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The Impact of Financial Parameters on Agricultural Cooperative and Investor-Owned Firm Performance in Greece

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Abstract. This paper attempts to examine how financial characteristics affect the performance of Investor- Owned Firms (IOF) and Unions of Agricultural Cooperatives (UAC) in Greece. Data has been collected over a period of five years for IOF (1995-1999) and six years for UAC (1995-2000). A theoretical model within a system of four simultaneous equations presenting size, profitability, financial risk and business risk as dependent variables has been developed. Financial analysis results were used with the help of OLS, panel data (fixed effect - random effect models), SUR and 3SLS techniques, to estimate those parameters which would determine the profit performance of the IOF and the UAC as well as to compare and contrast their financial structure and policies.

Keywords: agricultural cooperatives, profitability, size, financial risk, business risk, simultaneous equations.

1. Introduction

Many empirical studies (Baker, S. 1973; Hurdle, 1974; Harris, F. 1986; Bernier, 1987; Oustapassidis, K. and O. Notta, 1997; Kambhampati, 1999, Oustapassidis et al., 2000) analyze and measure the relationships among profitability, size, financial risk (leverage) and business risk. However, only few of them attempt to simultaneously analyze these factors. This paper develops a four – equation theoretical model relating these variables and using cross section and time series firm level data on 2533 greek manufacturing firms as well as on 93 Greek Unions of Agricultural Cooperatives. The results are extremely interesting as they try to explain intertemporal changes in profit margin differences between different industries. In addition, this work takes into consideration the existence of endogeneity bias between profitability, concentration, financial and business risk in order to choose the appropriate method of estimation. The paper uses firm level data, that is available in Greece to classify manufacturing firms into the 20 4-digit industries and estimates the value of variables and their determinants.

2. Model specification

Most of studies of Structure-Conduct-Performance (SCP) relationships use OLS to estimate single equation relationships assuming unidirectional causality running from structure to conduct and then to performance. Some however, suggest not only that market structure influence conduct and performance, but that market conduct and performance are likely to feed back and influence market structure too. Thus, a single equation model would suffer from simultaneous equation bias, and it would produce weak and inconsistent relationships.

For these econometric reasons a four-equation model was developed in which profits, market share, financial risk (leverage) and business risk are jointly determined. The model was tested using panel data for all the IOF in each Greek industry that occupied more than 10 employees from 1995 till 1999 (2533 firms) and for the Unions of Agricultural Cooperatives that have available data (93 out of 118) from 1995 to 2000 in Greece.

The model takes the general form provided below:

PR = f(MS,FR,BR,X)   PR :profitability (indicator of performance)

MS = f(PR,FR,BR,Ψ)   MS:market share (indicator of market structure)

FR = f(PR,MS,BR,Z)   FR:financial risk (indicator of conduct)

BR = f(PR,MS,FR,Ω)   BR:business risk (″) and

                                      X,Ψ,Z,Ω: vectors of exogenous variables

Following the relevant literature, the price cost margin (PCM) index can be used when available to test SCP relationships in empirical firm level studies. Also concentration and other independent variables, which affect industrial structure and conduct, should be included to give:

$$PR = a_0 + a_1 MS + a_2 FR + a_3 BR + a_4 CR_4 + a_5 DIV + a_6 CAPTURN$$

where:

CR_4: concentration ratio of the industrial sector, DIV: diversification level of the firm,
CAPTURN: capital intensity of the firm

Apart from the price cost margin, market share is a basic parameter for the examination of SCP relationships in empirical industrial studies. The theoretical model of market share equation (MS) includes profit rate ratio, financial risk ratio, business risk ratio as well as growth rate ratio.

$$MS = b_0 + b_1 PR + b_2 FR + b_3 BR + b_4 GROT$$

where GROT refers to the growth rate of the firm

Since financial risk (FR) is correlated with some of the elements of market structure and performance, it is desirable to include FR in the system of equations in order to explain the profitability level of the industry. The theoretical model of the financial risk equation includes profit rate ratio, market share, business risk ratio, efficiency ratio as well as an indicator of the firm age.

$$FR = c_0 + c_1 PR + c_2 MS + c_3 BR + c_4 NWTU + c_5 YOFES$$

where

NWTU: net worth over turnover of the firm   YOFES: firm age

Finally, the **business risk equation** includes profit rate ratio, market share ratio, financial risk ratio, turnover over the number of employees ratio as well as export intensity ratio.

$$BR = d_0 + d_1 PR + d_2 MS + d_3 FR + d_4 TE + d_5 EXAG$$

where

TE: turnover / # permanent employees of the firm
EXAG: export intensity ratio (exports / total sales)

The regression analysis results reveal the effects of the independent variables on the dependent variables for both IOF and UAC.

3. Data and measurement of variables

A total of 2533 manufacturing firms are classified into 20 Greek manufacturing industries according to their principle product for the years 1995 through 1999. The definition of these industries corresponds to the 2-digit Greek Standard Industrial Classification (SIC). Also, 93 UAC are used for comparison reasons for the years 1995 through 2000. Data for IOF is drawn from ICAP's annual reports. These reports provide individual balance sheet and income statement data for all manufacturing IOF. Data for UAC is gathered with the help of personal interviews as well as from their annual reports. The results of the financial analysis are exported with the help of OLS, panel data (fixed and random effect models), SUR and 3SLS techniques and describe the impact of several parameters on the performance of IOF and UAC in Greece. More specifically we include in the model the following parameters:

Profitability:	net income over turnover of the firm
Market share:	sales of each firm over the total industrial sales
CR_4:	concentration ratio of the industry according to the sales of the four biggest firms of each industrial sector
Financial risk:	total liabilities over net worth of the firm
Business risk:	deviation of firm profit from the industrial average profits
CAPTURN:	firm capital over its sales
Diversification:	the number of different firm activities
Growth:	annual firm sales over firm sales in the previous year
Export intensity:	exports over total firm sales
Efficiency:	a) net worth over turnover and b) turnover over the number of permanent staff
YOFES:	firm age

No advertising sales ratio is included in this equation as a separate market structure variable. Although advertising has often been treated as a market structure variable that has a separate positive effect on profitability, data is not available for the majority of firms and cooperatives and as a result it is not included.

4. Analysis

The analysis of data is done with the help of panel data technique (fixed effect - random effect) which can control for individual heterogeneity, can give more informative data, more variability, more degrees of freedom and it is able to better identify and measure effects that are simply not detectable in pure cross section or pure time series data (Nerlove, 1971, Judge et al, 1985). In the fixed effect method, we assume that all industries have identical coefficients except for the intercept. In case of random effect model there is an unobservable individual effect that is stable through time but different for each IOF. According to F-test, the appropriate method of estimating profitability, financial and business risk equation is the fixed effect method. On the contrary, in size equation we use the random effect method (table 1).

According to Hausman – Wu test (Martin, 1993; Greene,1997) there is endogeneity problem in all equations and as a result an instrumental variable technique (3SLS-2SLS) should be used. (table 2). According to Langrange multiplier statistic (λ=4638.6), there exist contemporaneous correlation bias across the four-equation system (the theoretical value of X^2 for 4 degrees of

freedom is 9.49 at 5% level of significance). Finally, we test the existence of identification problems (order and rank conditions) in each equation separately in order to be able to apply a system of simultaneous equations. The results show that all four equations are over-identified. We can therefore apply 3SLS to estimate jointly the four equations. However, we also apply SUR for comparison reasons (Tables 3-6).

In the profitability equation (table 3) all the independent variables are statistically significant (3SLS method). The market share ratio, leverage, concentration, diversification as well as capital over turnover ratio have a strong positive effect on profitability. On the contrary, business risk has negative effect on profitability. This occurs because both business risk and leverage, which are negatively correlated, are included in the same equation. According to 3SLS method, R^2 is 17.4% indicating that the independent variables explain by this amount the variability of the dependent variable.

In the size equation (table 4) the dependent variable is the market share. Growth has positive effect on size while business risk and leverage are negatively correlated. According to R^2, the independent variable explains by 8.5% the variability of the dependent variable (SUR method). In the leverage equation (table 5) profitability as well as business risk have a positive effect on leverage while efficiency and market share have a negative impact on leverage (3SLS method). A 1% increase on efficiency level decreases leverage level by 0.79%. R^2 is 69.2%. Finally, in the business risk equation (table 6) market share and leverage have positive effect on business risk whereby R^2 is 70.7% (3SLS method).

Apart from the analysis of IOF, the impact of the same financial factors on Greek Unions of Agricultural Cooperatives has also been examined. Cooperatives have been portrayed as a form of business enterprise in a market economy, which is particularly structured to serve the special needs and interests of its owner – members who have mutual benefits. Agricultural Cooperatives in the EU are presently in a state of transformation. The economic, social and legal environment of cooperatives is changing, resulting in the fact that the latter are accordingly in need of adopting new measures to adapt themselves to this new environment. To mention but a few of these changes: withdrawal of government from the market within the last decade, increase in international trade, new technological developments, changing consumer demands, concentration and integration process in other segments of the product and marketing chain and so on. All these factors have a major impact on the development of agricultural cooperatives, placing them under great pressure to adapt themselves to new realities.

In the year 2000 there were 118 Unions of Cooperatives in Greece. The level of sales has increased in recent years. However, the high leverage level as well as the high operating cost level results in difficulties in adopting expensive strategies that raise the competitiveness of the firm. The lack of capital leads to the increase of borrowed capital indicating higher financial risk. The net profit margin of cooperatives is negative from 1995 to 2000. On the contrary, the average profit margin on greek IOF is positive for the same period. The evaluation and comparison of the cooperatives performance with that of IOF is becoming imperative under these circumstances.

The same system of equations is examined for the UAC in Greece. In the profitability equation (Table 3) market share has a positive effect on profitability. A 1% increase of market share raises profitability by 0.91% (SUR method). Leverage and business risk are negatively correlated. In the size equation (table 4) profitability, business risk and growth have positive effect on size (SUR method). 1% increase on profit raises size level by 0.02% (SUR). In the leverage equation (table 5) profitability, market share as well as business risk have positive effect on leverage (SUR- 3SLS method). Finally, the business risk equation (table 6) indicates that the profitability

has a negative impact on business risk whereby a 1% increase of profitability leads to decrease of business risk by 1.89%. On the other hand, market share and leverage have a positive effect on business risk (SUR method).

5. Conclusions

It has been widely recognized that the economic health of Greek cooperatives has been failing in recent years and much needs to be done to bring the latter into line with current transformations that their European counterparts are undergoing.

Comparing the results from the analysis of IOF and Cooperatives we conclude that:

➢ In the profit equation of IOF, size, leverage, concentration, capital/sales as well as diversification have a positive effect on a firm's profitability whereas business risk has a negative effect (3SLS method)

➢ In the profit equation of Unions of Agricultural Cooperatives, size, leverage, capital/sales as well as diversification have a positive effect on firm's profitability whereas business risk has a negative effect (3SLS method). The results derived from the analysis of cooperatives absolutely agree with those of the analysis conducted for private firms. The only exception concerns the impact of concentration on profitability which is expected as all cooperatives belong to the same industry and concentration affects all cooperatives similarly.

➢ In the leverage equation of private firms, profitability, business risk as well as the age of the firm positively affect leverage level. On the contrary, market share as well as efficiency negatively affect the leverage level of private firms. The results of the leverage equation of agricultural cooperatives agree with those of private firms. The only exception refers to the positive impact of size on the cooperative leverage level

➢ In the size equation of agricultural cooperatives, profitability, business risk as well as growth affect positively the cooperative size. In the IOF equation, financial risk as well as growth affect positively the firm size (SUR method)

➢ Small size UAC and IOF have no economies of scale. In addition, they face obstacles in application of competitive strategies and have high production cost, low market share and low profit margins

Some proposals to enhance the economy of UAC and IOF are the following:

➢ Increase of net worth for the application of competitive strategies aiming at the increase of firm's market share

➢ Increase of size through mergers

➢ Evaluation of alternative scenarios of external growth

➢ Adoption of competitive strategies (e.g. product differentiation, advertising, reliable distribution channels, R+D, innovations)

➢ Better exploitation of economies of scale

➢ Restriction of fixed costs and expansion to trade activities with greater value added

➢ Focus on specialized parts of the market which do not interest big firms

It is obvious that a number of exogenous variables affect the level of profitability, size, leverage and business risk of a firm or a cooperative. Consequently, testing the hypotheses against models with even more exogenous variables would be desirable for further research.