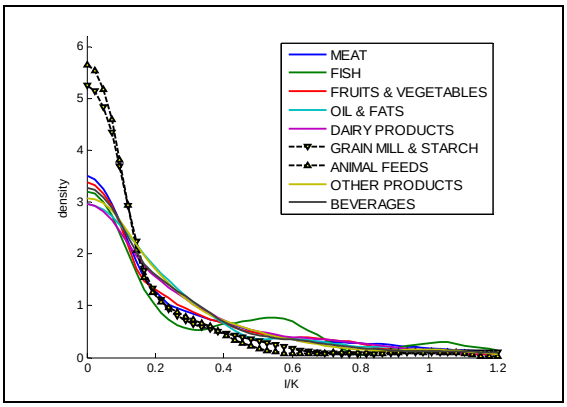

Figure B1. Nonparametric kernel density distributions of I/K by groups of output, h =0.15

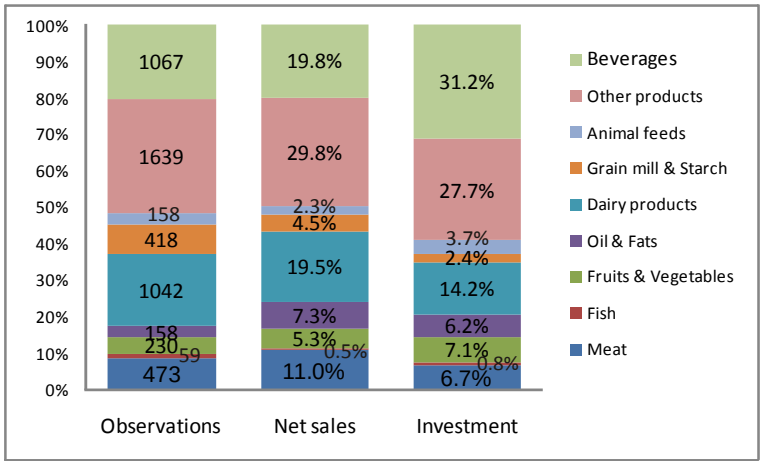

Figure B2. Breakdown of observations, net sales, and investment by groups of output.

Table B1. Li test on closeness of density distributions of I/K by groups of output, h =0.15

	Meat	**Fish**	**Fruits & Vegeta-bles**	**Oil & Fats**	**Dairy pro-ducts**	**Grain mill & Starch**	**Animal feeds**	**Other pro-ducts**	**Beve-rages**
Meat	0.00	0.23	-0.70	1.77	3.20	14.34***	9.14***	6.19***	2.82**
Fish		0.00	0.54	2.22	1.74	6.02***	6.41***	2.48*	2.13*
Fruits & Vegetables			0.00	1.27	0.50	11.63***	8.57***	2.86**	0.57
Oil & Fats				0.00	-0.35	12.70***	10.63***	-0.81	-0.51
Dairy products					0.00	31.42***	16.71***	2.55*	0.85
Grain mill & Starch						0.00	-0.03	29.45***	24.03***
Animal feeds							0.00	15.94***	13.06***
Other products								0.00	1.52
Beverages									0.00

t-statistics is reported
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table B2. Breakdown of changes of the organizational form

Old form	New form						
	State	Public Corp	Close Corp	Ltd	Others	Total	Total changes
State	639	2	0	0	1	642	3
Public Corp	0	2,979	2	8	1	2,990	11
Close Corp	0	5	1,372	5	2	1,384	12
Ltd	0	2	5	1,732	0	1,739	7
Others	5	5	12	18	1,355	1,395	40
Total	644	2,993	1,391	1,763	1,359	8,150	
Total changes	5	14	19	31	4		73

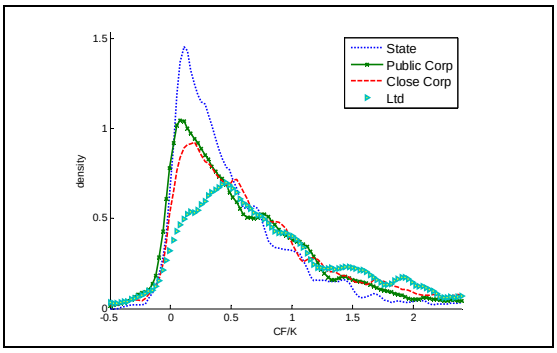

Figure B3. Nonparametric kernel density distributions of CF/K in the working sample, h=0.1

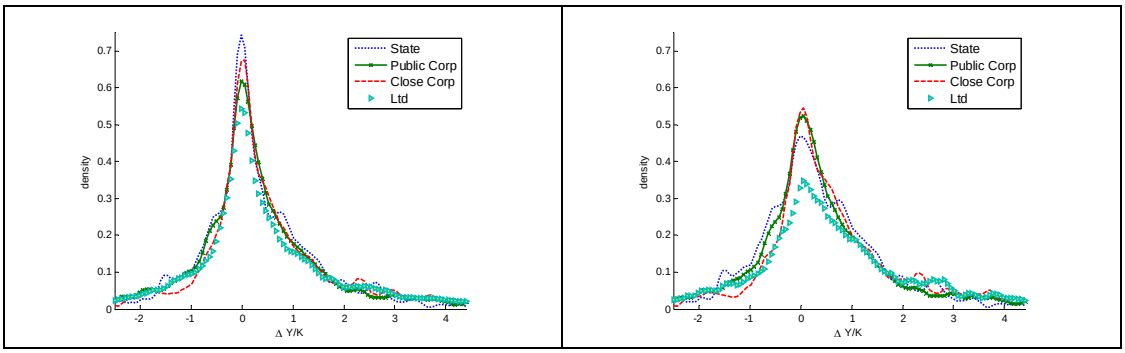

Figure B4. Nonparametric kernel density distributions of $\Delta Y/K$ in all the data (left) and working sample (right), h=0.2