Sources of Agricultural Productivity Differences between Israel, Jordan, Lebanon and Syria using DEA

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ABSTRACT

In the present chapter agricultural productivity in four countries Israel, Jordan, Lebanon and Syria is examined. A thorough look at previous studies that considered those countries is provided. The data used is drawn from the Food and Agriculture Organization of the United Nations and adjusted, covering the period of 1972 through 2006. The study utilizes Data Envelopment Analysis (DEA) to calculate Malmquist productivity indices. The study looks at the tendencies in agricultural productivity for the four countries throughout the 35 years, in which wars and conflicts took place. The estimates of efficiency change, technical change, and total factor productivity change obtained for the four countries are calculated. Moreover, a model for technical inefficiency effects in a stochastic frontier production function is suggested to provide a possible explanation of the sources of inefficiencies and the effect of each inefficiency variable.

Keywords: Agricultural Productivity, Data Envelopment Analysis (DEA), Food and Agriculture Organization of the United Nations, Israel, Jordan, Lebanon, Syria

INTRODUCTION

A few previous studies looked closely at agricultural productivity in the four countries mentioned in Table 1. Belhaj Hassine and Kandil (2009) discuss the link between trade openness, agricultural productivity growth and poverty reduction in some Mediterranean countries including Israel, Jordan, Lebanon, and Syria. Their results show positive effects of trade openness on farming efficiency and productivity. Another recent study shows that these four countries can
be both innovative and efficient and Jordan and Lebanon had the highest Agricultural TFP growth, 4.2 percent (3 percent growth in efficiency and 1.2 percent growth in technical change) and 3.4 percent respectively (Belloumi & Matoussi, 2009). During the 1980s, Syria had a negative 3 percent TFP which pushed the government to adopt more liberal agricultural sector policies and at the end of the 1990s Syria became a net exporter of many agricultural products (Belloumi & Matoussi, 2009). Furthermore, it’s worth mentioning that the Israeli 1.6 percent average growth in TFP was due to a 1.3 percent growth in technical change (TC) and 0.3 percent growth in efficiency change.

The main objective of the present chapter is to estimate the Malmquist agricultural productivity indices for Israel, Jordan, Lebanon and Syria between the period of 1972 and 2006. This chapter offers a close look at the different factors affecting the agricultural Total Factor Productivity (TFP) change differences, an estimation of the Malmquist productivity index using panel data and an estimation of a model for technical inefficiency effects in a stochastic production function.

Table 1. Studies of inter-country agricultural productivity that include the four countries of interest (1993-2009)

<table>
<thead>
<tr>
<th>Paper</th>
<th>Method</th>
<th>Original and Main Source of Data Used</th>
<th>Countries of Interest Included Separately</th>
<th>Years Covered</th>
<th>Countries</th>
</tr>
</thead>
<tbody>
<tr>
<td>Craig et al. (1997)</td>
<td>CD&lt;sup&gt;a&lt;/sup&gt;</td>
<td>FAO</td>
<td>Israel and Syria</td>
<td>1961-1990</td>
<td>98</td>
</tr>
<tr>
<td>Belhaj Hassine and Kandil (2009)</td>
<td>CD</td>
<td>FAO and WDI&lt;sup&gt;e&lt;/sup&gt; (for 36 agricultural commodities)</td>
<td>Israel, Jordan, Lebanon and Syria</td>
<td>1990-2005</td>
<td>14</td>
</tr>
</tbody>
</table>

* Monthly statistical Bulletin, ministry of agriculture, ministry of Labor, statistical yearbook, National Account Studies of the United Nations Economic and Social Commission of Western Asia region and other individual sources from studies. <sup>a</sup> Cobb-Douglas <sup>b</sup> Data Envelopment Analysis <sup>c</sup> Translog <sup>d</sup> United States Department of Agriculture <sup>e</sup> World Development Indicators.
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