Is foreign trade important for regional growth? Empirical evidence from Portugal

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ABSTRACT

The aim of this study is to investigate whether openness, export shares or trade balances affect regional growth in Portugal. Human capital is also considered as a conditional factor to growth, expressed by the rate of success in high school education. Thus, we analyse whether the combination of international trade and human capital is relevant to explain regional growth in Portugal and how it affects the convergence process between regions. In the empirical analysis, interaction terms are introduced to explore the existence of different performances between regions of the *Littoral* and the *Interior*. As an alternative to the traditional approach that considers the population growth rate, we include the share of sectoral employment aiming to capture labour specialisation in the main sectors of economic activity and measure its impact on regional growth.

The empirical analysis estimates the conditional convergence model of the Barro's type, applied to the Portuguese NUTS3 regions for the period 1996–2005. The GMM estimation approach applied to regional panel data reveals that factors associated with external trade, human capital and sectoral labour share (especially of the industrial sector) are relevant to explain regional growth and convergence in Portugal.

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1. Introduction

Different approaches have been used to test the convergence hypothesis, the most common being the conditional convergence developed by Barro and Sala-i-Martin (1991). According to this approach, growth is conditioned by structural factors such as human capital accumulation, technical progress, innovation, amongst others, with increasing returns to scale characteristics. Differences on these structural factors characterise properly the steady-states of the economies and explain the capability of the backward economies to grow faster than the advanced ones.

Several studies have been carried out at the European level to analyse the convergence phenomenon amongst regions, using different approaches, samples and time periods.[1] A great number of studies also deal with regional convergence within a given country. Some examples are those by De La Fuente (2002), Vittorio (2009), Michelis et al. (2004), for the Spanish, Italian and Greek regions, respectively. In the particular case of Portugal, Crespo and Fontoura (2006, 2009) analysed the convergence process at the municipal level. Antunes and Soukiazis (2006) showed that Structural Funds received from the EU had contributed to a higher convergence of the Portuguese NUTS3 regions and Soukiazis and Proença (2008) provided empirical evidence showing that tourism was a factor of regional convergence.

In all the above-mentioned studies foreign trade was not considered as a factor of convergence. It is argued that when a region faces an external deficit, capital flows from the central government can solve this problem.[2] We do not share this view for several reasons: (i) regional external deficits reflect lack of economic competitiveness which can constrain local growth and increase unemployment (Thirlwall, 1980); (ii) capital transfers from the central government to the deficit regions are not sustainable in the long-term and can create budget deficits that affect the whole economy; (iii) capital transfers from the central government to less competitive regions can be inefficient in terms of the optimal reallocation of resources; and (iv) the reallocation of resources to less competitive regions with the aim to finance external regional deficits can be made in detriment of other regions increasing, therefore, regional inequality. In our opinion, regional trade competitiveness is important for local growth as it is for the whole economy, and capital flows are not a sustainable solution in the long-term. Structural solutions are needed to turn regions more competitive by allocating resources to sectors with increasing returns to scale characteristics and encouraging the production of goods with high income-elasticity of demand in international markets.

The aim of the present study is to test the convergence hypothesis of per capita income amongst the Portuguese NUTS3 regions for the period 1996–2005, using different conditional factors. The main

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[2] Ramos (2007) in line with other authors like Bayoumi and Rose (1993), Helliwell and McKitrick (1999) and Decressin and Disyatat (2000), argues that regions can run external imbalances in a greater scale than countries and since they avoid sustainability constrains they may even benefit from those imbalances.

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contributions of the paper are: (i) foreign trade indicators are introduced into the growth model to measure their impact on regional growth and convergence; (ii) sectoral employment share is considered in the growth equation as an alternative to population growth which is usually used in growth models of the Barro type; (iii) the dichotomy between the *Littoral* (coastal) and the *Interior* (in-land) zones is shown to be relevant in the process of convergence in Portugal; and (iv) technology diffusion effects are detected by adding an interaction term between foreign trade and human capital into the growth model. These issues have not been studied before at a regional level for the same country and mostly for Portugal.

The study is organised as follows: in Section 2 the growth and convergence issues are discussed and the importance of trade for growth is explained. In Section 3 the convergence model is adapted to include trade as a conditioning factor of growth. Section 4 provides statistical information that allows analysing regional asymmetries with respect to per capita income, foreign trade, educational standards and employment structure. In Section 5 the conditional convergence model is estimated and the results are discussed. The last section summarises the most relevant outcomes from the study.

2. The importance of trade on growth and convergence

The origin of the studies on economic growth and convergence is based on Solow's (1956) neoclassical growth theory. According to this theory, factors of production move freely, and face diminishing returns and decreasing marginal productivity. Technological progress is exogenous and freely available to everyone. Under these circumstances, convergence in per capita income will occur, indicating that poorer economies grow faster than the richer ones. Empirically, this tendency is confirmed by the negative correlation between the growth of per capita income and its initial level (absolute convergence). In the long-term, all economies will grow at similar rates and converge to the same steady-state. Trade is not considered as an impediment to growth since flexible relative prices solve trade imbalances and bring the economy back to equilibrium.

Romer's (1986) work pointed out the failure of the neoclassical convergence hypothesis, when confronted with empirical evidence. Growth models with increasing returns to scale (coming mainly from human capital and technological progress) became an alternative to the neoclassical approach. Baumol (1986), Barro and Sala-i-Martin (1992) and Mankiw et al. (1992) assessed the existence of conditional convergence when differences on structural factors (human capital, technological progress and innovation, amongst others) were taken into account. Most of the theoretical growth models are based on aggregate production functions with physical capital, human capital and technology as the relevant explanatory factors of income growth (Islam, 1995; Galor, 1996; Temple, 1999). Different economies converge to different steady-states, characterised by dissimilar economic structures, thus reflecting differences in production functions.

Empirical studies testing the hypothesis of conditional convergence have not sufficiently explored the possibility that trade can be a conditioning factor of growth.[3] The absence of trade considerations is more evident in studies of regional convergence within the same country.

The influence of trade on growth can be explained through several channels: trade is responsible for technological and knowledge transfers amongst trading partners; trade is essential for exploiting economies of scale due to market size; trade allows for a better reallocation of resources towards the more productive sectors; trade enhances higher product specialisation according to the comparative

advantage principle (Grossman and Helpman, 1991; Yanikkaya, 2003; Di Liberto, 2005). In fact, international trade is considered to be a privileged way of transmission of R&D spillovers, namely through the acquisition of intermediate products and capital equipment containing foreign technology and innovation activities (Coe et al., 1997). Therefore, trade affects convergence not only through the price mechanism (Temple, 1999) but also because the trade of goods and services, incorporating sophisticated technology and new ideas, accelerates technological diffusion amongst economies (Tondl, 2001).

Trade openness is by itself an incentive for economies to get involved in innovative activities, thus favouring growth in the long-term. In this context, a link between trade openness, human capital and technological changes can be established. The stock of human capital is more likely to embrace R&D activities than the non-specialised workforce. The higher innovation rate enabled by R&D activities is further stimulated by the existence of an international market where new products and services can be traded and technological diffusion promoted.

All the above arguments justify the inclusion of trade measures in the growth equations when estimated empirically. The omission of this factor can bias the results.

3. The convergence model with trade

The convergence equation more often estimated in the empirical literature is of the Barro's type, assuming that human capital is partly endogenous with increasing return properties in the long-term that compensate the diminishing returns of physical capital. The model has been adjusted by Mankiw et al. (1992) to include human capital and by Islam (1995) to be used with panel data, controlling for differences in the production function amongst different economies. According to these authors, the convergence equation is given by the following relation[4]:

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\begin{aligned}
ln\,y_i(t_2) - ln y_i(t_1) = {} & \theta\,ln A_0 + gt - \theta\,ln y_i(t_1) - \theta\frac{a}{1-a} \\
& \times ln\Big(n_{i,t}+g+\delta\Big) + \theta\frac{a}{1-a}\,ln\Big(s_{i,t}\Big) + \theta\frac{\beta}{1-\alpha} \\
& \times ln\Big(h_{i,t}\Big) + \theta\frac{\gamma}{1-a}\,ln\Big(m_{i,t}\Big) + v_{i,t}
\end{aligned} \tag{1}
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In this expression, y is the per capita income, n the annual growth rate of population, g the growth of technology, δ the depreciation rate, s the savings (investment) rate, h the human capital and m is the trade. On the other hand, α, β and γ are the growth elasticities with respect to physical capital, human capital and trade, respectively. Finally, $\theta=(1-e^{-\lambda T})$ with λ the speed of convergence, gt is a constant (technological progress is assumed to be the same for all economies) and A_0 reflects not only the technological level but also resource endowments, the legal system and institutions, amongst others, and thus it may differ across economies. The term $\theta ln A_0$ is the time-invariant individual effect reflecting the economy's specific effects and v_{it} is the error term that varies across countries and time periods. Estimating Eq. (1) by panel data techniques is the way to control for the individual effects.

In our analysis, several alternative proxies for external trade are considered. We distinguish two kinds of external trade flows according to the trading partners involved: trade with the EU countries, labelled intra-trade and trade outside the EU area, labelled extra-trade. Given this distinction, we consider the degree of openness (ratio of external trade to GDP) and the trade balance as percentage of GDP, in both situations — intra and extra-EU. Additionally, the *intra-*, *extra-*, and *total-exports* ratio (as percentages of GDP) are used as conditioning factors of regional growth in

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[3] An exception is the study by Antunes and Soukiazis (2009), where the balance-of-payments constraint hypothesis and the degree of openness are considered as conditioning factors to explain the convergence process between the early EU countries.

[4] The convergence equation has been adapted to include trade.