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Abstract
This paper uses the stochastic approach to convergence to investigate whether real per capita GDP in Portugal has been converging to the EU15 average. The estimation accounts for conditional convergence, transitional dynamics and up to two structural breaks. It is found that per capita GDP in Portugal has indeed converged to the EU15 average, but the pace of convergence has not been uniform along time. In particular, a slow down in the convergence process is identified in 1974. This result depends, however, as to whether the choice of this break-date is viewed as uncorrelated with the data. No evidence of acceleration in the speed of convergence is found after EC accession, in 1986. (JEL C32, O40)

Keywords: Income Convergence, The Portuguese Economy, Unit Root test

Introduction
After a secular trend of divergence, the Portuguese economy appears to have engaged in a convergence track towards the industrialised world. In the last four decades of the twentieth century, Portugal achieved the eighth highest growth rate of per capita GDP, among 98 nations for which comparable data is available [Summers and Heston, 1991]. This episode of fast economic growth allowed the country to reduce consistently its income gap vis-à-vis the most advanced nations.

Some may argue that such achievement is not impressive. Since Portugal departed from a low standpoint, higher growth rates would be expected anyway. This reasoning has a long tradition in economic thinking. Following David Hume [1758], economists have been arguing that transfer of technology, diminishing returns, and capital mobility provide poor economies with an impetus to catch up. A fact that has received large consensus in the economic profession, however, is that there is no systematic tendency for poor countries to grow faster than rich countries [De Long, 1988]. Although a number of poor countries have been able to join the club of more advanced nations, in the last century, most poor countries have remained poor.

This evidence lead economists to search for weaker definitions of convergence. According to the neo-classical growth model [Solow, 1956; Swan, 1956; Mankiw et al., 1992], convergence to the same level of per capita income (absolute convergence) should

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not hold in general. If economies differ in terms of fundamental parameters, such as the propensities to invest in physical or human capital, their balanced growth paths will be parallel (as implied by the assumption that technology spills over), but not necessarily coincident. Still, in this model, the steady-state levels of per capita output are independent of initial capital endowments. Thus, economies lying initially below their balanced growth path should exhibit faster growth than those economies having per capita income initially above their balanced growth paths (conditional convergence). Evidence of conditional convergence in large samples of heterogeneous countries has been found in many cross-country studies, including Mankiw et al. [1992].

Other authors have departed from the neo-classical growth model. Romer [1986] and Lucas [1988] showed that social increasing returns to scale associated to physical and human capital may actually cause divergence. Romer [1990] departed from the assumption of perfect competition to motivate innovation as a rent seeking activity. Other researchers have argued that the ability of a country to take opportunity of the world technological progress depends on a number of conditions that determine the economic environment and the structure of incentives in which individuals produce and invest [Klenow and Rodriguez-Clare, 2004; Easterly, 2001; Barro and Sala-i-Martin, 1997; Parente and Prescott, 1994; North, 1990]. Cross-sectional studies that depart from the basic neo-classical formulation to stress the role of policy and institutions include Barro [1991], Sala-i-Martin [1997], Sachs and Warner [1995, 1997], Hall and Jones [1999], and Rodrick et al. [2002].

An emerging view in the economics profession is that no one theory fits all. While some economies may be though as sharing the benefits of a common body of technical knowledge, many other are falling behind, constrained by institutional idiosyncrasies, bad policy, or geography. For a poor country, convergence is pretty much a matter of moving from the second case to the first.

A limitation of cross-section empirical tests is that they work with the null hypothesis that no countries are converging and the alternative hypothesis that all countries are. This leaves out a host of intermediate cases. In particular, cross-country regressions cannot assess whether a particular country has been converging to another country or to a given group of countries. In alternative, some researchers have proposed tests for the convergence hypothesis based on time series data. The time-series approach focuses on the evolution of relative per-capita incomes by employing a stochastic definition of convergence: Two or more economies are said to converge if the long run forecast of per capita output differences tends to zero [absolute convergence, Bernard and Durlauf, 1995] or to a constant [conditional convergence, Evans and Karras, 1996].

This paper investigates whether per capita Gross Domestic Product (GDP) in Portugal has been converging to the EU15 average (defined as the average of the 15 countries that formed the European Union before last enlargement), using the stochastic approach to convergence. The analysis covers the period 1960–2003, and the empirical strategy consists of investigating the persistency of shocks to the series of the log of per capita GDP in Portugal relative to the EU15 average. If this series contains a unit root, then there will be no tendency for per capita GDP in Portugal to approach an equilibrium differential vis-à-vis the EU15 average. In that case, income levels will be drifting apart, even though in a particular period of time the respective time series looked like being approaching each other. If, on the contrary, income disparities have an error correcting representation, then the null of non-convergence is rejected. The testing procedure includes a drift and a time trend so as to account for non-coincident steady states and transition dynamics.