Chapter 22
Examining the Evolution of Agriculture Productivity in the European Union

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ABSTRACT

This chapter examines agricultural productivity across 12 Member-States of the European Union. Time series techniques are employed. The results suggest that there is no uniform pattern across all EU countries. Few Member-States, nevertheless, follow a common evolution path.

INTRODUCTION

In recent years there has been a proliferation of studies on economic convergence. However, several distinct types of convergence have been suggested in the relevant literature, each being analysed by distinct groups of scholars employing different methods. As part of the aforementioned efforts, economic convergence has been tested across the economies (countries or regions) of the European Union (EU). Indeed, there appears to be a strong literature testing convergence in the EU. However, these studies refer either to per capita income convergence (e.g. Boldrin and Canova, 2001; Ezcurra et al., 2005) or manufacturing productivity (e.g. Pascual and Westermann, 2002; Gugler and Pfaffermayr, 2004). Despite the significance of agriculture for the EU and the fact that productivity growth in agriculture is one of the main goals of the Common Agricultural Policy (CAP), the agricultural sector has rarely received attention in the relevant literature[1]. Convergence in agricultural productivity is of critical importance, since competitiveness of European agricultural products in international markets requires convergence

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in levels of agricultural productivity among the EU Member-States. The purpose of this chapter is to present some empirical evidence using data from 12 EU Member-States. The remainder of this chapter is organised as follows. The context, in which the chapter's main question emerges, viz. time-series test, is discussed in Section 2. Section 3 briefly discusses the data followed by a presentation of the empirical results. Section 4 concludes the chapter.

TIME-SERIES TESTS

Conceptually, long-run convergence implies that economies are driven to 'steady-state' equilibrium with equalised per capita income. Encapsulated in this definition are two fundamental issues. First, there is the question of how to identify those economies which converge towards steady-state equilibrium, and second there is the question of what is the 'steady-state' equilibrium towards which economies are progressing in the long-run. According to Bernard and Durlauf (1995) convergence can be defined as follows:

$$\lim_{k\to\infty} E(y_{1,t+k} - y_{i,t+k} \mid I_t) = 0\,,\ \forall i \neq 1 \tag{1}$$

where *E* stands for the mathematical expectation, y_i is GDP per worker in economy *i*, and I_t describes the information set available at time *t*.

The intuition behind equation (1) is clear. Convergence between two economies, let *i* and *j*, occurs if the long-run forecasts of GDP per worker for both economies are equal at a fixed time *t*. The associated econometric test is known as the bivariate Augmented Dickey Fuller (hereafter ADF) test and takes the following general form[2]:

$$\Delta\left(y_{i,t} - y_{j,t}\right) = \mu + \alpha\left(y_{i,t-1} - y_{j,t-1}\right) + \beta t + \sum_{k=1}^{n} \delta_k \Delta\left(y_{i,t-k} - y_{j,t-k}\right) + \varepsilon_t \tag{2}$$

Long run convergence implies two properties; firstly disparities across economies are disappearing and secondly a movement towards long run equilibrium is occurring. However, the unit root test is directed at 'catching-up' convergence only, i.e. the first of the two properties. In order to assess for long-run convergence also, then it must be the case that the coefficient on the time trend is equal to zero ($\beta = 0$). Thus, long run convergence between two economies occurs if $\alpha < 0$ and $\beta = 0$ (Oxley & Greasley, 1995).

EMPIRICAL APPLICATION

Trend evaluation of economic variables in the agricultural sector is always been handicapped by unavailability of consistent time-series. However, EUROSTAT provides time-series for agricultural gross value added (GVA) and labour force. Thus, based on data published by EUROSTAT, agricultural productivity can be expressed as GVA per-worker in agriculture. The empirical analysis is carried out over the