

Application of Data Envelopment Analysis and Key Characteristics of Greek Agro-Firms

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ABSTRACT

The purpose of this study is to investigate key characteristics for the competitiveness in Greek agro-firms during the time period 2004 to 2011, based on firm level financial data. The study attempts to determine the firms' efficiency as well as the impact of exporting activity in agro-firms competitiveness, and more specifically in fisheries, farms with livestock and farms with fruits, vegetables and cereals. Although many empirical studies have been conducted relative to manufacturing firms' financial characteristics, limited research exists on agro-food firms. The use of DEA method seems to be a very useful tool for efficiency assessment and identification of best practices in firms' management for both managers and the Government as well in order to facilitate the growth of the agricultural sector.

Keywords: Agricultural Firms, DEA Analysis, Efficiency, EGLS, Exporting Activity, Exports, Farms with Fruits, Farms with Livestock, Fisheries, Vegetables and Cereals

1. INTRODUCTION

There is no commonly accepted definition and theory of firms' competitiveness, especially in the vulnerable sectors of agricultural firms. Efficiency and competitiveness is a determining factor of the level of welfare a country can sustain (Porter, 2005). According to EU Commission (2009), "competitiveness refers to the overall economic performance of a nation measured in terms of ability to provide its citizens with growing living standards on a sustainable basis and broad access to jobs to those willing to work". A widespread concept of competitiveness refers to the tendency and the skills to compete, win and maintain a market

position, increase market share and profitability, and ultimately establish commercially successful activities (Filó, 2007). Another definition of competitiveness that is focused more on manufacturing sector supports that is the ability to gain sustainable profits and maintain market share (Fischer & Schornberg, 2007).

The recent economic crisis hit Greek economy severely dropping its GDP annual growth rate from 5.5% in 2006 to -6.9% in 2011 improving slightly to -6% in 2012, -4 in 2013 and -2.3% in 2014 (projections). However, the percentage of GDP contributed to agriculture, forestry and fishing is only 3.2% in 2013 indicating a low productivity in the sector (OECD, 2014).

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Greece is representing an example of a European country which although it showed an above average performance during 1990s and middle 2000s, suffered a severe economic depression since 2008. So the use of Greek agro firms' financial data may lead to an assessment of general applicability of conclusions to other countries as well with similar economic climate. The sector of agricultural food products shows a potential for growth, given the advantages of the Greek agricultural products, due to special climatic and geographical area.

In this paper we research the level of effectiveness of agro-firms related to fisheries, farms with fruits, vegetables & cereals and farms with livestock in terms of their technical efficiency scores. Effectiveness here is measured in terms of technical efficiency, i.e. how efficiently the firm uses its inflows versus its outflow. The method used is Data Envelopment Analysis (DEA). Efficiency produces scores for each region and agro-firms sectors; further, with the help of econometric modeling (EGLS model), we attempt to specify the relation of Market Share Increase (a proxy for firms' Competitiveness) in agro-firms as the dependent variable with the efficiency taken from DEA method scores as well as with the examining time period, i.e. the pre-crisis (years 2004-2008) and the crisis (years 2009-2011) period, with the exporting activity taken for the year 2011, due to non-availability of data.

The present study contributes to the existing literature in the following ways: a) by using data from the agro-food processing sector in order to focus on efficiency, exportability, and competitiveness issues, b) by covering the period before and after the financial crisis in Greece and c) by using DEA technical efficiency scores for the measurement of firms' efficiency.

The literature review and research background on agro-firms efficiency is given in the next section. Then, the variables, data sample and the methodology to be used are presented in more details. Then, the empirical results and discussion are presented and finally the conclusion and policy implications are presented.

2. LITERATURE REVIEW

In most studies, either profitability, or efficiency or even productivity are used as proxies for competitiveness. For Greece, research on factors affecting Greek firms' profitability were undertaken (see, e.g., Notta et al., 2010; Voulgaris et al., 2003; Papadogonas et al., 2005; Agiomirgianakis et al., 2006 and the references therein). The present study tries to fill this gap by examines factors affecting agro-firms effectiveness measured as a DEA score as well as with the use of econometric analysis to find out the relation of competitiveness with DEA efficiency and firms exporting activity.

Several studies have focused on competitiveness of agriculture and the agro-food sector at levels of regions. However, competitiveness should be measured with regard to a benchmark such as relative concept and thus firms should be compared with each other and industries with each other (Latruffe, 2010). Little research exists on manufacturing firms in agricultural sector, especially in Greece. In most of the empirical studies competitiveness of an organization is measured of certain financial parameters (Singh et al., 2008). Productivity and efficiency are widely used as indicators or measures of competitiveness and European Commission regards it as the most reliable indicator for competitiveness in the long-term (European Commission, 2009).

Agiomirgianakis et al., (2006) search on financial factors affecting profitability of Greek manufacturing firms over the period 1995-1999, and show among others that exporting activity, as well as efficient management of assets, influence profitability. In a research (see e.g., Papadogonas, 2007 and the references therein) there is a use of data from Greek manufacturing firms for years 1995-1999, that finds that managerial efficiency, debt structure, investment in fixed assets and sales growth affect significantly firm profitability.

Theocharopoulos et al., (2007) searched for the potential for increased profitability and improved farm income for sheep farms in Greece, as a result of the reorganization of

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