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Competitiveness of Portuguese Regions: A Comparative Analysis

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**COMPETITIVENESS OF PORTUGUESE REGIONS:
A COMPARATIVE ANALYSIS**

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ABSTRACT

Considering the importance of national competitiveness to economic development and social progress, it is also fundamental to follow how it evolved in regional terms. The present study undertakes this issue using as reference a group of national competitiveness indicators and applies them at the Portuguese regional level. The objective is to verify the subjacent clusters that derived from the group of indicators and the differentiation of the principal factors of the groups found. The results reflect the existence of three regional groups, determined in function of the considered indicators. The first group constituted by the North Region, Center and Alentejo and Azores; the second group encompasses the Algarve and Madeira, and a third region that emerges solidly correspondent to that of Lisboa and Tejo Valley.

1. INTRODUCTION

Within the European Union a cross-border imbalance exists and the relevance of this issue for a successful socio-economic integration has been widely pointed out by the literature. The convergence in gross domestic product levels across the European Union regions registered up to the 1970s, slowed down in the 1980s and started to reverse in the early 1990s.

With enlargement, regional diversity in the European Union will increase, however the objectives settled initially remain the same: become the most competitive and dynamic knowledge-based economy in the world, capable of sustainable economic growth with more and better jobs and greater social cohesion (Lisbon 2000) and decoupling environmental degradation and resource consumption from economic and social development (Gothenburg 2001).

Based on this idea a set of goals was established for 2007-2013 and presented at the Third Report on economic and social cohesion (2004): convergence and competitiveness; competitiveness and employment and cooperation of regions.

The first objective of convergence and competitiveness relies on five aspects:

- Modernisation of the productive tissue
- Infrastructure
- Human resources and social integration
- Rural development
- Modernisation of administration and institutional capacities

However and according to one of the last European Union reports, about regional policy and sustainable development, most Portuguese regions (the only exceptions were Lisbon and Algarve) were presented as having less than 75% of average European Union gross domestic product and characterized for being predominantly agricultural, showing low economic growth, having limited technological activity and low unemployment.

The awareness of this phenomenon leads us to this research that tries to provide further insights into the convergence/divergence processes within portuguese regions. The paper is organized as follows. The next section includes a literature review about competitiveness and convergence. Section 3 explains the methodology used in this study. Section 4 includes the data treatment and the estimation results. The discussion and conclusions are presented at section 5.

2. COMPETITIVENESS AND CONVERGENCE

The competition of countries and businesses is part of regional competition. In the context of globalisation and of the opening of economies, there has been an increase in territorial disparities leading to more discussion about competitiveness. Regions/territories, not just businesses, are increasingly in competition with each other everyday. They have to know how to explore their competitive advantages and production efficiency, as well as maximize their valuable potentials, in order to survive.

Porter (1990,1998), Organisation for Economic Co-operation and Development (1996b, 1997c, 1997d), Teece (ed) (1987), European Communities Commission (1993), Jacquemin and Pench (eds) (1997), Centre d'etudes Prospectives et d'Informations Internationales and the European Observatory Leader (2001) are main contributors to competition analysis. In Portugal, the studies emphasized are Porter (1994), Rodrigues (1994), Mateus et al (1995, 2000), Competitiveness Forum (1995), Freire (1995), Lopes (2001), Department of Regional Development (2000) and the recent study of the Portuguese Investment Agency (2003): the Competitiveness Magna Cart.

Given the above facts, the objective of this study is to amplify the study by Mateus et al (2000) about the pyramid of territorial competition of the Autonomous Regions of the Azores and Madeira. Thus, we will begin by giving a brief review of the pyramid model of territorial competition, followed by a generic analysis of the Regions and a post evaluation of regional competition emphasizing the Autonomous Regions.

For authors such as Mateus, Madruga and Rodrigues (2000), Lopes (2001) and the Organisation for Economic Co-operation and Development (1996) amongst others, territorial competition is understood to be the capacity, given the territory (nation or region), to produce goods and services that satisfy the necessities of international markets, guarantees the economic conditions of sustained development and simultaneously offers employment and quality of life to its inhabitants.

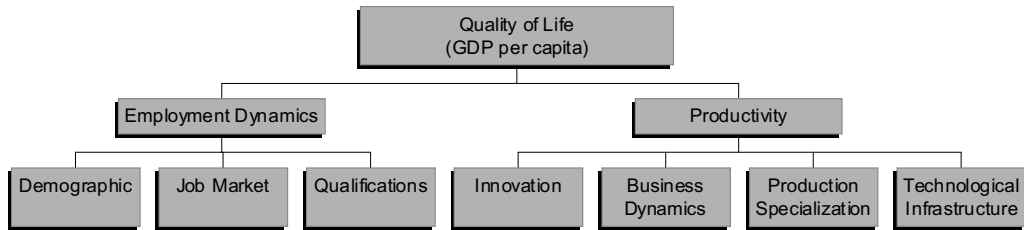
Competitiveness is often seen as a key indicator of success. However, if this concept as applied to businesses is relatively simple, as applied to regions/territories it is much more difficult to define and especially to measure. It is clear that a predominantly agricultural region cannot directly compete with an industrial region, posing the problem of measuring its relative competitiveness.

A region is competitive when facing international and national competitiveness, it has the capacity to generate capital, with productive efficiency and efficacy, to attract and retain technical staff, young population and investment, to create jobs and offer its population a high quality of life, respecting the environment and scenery, the historic, cultural and natural assets.

According to various authors (Mateus et al, 2000, Lopes, 2001) territorial competitiveness is considered as a territory's capability to create employment and quality of life for its inhabitants, while simultaneously guarantying sustained development and the fulfilment of international markets.

Regarding territorial competitiveness, the reports by Department of Regional Development (2000) and Mateus et al (2000) evidence that this can be analysed by competitiveness results perspective (1st and 2nd hierarchical level of the pyramid) and a conditions view (3rd level of the pyramid), as shown in figure 1. Effectively, there are several factors that impact the competitiveness results of a region, in which the relationships between these factors can be illustrated by the *pyramid of competitiveness* (Department of Regional Development, 2000, p. 38).

Figure 1: The Pyramid of Territorial Competitiveness



Source: Adapted from Department of Regional Development (2000) and Mateus et al (2000)

According to the results perspective, the quality of life of the regions can be measured through the gross domestic product per capita. Simultaneously, this indicator depends upon the human resources utilization rate and productivity. The first reflects the relation of employment index to population and the second the gross added value over employment (estimated indicator of work productivity).

A region is considered competitive when productivity and employment simultaneously increase. Regarding productivity, employment and quality of life are interdependent. A high level of productivity allows for the improvement of the quality of life. Also, if this level is reached without sacrificing the employment volume through efficiency and if there exists the capability to maintain human resources usage at a satisfactory level, there will also be direct ramifications on the level of quality of life.

Regardless, either productivity or the human resources utilization rate is associated to certain factors that altogether determine the region’s competitive advantages. Equally, under the conditions optic, competitiveness is explained by factors related to structure. Specially, it involves local particularities that can either be natural or developed, such as the adaptation of factors (quality and quantity), the use of economies of scale, technological capacity, or simply the innovative capacity. The development of each region depends upon not only the availability of resources (territory, capital and employment) but also upon the way it organizes, combines and maximizes the existing conditions to generate externalities and increase the quality and quantity of strategic resources.

Under the *Pyramid of Territorial Competitiveness* the base is set on factors that allow achieving the necessary conditions so that the region obtains long-term competitive advantages. As Mateus et al (2000) explains, this base was created keeping in mind the notions of group efficiency and articulates the demographic dynamics, the job market, and the qualifications of innovation based on available infrastructures, a particular requirement and the business dynamics.

Demographics restrict a region's structural development and can be analysed through the youth index. Such index provides indications about the age structure of the population. The younger population represents a segment of the population that has a greater potential of being active and with a greater innovative capability and to adapt to innovations.

As far as employment dynamics it shows if there is an adjustment between supply and demand of employment, given that an improvement in quality of life is not sustained by long-term unemployment.

Qualification is also important so that territories can become more innovative and competitive, since the greater the level of education the greater is the capacity to come up with creative solutions. People with greater levels of education are more open to innovation. Innovation is without a doubt a key factor when competing.

Also, business dynamics restricts a region's competitiveness since it requires a tight, innovative and open business environment. Production specialization, in some industries, can be an advantage or a restriction so that the region is more or less competitive. Clearly, the region benefits from an adequate infrastructure so that it becomes more attractive in terms of new business and entry-level positions.

3. METHODOLOGY

With these observations in mind, it is our goal to analyse if Portugal's integration into the E.U results in the following: competitive advantage for the mainland and convergence of Autonomous Region of the Azores and Madeira.

Therefore, a set of three indicators is considered: the first links competition with the relative increase of gross domestic product and gross domestic product per capita, the second links competition with the relative increase of work productivity, and the third relates it to foreign markets penetration. These variables will be studied from 1988-2000. The main source of data is the National and Regional Accounts and the Chronological Series, from the National Institute of Statistics.

INDICATOR 1: Comparable growth of the gross domestic product and the gross domestic product per capita

The growth of the gross domestic product and the gross domestic product per capita, make up a reasonable indicator of the competitiveness of the region. Actually, in the various competitiveness reports (World Economic Forum, Organisation for Economic Co-operation and Development, World Bank, Portuguese Investment Agency), this variable assumes a predominant place, which is also important for the evaluation of convergence of the Azores and Madeira.

1) Using Portugal as reference, the objectives were to:

Compare the growth of the region's gross domestic product with the national average

Let:

τ_{r0} and τ_{rt} the region's gross domestic product in the years 0 and t, accordingly

τ_{n0} and τ_{nt} the country's gross domestic product in the years 0 and t, accordingly

$$\alpha = \frac{\tau_{rt}}{\tau_{r0}} \bigg/ \frac{\tau_{nt}}{\tau_{n0}}$$

if $\alpha > 1$ the result is an increase in the regional competitiveness in comparison with the national total

if $\alpha < 1$ the result is a loss of regional competitiveness in comparison with the national total

if $\alpha = 1$ the result is that the regional competitiveness in comparison with the national total remains unchanged

Comparison of the growth of the gross domestic product per capita with the national average

Let:

ρr_0 and ρr_t be the value of the region's gross domestic product (the weight of the regional gross domestic product in the country) per capita in the years of 0 and t, accordingly

ρn_0 and ρn_t be the value of the countries gross domestic product per capita in the years 0 and t, accordingly

$$\varphi = \frac{\rho r_t}{\rho r_0} \bigg/ \frac{\rho n_t}{\rho n_0}$$

if $\varphi > 1$ the result is an increase in the regional competitiveness in comparison with the national total

if $\varphi < 1$ the result is a loss of regional competitiveness in comparison with the national total

if $\varphi = 1$ the result is that the regional competitiveness in comparison with the national total remains unchanged

INDICATOR 2: Comparable growth of work productivity

This second indicator, productivity is considered to be fundamental in order to determine regional competitiveness. According to Porter (1990), Krugman (1994), amongst others, competitiveness depends mainly of productivity. The goal, thus, is to compare the growth of the regional productivity with the national average.

2) Using Portugal as reference, the objectives were to:

Compare the growth of the region's productivity with the national average

Let :

πr_0 and πr_t the region's average productivity in the years 0 and t, accordingly

πn_0 and πn_t the country's average productivity in the years 0 and t, accordingly

$$\chi = \frac{\frac{\pi r_t}{\pi r_0}}{\frac{\pi n_t}{\pi n_0}}$$

if $\chi > 1$ the result is an increase in the regional competitiveness in comparison with the national total

if $\chi < 1$ the result is a loss of regional competitiveness in comparison with the national total

if $\chi = 1$ the result is that the regional competitiveness in comparison with the national total remains unchanged

The objective in using as reference each sector was to:

Compare the regional sector's productivity with the national average of the same sector

Let:

πir_0 be the region's average productivity in the year 0 and in sector i

πir_t be the region's average productivity in the year t and in sector i

πin_0 be the country's average productivity in the year 0 and in sector i

πin_t be the country's average productivity in the year t and in sector I

$$\xi_i = \frac{\frac{\pi ir_t}{\pi ir_0}}{\frac{\pi in_t}{\pi in_0}}$$

if $\xi_i > 1$ then the region's sector gains competitiveness in comparison with the national average in the same sector

if $\xi_i < 1$ then the region's sector loses competitiveness in comparison with the national average in the same sector

if $\xi_i = 1$ then the region's sector competitiveness in comparison with the national average in the same sector, remains the same

Observing the results of the Indicator 2, we can conclude that Azores, from 1988 to 2000, does not have productivity gains. Contrarily, in Madeira, there were competitiveness gains also in terms of productivity in comparison with the national average.

INDICATOR 3: Comparison of the entry of foreign markets

Exports allow the evaluation of competitiveness gains for the region. As globalisation increases and frontiers disappear, an increase on exports regarding production shows the region's capacity to penetrate foreign markets. This can be seen in various reports that use this indicator to evaluate regional competitiveness, such as World Economic Forum, Organisation for Economic Co-operation and Development and the World Bank.

Using the country as reference, the goal was to:

Compare the entry in exports' foreign markets of the region, in terms of gross domestic product, with the national average

Considering:

$Er_0/Yr_0 = er_0$ (Er_0 - Exports; Yr_0 - Gross Domestic Product; for the region and year 0)

$Ert/Yrt = ert$ (Ert - Exports; Yrt - Gross Domestic Product; for the region and year t)

$En_0/YN_0 = en_0$ (En_0 - Exports; YN_0 - Gross Domestic Product, for the country and year 0)

$Ent/Ynt = ent$ (Ent - Exports; Ynt - Gross Domestic Product, for the country and year t)

$$\mu = \frac{\frac{er_t}{er_0}}{\frac{en_t}{en_0}}$$

if $\mu > 0$ then the region gained competitiveness in comparison with the national average
if $\mu < 0$ then the region lost competitiveness in comparison with the national average
if $\mu = 0$ then the region's competitiveness in comparison with the national average, remained unchanged

4. DATA TREATMENT AND RESULTS

Figure 2: The Analysis Model

| FACTOR | INDICATOR |
|------------------------------|---|
| Demographic | Youth Index |
| Job Market | Employment Rate, Compensation |
| Qualifications | Qualifications Index, Work Productivity |
| Innovation | R&D Expenses <i>per capita</i> , Business Weight and R&D |
| Business Dynamics | New Businesses Rate |
| Production Specialization | Level of Production Transformation; Exports/Gross Added Value |
| Technological Infrastructure | Computer Access, Internet Connection |

Table 1: Comparison of the growth of GDP

| | Population Growth Rate 1991-2001 | Gross domestic product's Comparable Growth | | | | Gross domestic product's per capita Comparable Growth | | | |
|----------|-------------------------------------|--|---------|-----------|-----------|---|---------|-----------|-----------|
| | | 1988-90 | 1991-95 | 1996-2000 | 1988-2000 | 1988-90 | 1991-95 | 1996-2000 | 1988-2000 |
| Portugal | 5,0 | - | - | - | - | - | - | - | - |
| Azores | 1,7 | 1,02 | 1,03 | 0,99 | 1,06 | 1,04 | 1,03 | 1,00 | 1,12 |
| Madeira | -3,3 | 1,02 | 1,30 | 1,09 | 1,61 | 1,02 | 1,33 | 1,11 | 1,74 |

The analysis of the results of Indicator 1 shows that from 1988 to 2000, there was an increase of competitiveness relative to the national average in terms of the gross domestic product and gross domestic product per capita in both, Azores and Madeira. However, in the second half of the 90's, the Azores shows a decline in its competitiveness relative to the country's average, since the unitary gross domestic product remained unchanged. Regardless, it is important to remember that this last indicator was strongly influenced by the population growth rate that from 1997-2001, that was lower than the national average (according to the 2001 Census).

Table 2: Comparison of foreign markets entry

| | Comparison between exports growth in gross domestic product terms and the national average | | |
|---------|--|-----------|-----------|
| | 1993-95 | 1996-2000 | 1993-2000 |
| Azores | 1,05 | 0,68 | 0,71 |
| Madeira | 0,62 | 0,56 | 0,35 |

In considering the entry in foreign markets (Indicator 3) it can be seen that the Azores as well as Madeira, lost competitiveness with regards to exports per unit produced (gross domestic product), in comparison with the national average.

Table 3: Comparison of productivity's growth with the national average

| | Productivity's Comparable Growth | | | | Employment Growth Rate |
|----------|----------------------------------|---------|-----------|-----------|------------------------|
| | 1988-90 | 1991-95 | 1996-2000 | 1988-2000 | 1988-2000 (%) |
| Portugal | | | | | 12,5 |
| Azores | 1,03 | 0,90 | 0,97 | 0,89 | 34,3 |
| Madeira | 1,02 | 1,09 | 1,19 | 1,37 | 31,5 |

Table 4: Comparison of the sector productivity's growth

| | Comparison of the regional sector productivity's growth with the national average of same sector | | | Comparison of productivity's growth with the sectors' average | | |
|----------|--|------|------|---|------|------|
| | SI | SII | SIII | SI | SII | SIII |
| Portugal | | | | 0,17 | 1,10 | 1,73 |
| Azores | 1,09 | 1,03 | 0,99 | 0,36 | 1,00 | 1,64 |
| Madeira | 1,26 | 1,29 | 1,11 | 0,20 | 1,06 | 1,74 |

The productivity index of Azores and Madeira in the last decade shows a difference tendency. Azores index tends to diverge compared with the national average and Madeira's situation surpassed the national average. This way, the process of convergence of the quality of life does not reflect a convergence of the productivity levels of Azores. The question is whether this fact is due to the intensity of the use of human resources.

Considering this overview and the methodology exposed, we can proceed to the analysis of the model propose. In the following table we can see the relationships between the various variables of the model. We highlight the correlation between the gross domestic product *per capita* and productivity, compensation, R&D expenses and the initiative rate. There are also significant relationships between R&D expenses, computer access and Internet connection.

Table 6: Clusters of National Regions

| Cluster Identification Subjacent Variables | 1 North, Center Alentejo and Azores (n=4) | 2 Algarve and Madeira (n=2) | 3 Lisboa and Taugus Valley (n=1) | F | Sig. |
|---|--|--------------------------------------|---|-------|-------|
| GDP per capita | 8,99 | 12,17 | 14,99 | 29,42 | 0,004 |
| Productivity | 17,02 | 21,97 | 25,40 | 22,82 | 0,006 |
| % of GDP investment | 0,26 | 0,29 | 0,26 | 0,19 | 0,837 |
| Employment Rate | 14,22 | 14,94 | 18,05 | 7,41 | 0,045 |
| Youth index | 1,07 | 0,83 | 0,91 | 0,13 | 0,885 |
| Net employment creation rate | 0,27 | 0,17 | 0,12 | 0,19 | 0,836 |
| Qualifications Index | 0,11 | 0,11 | 0,12 | 2,45 | 0,202 |
| Weight of R&D in the businesses | 0,15 | 0,15 | 0,23 | 0,20 | 0,825 |
| R&D expenses | 0,75 | 0,50 | 4,00 | 5,91 | 0,064 |
| Level of production transformation | 0,86 | 0,86 | 0,86 | 0,19 | 0,831 |
| Initiative rate | 0,26 | 0,46 | 0,37 | 5,94 | 0,063 |
| Exports without GVA | 0,24 | 0,01 | 0,22 | 1,85 | 0,270 |
| Computer access | 0,21 | 0,14 | 0,30 | 15,95 | 0,012 |
| Internet connection | 0,12 | 0,10 | 0,17 | 3,53 | 0,131 |

A discriminate analysis was done in order to observe the capacity of the considered variables to distinguish between the clusters identified. In applying this technique, two discriminate functions were extracted. The first function alone practically explains 97.8% of the variance and has a significance level of 1% when the Lambda de Wilks test was applied. The second function is less significant explaining 2.1% of the variance and with a significance level of 5%.

Table 7: Discriminante Analysis

| Function | Coefficients | % of Variance | % Cumulative | Canonical Correlation |
|----------|--------------|---------------|--------------|--------------------------|
| 1 | 57.144 | 97.860 | 97.860 | 0.991 |
| 2 | 1.250 | 2.140 | 100.000 | 0.745 |

Table 8: Wilks Test

| Test of Functions | Lambda of Wilks | Qui-square | df | Sig. |
|----------------------|-----------------|------------|----|--------|
| 1 a 2 | 0.01 | 12.18 | 8 | 0.0014 |
| 2 | 0.44 | 2.03 | 3 | 0.0567 |

In observing the structure matrix, table 8, we verify that the variable that contributes the most to the functions found, are R&D expenses and computer access, which shows significant correlation with the first discriminate function. The level of production transformation and the youth index are within the second discriminate function. This second function does not significantly explain the variance; therefore it assumes a less relevant role.

Table 9: Structure Matrix

| | Function 1 | Function 2 |
|--|------------|------------|
| R&D expenses | 0.614 * | 0.526 |
| Computer access | 0.439 * | 0.156 |
| Production transformation level | 0.440 | 0.783 * |
| Youth index | 0.022 | 0.762 * |
| Productivity | 0.511 | -0.691 * |
| Exports GVA | -0.057 | -0.362 * |
| Net employment creation rate | -0.019 | 0.303 * |
| Qualifications index | 0.031 | 0.191 * |
| * Larger correlation between each variable and the discriminate function | | |

5. DISCUSSION AND CONCLUSIONS

In this analysis, the conclusion is that there was an increase in competitiveness relative to the national average in terms of the gross domestic product per capita, in Madeira and Azores. However, in the second half of the 90's, the Azores fell behind in its competitiveness compared with the national average.

Azores from 1988 to 2000 did not have productivity competitiveness gains in comparison with the national average. Although, employment as increased compared with the national average. As such, the productivity index of Azores and Madeira in the last decade shows a tendency to diverge in the AR of the Azores compared with the national average and an improvement in AR of Madeira's situation that surpassed the national average.

In considering the entry in foreign markets it can be seen that the Azores as well as Madeira, lost competitiveness with regards to exports per unit produced (gross domestic product), in comparison with the national average.

In general terms, there was a positive evolution of economic competitiveness in the Azores and Madeira, during the period being analysed. However, the evolution of competitiveness in Madeira clearly exceeds the Azores, since Madeira evolved to levels above the national average, while the Azores are at about 80% of the national average.

It should be mentioned, however, that the population dynamics in the Azores is significant because it has been growing while in Madeira it declined. This affects the analysis of the product because of the per capita component.

It is also important to include the big differences between the Azores and Madeira in structural terms, including the number of islands in each region, nine in the Azores and two inhabited islands in Madeira, and the large dispersion of the islands in the case of the Azores.

In global terms, the use of the analysis model allows us to identify that there are three regional groups: the first group, made up of the regions North, Center, Alentejo and Azores; the second, includes the regions of Algarve and Madeira, and the third group, made up of Lisbon and Tejo Valley.

In analysing the variables included in the model that define the clusters, we can see that the variables with greater significance regarding group differentiation, are gross domestic product per capita, productivity, R&D expenses and computer access. Factors such as the initiative rate, the level of production transformation and the export weight over the gross value added, do not present significant differences in the defined regional clusters. On the other hand, the qualifications index and the youth index do not illustrate significant statistical differences.

The results of the discriminate analysis complement these conclusions, since these results show that the most significant contribution to the explanation of the variance was R&D expenses and computer access.

Such situation shows that of all of the factors normally indicated as the basis for national competitiveness, once applied to continental and insular regions, the most significant variables are work productivity and considered technologic factors.

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