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Real convergence in Europe: A cluster analysis

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ABSTRACT

In this paper we analyse real convergence in GDP per worker in the EU member states. The aim is to test whether there is evidence of club convergence in the EU, i.e. divergence in GDP per worker. Evidence in favour of cluster or club convergence may be an indication of significant productivity divergences between countries, which may also explain the current turmoil in the euro zone. The results show evidence of different economic growth rates within Europe, which also converge to different steady states, implying divergence in the EU-14. Within the EU-14 member states we observe two convergence clubs, which are not related to the fact that some countries belong to the euro area. Furthermore, Eastern European countries are also divided in two clubs, with a more direct effect of belonging to the euro zone in the composition of the clubs.

1. Introduction

The existence of real convergence within the European Union (EU) member states is of paramount importance in the process of economic integration, providing a mechanism to achieve economic and social cohesion amongst countries. In fact, the reduction of income inequality across its members has long been a declared objective of the EU, and policies aimed to promote economic convergence were set out in 1975 through the Structural Funds, and in 1993 through the Cohesion Funds. The idea that European integration through macroeconomic policy convergence and greater capital mobility will cause convergence in income growth rates motivated the implementation of those policies aimed to promote cohesion.

Boldrin and Canova (2001) suggest that EU regional and structural policies have mostly redistributed income and have had little effect in fostering economic growth and the desired convergence of income levels across countries. This divergence view stands at odds with the neoclassical growth theory (Mankiw et al., 1992; Solow, 1956). According to this theory, the growth rate of capital per worker of countries with a lower initial capital endowment tends to be greater than countries with an initial higher capital stock. Thus, countries with different initial capital stocks tend to converge in terms of income per worker, over time. This hypothesis is known as *absolute convergence*. The empirical evidence on the absolute convergence hypothesis is mixed. Baumol (1986) and the World Bank (1993), amongst others, point to the fact that this process is hardly observed in practice. In contrast, Barro and Sala-i-Martin (1991) concluded in favour of absolute but slow convergence in Europe. There is generally more evidence in favour of the convergence hypothesis when country heterogeneity is taken into account and, in particular, when the assumption of similar parameters between countries is relaxed, implying different steady states (Barro and Sala-i-Martin, 1995). Only after controlling for different economic conditions, can one observe the negative relationship between initial income per worker and economic growth. This hypothesis is known as *conditional convergence*.

In this paper we analyse the process of real economic convergence in Europe, focusing on the real economy, using as a proxy the gross domestic product per worker. In contrast to Lein et al. (2008) the aim is to test whether there has been club convergence. That is, our primary question is: are EU countries converging to a single steady state or are they clustering around different states? The possibility of club convergence within the EU may raise issues in terms of differences in competitiveness, linked to the lack of structural reforms, which may yield significant instabilities within the EU. These instabilities may also affect the stability of the euro currency, as we have seen in the 2008–2011 financial and sovereign debt crisis. In addition, the analysis of real convergence in Europe is relevant since significant differences in output growth, may increase the risk of asymmetric shocks. Mundell (1961) established the conditions for an optimal currency area, pointing out, amongst others, the importance of absence of asymmetric shocks.

The consensus at the introduction of the euro was that the internal EU market with free mobility of goods, capital, and labour would

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ensure sustainable growth and economic convergence in the euro area, even though cross-country structural differences prevailed at the beginning. This view also suggested that under economic and monetary integration, the preconditions for the convergence theories are more likely to be met. A number of studies have analysed the existence of convergence in the EU and the euro zone. The results to date are far from conclusive. De la Fuente (2003) finds only mild evidence in favour of convergence, due to the different labour market institutions and investment ratios, whereas Salinas-Jiménez et al. (2006) find some evidence in favour of convergence trends, due to human and physical capital accumulation. In a recent contribution, Crespo-Cuaresma et al. (2008) point to the fact that being a EU member state increases integration and has positive and lasting effects on economic convergence. Similar results are found by De Grauwe and Schnabl (2008), who obtain that fixing the exchange rate and adopting the euro would enhance economic growth in South-Eastern and Central European economies.

As the new and future EU members are much poorer than the old members, the prospect of further enlargement of the EU may jeopardise the achievement of real convergence. The reason is twofold; first, because the disparities between GDPs per capita within the Union increases and, second, because there will be more countries receiving structural funds. It is also worth mentioning that the process of convergence of Eastern European countries with Western European countries has special features which are different from other process of economic and political integration: first, all Eastern European countries have been in transition from planned to market economies, at the same time as an intense process of integration with the west; second, this group of countries belong to the common European market and, according to the neoclassical model of economic growth, the process of economic integration may have accelerated real convergence with the west. This is due to the elimination of barriers to the mobility of production factors. The latter elimination, arguably, would help to equalise those production factors' productivities.

One of the consequences of the process of economic integration is that Eastern European countries have adopted the EU standards in terms of economic policies, institutions and economic governance. For instance, these countries have had to adopt multilateral agreements, such as Stability and Growth Pact, which establishes a number of fiscal policy rules. Thus, Padoa-Schioppa (2003) highlights the fact that Eastern European countries have had to keep two process of convergence; real income and structural convergence. These processes are of course related.

Additionally, by means of participating in the process of European economic integration, this group of countries, sooner or later, will join the euro zone, once the Maastricht criteria are fulfilled (ECB, 2003). This situation implies, then, that not only the countries involved will have to face the process of real convergence, but also those countries which are EU member states, will have to face nominal convergence. Lein et al. (2008) have analysed whether real convergence has been driving nominal convergence in the new EU Member States. These authors concluded that openness has had a negative impact, due to increased competition in the domestic markets of tradable, and productivity a positive one, through the Balassa–Samuelson effect, on price level convergence with respect to the Euro area. More recently, Fritsche and Kuzin (2011) analyse convergence within the EU-12 plus Denmark, Sweden and the United Kingdom for CPI, GDP deflator, labour cost, GDP per capita and total factor productivity data, by means of using Phillips and Sul (2007) approach. Focussing on the data for GDP per capita, their results do not support the hypothesis of a two tier Europe, based upon the geographical situation of the countries (see also Rinaldi-Larribe, 2008, for Central and Eastern European countries).

In the present paper we apply recently developed club convergence tests, Phillips and Sul (2007, 2009) which is based upon panel data taking into account time varying parameters, so as to obtain some insights into the validity of the hypothesis 'two tier Europe', grouping countries as northern and southern.

The remainder of the paper is organised as follows; the next section presents the cluster methodology proposed by Phillips and Sul (2007, 2009) to test for club convergence within the EU-14. Section 3 discusses the empirical results. The last section concludes.

2. Methodology: convergence and cluster tests

The hypothesis of conditional convergence implies that real convergence depends upon the basic structural characteristics of the country, but it does not depend upon initial income per worker. Nevertheless, the initial income per worker may have an effect on the country's economic growth path. Thus, regardless of the fact that two countries might share similar evolutions of fundamental variables and long term growth rate, they may not converge to the same steady state if they do not have similar initial incomes per worker. This is known as the *club convergence* hypothesis. According to the latter, if two countries start the process of economic convergence with different incomes per worker, they will hit different steady states. In other words, a country's income per worker converges to a long-run growth path that depends on the country's basic structural characteristics and on whether its initial GDP per worker is above or below a specific threshold value. Income per worker therefore converges to the same level across countries conditional on the countries being structurally alike and on the countries starting on the same side of their respective threshold values. This does not contradict the fact that countries with different initial income per worker may converge to the same steady state as richer countries, if the former countries get involved in structural reforms. These reforms may bring the country's income per capita above the threshold level, and thereby initiate a growth process eventually leading the country to higher levels of income.

In the case of the EU, club convergence refers to the possibility that southern and eastern European countries may have sluggish economic growth, diminishing their possibilities of catching up with the rest of the countries, the latter achieving a higher steady state.

The time series approach to convergence study can be found in the seminal papers by Carlino and Mills (1993) and Bernard and Durlauf (1995, 1996). These authors have developed the concept of stochastic convergence, based upon the stationarity properties of the variables under analysis. Thus, two non-stationary variables converge if there is a cointegrating relationship between them. In other words, two non-stationary series convergence if they share the same stochastic trend.

This definition of convergence can be empirically tested by means of time series econometric techniques. However, as pointed out by Phillips and Sul (2009), traditional convergence tests are inadequate when technology is heterogeneous across countries and the speed of convergence is time-varying. To account for temporal transitional heterogeneity, Phillips and Sul (2007, 2009) introduced cross-sectional and time series heterogeneity in the parameters of a neoclassical growth model. The starting point of the test is a simple factor model:

$$X_{it} = \delta_i \mu_t + \varepsilon_{it} \tag{1}$$

where δ_i measures the idiosyncratic distance between some common factor μ_t and the systematic part of X_{it}. This model seeks to capture the evolution on the country specific X_{it} in relation to μ_t by means of its two idiosyncratic elements, that is, the systematic element δ_i and the error ε_{it}. Phillips and Sul (2007) modified this initial model by allowing the systematic idiosyncratic element to evolve over time, thereby accommodating heterogeneous agent behaviour and evolution within that behaviour by means of a time-varying factor-loading coefficient, δ_{it}. Furthermore, they allow δ_{it} to have a random component, which absorbs ε_{it} in Eq. (1) and allows for possible