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Conference Paper

Patterns of Fluctuation of Employment in the European Union: National Cycles and Effects of Tertiarization

43rd Congress of the European Regional Science Association: "Peripheries, Centres, and Spatial Development in the New Europe", 27th - 30th August 2003, Jyväskylä, Finland

Provided in Cooperation with:

European Regional Science Association (ERSA)

Suggested Citation: Cuadrado-Roura, Juan R.; Iglesias, Carlos; Llorente, Raquel; Barriopedro, Estela (2003) : Patterns of Fluctuation of Employment in the European Union: National Cycles and Effects of Tertiarization, 43rd Congress of the European Regional Science Association: "Peripheries, Centres, and Spatial Development in the New Europe", 27th - 30th August 2003, Jyväskylä, Finland, European Regional Science Association (ERSA), Louvain-la-Neuve

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PATTERNS OF FLUCTUATION OF EMPLOYMENT IN THE EUROPEAN UNION: NATIONAL CYCLES AND EFFECTS OF TERTIARIZATIONⁱ

Juan R. Cuadrado-Roura(1), Carlos Iglesias-Fernández(2) y Raquel Llorente-Heras(3)

SUMMARY:

In the context of the building a single European labour market and this article has two objectives. On the one hand, to check if the labour European cycles are or not different by countries, in such a way that integration does not result significantly in a progressive assimilation of the functioning of the different labour markets. On the other hand, the paper aims to test the hypothesis that a greater presence of employment in the service industry has important consequences on the fluctuation of employment at national level. For this, the article firstly analyses which are the relationships between cyclical patterns of employment in the different member countries and in those of the European Union (EU) as a whole. Secondly, it studies the cyclical characteristics of the labour market in the service industry in the EU countries. Finally, the paper analyses the effects derived from tertiarization on national cyclical patterns in employment. The results show the existence of a high heterogeneity in the cyclical behaviour of the labour market in European countries and that the services play a cushioning role, softening the total employment cycle.

Key words: cycle, trend, employment, tertiarization, European Union, economic integration.

Clasificacion JEL: E3, J20, L80

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1. Introduction and approach.

In our opinion, there are two particularly relevant facts which have occurred in Europe from the economic point of view. First, and undoubtedly, the integration process carried out. Secondly, the intense, and in some cases, accelerated processes of tertiarization of the economies that form the EU-15.

After the signing of the Treaty of Rome in 1957 and the constitution of the European Economic Community in 1958, a large part of the European history has been consolidated in the construction of a single economic space, through which a notable degree of integration among the different European countries and regions has been reached. The customs union was completed in 1968, constituting an interior space of free trade of products and full mobility of productive factors. Successive phases of this evolution have led Europe to the constitution of an economic monetary union, with free circulation of products and factors, coordination of policies and a common currency.

On the basis of the afore-mentioned facts, it can be affirmed that Europe has been constituted in a potentially unique economic space, an affirmation which is however notably clearer in the case of markets of products and capital than in the labour market. The speed with which integration has advanced has been much more intense in the market of products and of capital than in the labour markets. The degree of commercial interconnection of the member countries has not stopped to increase since 1960, reaching very high levels at the present moment. The commercial interchanges intra-EU were 35% of the GDP in the year 2001 and direct investment among countries has reached nearly 15% of the GDP, having produced a notable convergence among the different member countries in terms of price levels. On the contrary, the level of interpenetration in the different national labour markets (so much percent of population employed proceeding from other member countries with respect to the total of the employed population in each country) is still very reduced, consequence of a really moderate labour mobility among countries. Not more than 2% of the work force of the member states finds itself outside its country of origin.

However, and in accordance with the most habitual theoretic models (Heckscher and Ohlin; Samuelson; Mundell), there are various mechanisms through which economic integration can exercise its effects on labour markets:

- a) On the one hand, labour integration can be reached by means of interconnection of labour markets. The existence of wages differentials among countries or of levels of unemployment induces processes of labour mobility which lead to an elimination of the differences and to the efficient assignation of the labour factor.
- b) This result can also be derived from the integration of the markets of products. In the measure that, as a consequence of free trade, countries specialise in the production of those goods in which they have a comparative advantage, the integration of the markets of products will also affect the relative demand of factors and therefore, the prices. The main consequence will be the convergence of the price of the factors among the countries implicated.

- c) In a similar way, labour integration can also affect the conditions of the markets of products, favouring the convergence of prices through the modification of the availability of factors.
- d) As far as economic integration facilitates the mobility of capital not only through the construction of a common financial market but also through the stimulation of direct investment, these can also be interpreted as processes of labour mobility among countries, incrementing the demand for work in the receiving countries (with low salaries) and therefore reducing that of the states of origin (with higher salary costs). The convergence of salaries would then be produced, not by the compensatory movements of supply, but by the displacements induced in the labour demand.

In this way, integration in the markets of products and factors can be considered as two alternatives to obtain similar effects. In spite of the existence of a limited degree of labour mobility, the labour markets of the European countries can reflect, to a certain degree, the real effects of integration through the consequences induced by the free trade of products. Even when direct integration of European labour markets is still far from being reached, certain advances can have been produced through the ways described.

On the other hand, there is no doubt that one of the most relevant structural changes to occur in the generality of market economies is the intense tertiarization of its labour markets (Cuadrado *et al*, 1999) (OCDE,2000) (European Commission, 2001).The expansion of employment in the service industries have a marked intensity in the EU, which has propitiated a certain convergence in the sectorial structures of the different European countries (see annex, figure a.1). The relevance of tertiarization in the explanation of the behaviour of labour markets has also been object of certain analysis from different perspectives. Tertiarization is shown as an important factor in explaining the more relevant transformations occurred in the characteristics of employment and in the requirements of labour qualifications (Cuadrado-Roura, Iglesias-Fernández and Llorente-Heras,2003). The presence of the service industry also explains to a great extent, the results (creation of jobs) and the functioning (degree of flexibility) of the labour market (Cuadrado-Roura. Iglesias-Fernández and Llorente –Heras, 2002), constituting a factor of prime importance in the explanation of the changes in the cyclical patterns of employment (Cuadrado-Roura and Ortiz,2001).

Certainly, the previous arguments justify dealing with the analysis of the EU as an economic unit, configured by markets of products, capital and work potentially interconnected by way of trade and factor mobility s. In this context, the aim of this paper is to analyse the patterns of cyclical fluctuation of work in the EU. This decision responds to two motivations. On the one hand, the interest derived from the investigation of economic fluctuations within modern economic analysis. On the other hand, because it allows us to study in depth, the characteristics of the processes of integration carried out in the European labour markets, in as much as the patterns of cyclical fluctuation constitute a good indicator of the global functioning of an economic system. With respect to this point, our objective is to analyse two of the most important characteristics in the patterns of cyclical fluctuation of employment in Europe: national diversity, on the one hand, and the processes of sectorial change i.e. tertiarisation, on the other, the underlying hypothesis of this paper is that the cycle of employment in the EU will be the first result of the different degrees of integration reached by the different

member countries, and after the conditioning effects introduced by the sectorial differences (presence of services) on this relation.

In this way, Rismann (1999) conclude a high integration between the United State (U.S) regions presenting similar employment cycles. Additionally he states also that the differences in sectorial structure are an important factor to determinate the total employment growth. So, the comparison between the U.S. and the EU situation constitutes an additional incentive to this paper.

We have tried to include in this paper some analysis on the European regions, however the lack of data and the first results obtained from the analysis of the European countries carried us to limit the estimations only to the fifteen EU countries. The heterogeneity, detected in our earliest analysis is obvious utilizing this approach. So, the regional perspective would contribute to obtain the same results with an unnecessary complexity.

The paper is organized in the following way. First, the cycles of total employment are described and analyzed EU as a group and for each one of its members (section 2). The objective is to check the extent to which the very different national realities underlie the patterns of employment in Europe. In section 3, a series of analyses are developed that try, first, to knowing the relation that links tertiary employment with the cycles of total employment obtained in the previous section and, secondly, if national heterogeneity is also a basic characteristic for defining the EU from this perspective. Later, in section 4, a series of econometric models on the evolution of total employment and tertiary employment are developed, with the aim of verifying more strictly the results obtained in the previous sections. The paper ends with a synthesis of the main results obtained.

The data used from 1993 to 2002 are provided by Eurostat. For the labour market, the quarterly statistics on Population and Social Conditions have been used and for the GDP series statistics on Economy and Finance based on National quarterly accounts.

2. Patterns of cyclical fluctuation in employment in the EU: differences for countries.

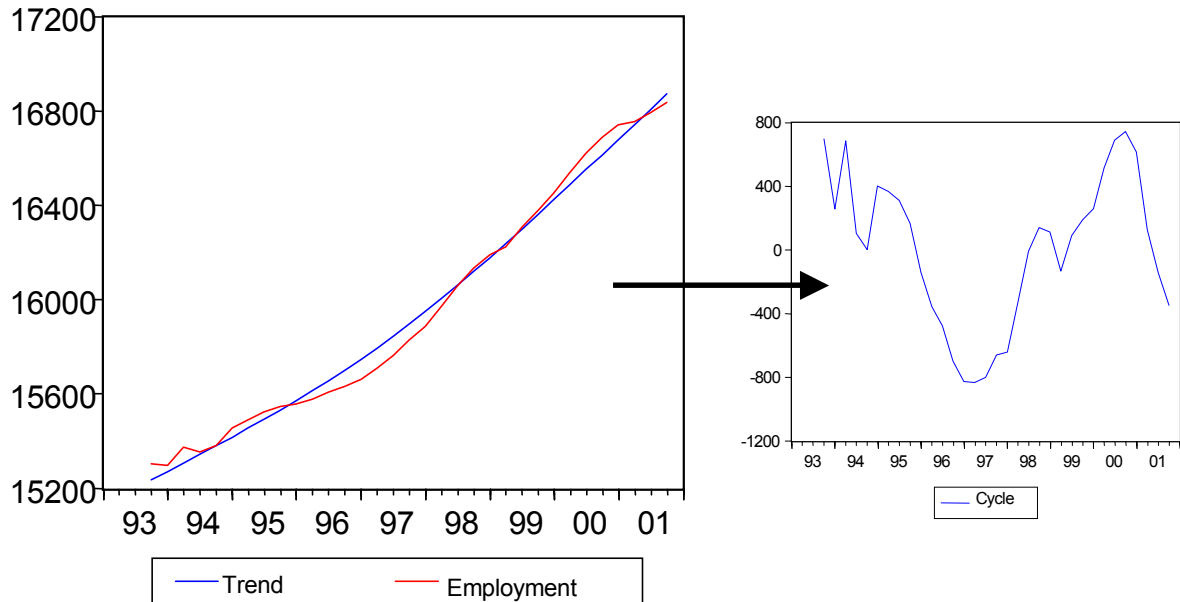
The first task to be dealt with is to know the patterns that define the cyclical behaviour of employment both in the EU as a whole and in the countries which form it. For this, and in accordance with the usual methodology (Hodrick and Prescott 1997), the cyclical and trend componentsⁱⁱ have been extracted using the original series.

2.1. Stylised facts.

Figure 1 shows the evolution of employment in Europe, differentiating between the trend and cyclical components. It can be seen that from the beginnings of the 90s, total employment in Europe has had a marked growth tendency. Since the second quarter of 1994, the number of employed in the EU has continued to increase, reaching a growth rate for the group over this period of nearly 9%. The employment cycle appears to be rather unstable throughout the period analysed (1993-2002). In this sense, from the beginnings of the 90s until 1996, it can be observed how European employment went through a recessive phase, although this was not a crisis in the strict sense, as employment did not cease to grow. From 1996 to the middle of 2000 there was an

expansive phase and from then on until the present moment it appears that a new recessive phase of notable intensity is being produced.

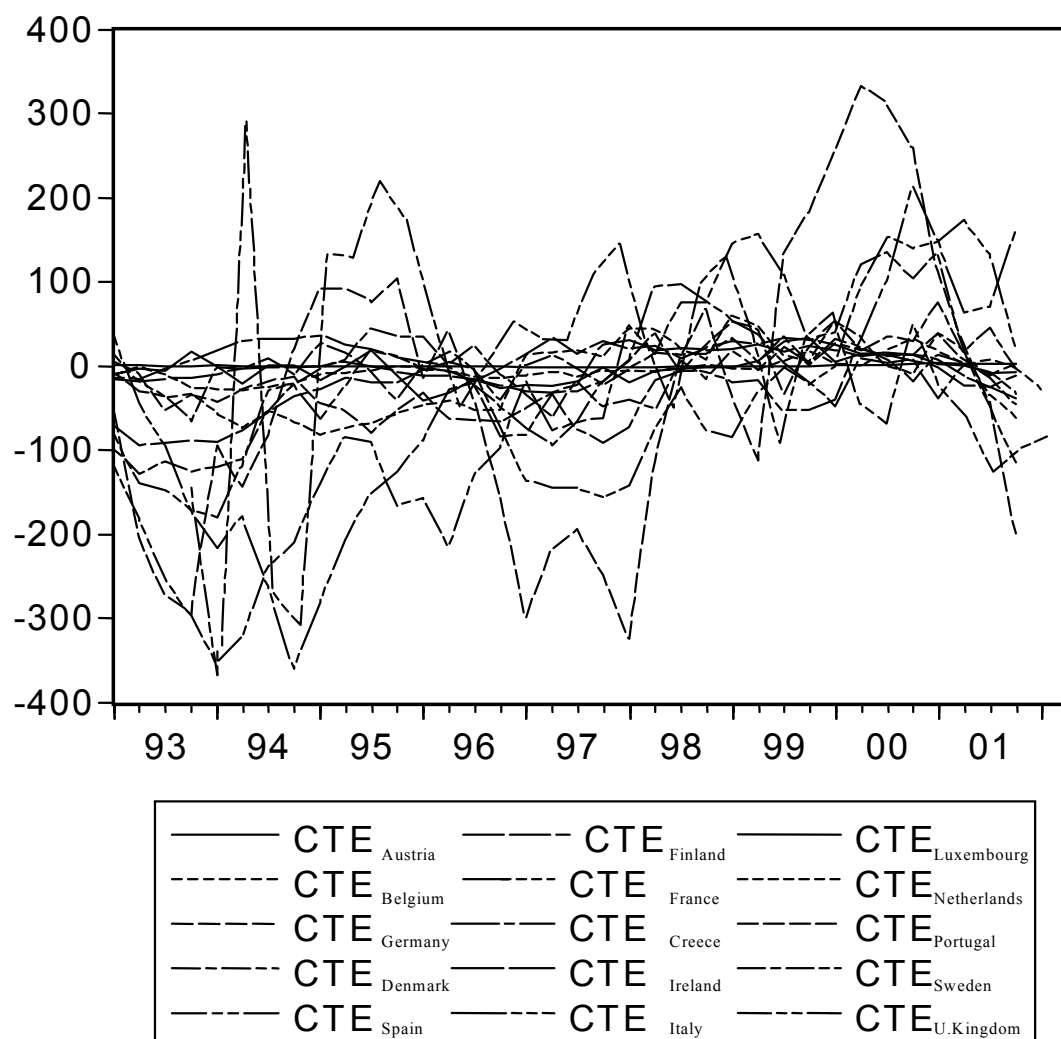
Figure 1. Evolution, trend and cycle of employment in the EU. Thousands of people.



(Source: Own elaboration from statistic data of Population and social conditions. 1 Quarter 1993 – 1 Quarter 2002. Eurostat)

A similar analysis has been carried out for the different EU countries (Figure 2). It can be seen how the cyclical behaviour of employment in the 15 countries of the EU differs very much from one to another and with respect to the EU as a whole. On the other hand, there are not clear or even similar common patterns. This initial result suggests the use of additional tools for deeper study. For this, measurements of the cyclical component of employment have been developed both for width and for the degree of coherence of synchrony with respect to the general cycle.

Figure 2. Total employment cycle (CET) for countries of the EU.



(Source: Own elaboration from statistical data from Population and Social Conditions. 1 Quarter 1993 – 1 Quarter 2002. Eurostat)

2.2. Extent of cycles

The width of cyclical variations in employment has narrowed through the concept of volatility, and more specifically by that of the calculation of the relative volatilities defined as the relation between the variance of the employment cycle throughout the period and the variance of the European GDP cycle. The latter reflects the general cyclical evolution of the economy, in general. Table 1 shows the results of these estimations. Belgium, France and Austria are the countries whose employment shows a lower cyclical variation in relation to the cycle of economic activity, whilst Finland, Ireland and Sweden present the greatest relative volatility. The volatility by countries is quite wide indicating the co-existence of very different realities in the behavioural cycles of employment. In general, the differences of European countries in two clearly distinct groups should be underlined. On the one hand, those whose cyclical sensitivity to employment is less than that shown for the level of economic activity (Belgium, France Austria, Germany, United Kingdom, Italy, Luxembourg and Netherlands). On the other hand, Portugal, Denmark, Spain, Greece, Sweden, Ireland and Finland have a relatively higher volatility than the unit.

Table 1. Relative volatility of the employment cycle with respect to the GDP cycle.

Countries	Relative Volatility 1T 1993 – 1T 2001	Countries	Relative Volatility 1T 1993 – 1T 2001
Belgium	0,522	Portugal	1,194
France	0,627	Denmark	1,284
Austria	0,642	Spain	1,522
Germany	0,687	Greece	1,687
United Kingdom	0,821	Sweden	1,731
Italy	0,836	Ireland	2,000
Luxembourg	0,836	Finland	2,373
Netherlands	0,881		
Average	1,176		
Volatility of European GDP	0.0067		

(Source: Own elaboration from data of the statistics of Population and Social Conditions and Economy and Finance. 1 Quarter 1993 – 1 Quarter 2002. Eurostat)

Various arguments can explain this behaviourⁱⁱⁱ

- a) The different capacities of adjustment enjoyed by the national labour markets, which would be derived from different institutional frameworks which condition the functioning of their labour markets (through costs of firing and temporary contracts mainly), explain the different sensitivities of employment faced with changes in the level of the activity.
- b) The un-divisibility of labour could prevent the rapid adjustment of employment when faced with shocks in production. The crisis does not translate into a variation of employment in terms of the number of people employed but in the average number of hours worked. This type of behaviour would be directly related, for example, to the presence of part time work in as much as this type of hiring clearly favours the substitution of labour adjustment through firing for another based on the time worked.
- c) The existence of more or less important behaviour of labour hoarding. In accordance with this theory, the labour markets would present a certain degree of rigidity in their capacity to adjust due to the presence of indirect costs (investment in acquisition of human capital of a specific nature) associated to the labour factor which converts it in a quasi- fixed production factor (Oi,1962). When these costs are high, firms are reluctant to fire workers and this leads to a greater stability in the employment cycle in relation to the cycle of economic activity.

A final hypothesis to explain the national differences observed in terms of relative volatility in employment, especially relevant for the objective of this paper, is related to the different sectorial compositions of their employment. The growing concentration of jobs in the service industry, a sector which is traditionally considered less sensitive to economic fluctuations than those of agriculture and industry, can be converted in an

explicative factor for lesser cyclical sensitivity in employment. However, within such a heterogeneous sector as that of services, very different cyclical patterns exist. In addition, some tertiary activities are profoundly modifying their fluctuation patterns, approximating them notably to those of industrial patterns (Cuadrado *et al*, 1999).

In this sense, if we compare the results included in table 1 with data of the relative presence of tertiary employment for countries (figure a.1 of the annex), it can be seen that those countries with a greater presence of employment in services show a lower relative volatility (with the exception of Italy and Austria), and that the opposite occurs in countries of lesser weight of tertiary employment (except in the case of Sweden).

2.3. Coherence or synchrony of cycles.

The degree of coherence or synchrony (co-movements) has been realised by means of correlation coefficients among the variables for different foreseen, coincident and past periods. In this way, a variable is considered pro-cyclical if its fluctuations are in agreement (have the same direction) with the economic cycle. The variable is considered anti-cyclical if the movements of both variables have an opposed character. When there is no relation between either, the variable is anti-cyclical. On the other hand, the different variables can be ahead, coincide or be delayed in their relation with the economic cycle. They would be ahead of the cycle if their variations are produced before the movements of the economic activity. On the contrary, they would be delayed if their movements occur as a result of what has already taken place in the general cycle. Finally, if the variations occur at the same time, we can say that the variables have a coincident character. According to the value of the correlation index the intensity of the cyclical relation can be classified. If the absolute value of the greatest correlation index obtained is found to be between 1 and 0.5, the relation can be classified as *strong*, if it is between 0.5 and 0.2 the relation is *weak* and if the value is between 0.2 and 0, the relation is *anti-cyclical* (non-existence of relation).

Table 2 classifies the co-movements between employment and the variables representative of the general economic evolution, according to this methodology, the GDP (European GDP and the GDP of each country). The number of delayed and advanced variables used has been from 1 to 5 quarters indicating in brackets what the type of existent relation is and the degree of delay or advance i.e. the quarter where a greater synchrony is obtained.

From a theoretical point of view, the relation between GDP and employment should be pro-cyclical. One of the ways of incrementing production before exhausting the scale returns consists in increasing the use of productive factors, especially, employment. Also, the labour demand is not other than a demand derived from the demand of product, which should lead to the observation of co-movements of both variables in the same direction. Our estimation confirms the previous statements (table 2). The co-movements between employment and GDP, both aggregate for the EU and for each country. In relation to the European GDP cycle, the majority of the cycles present general patterns of advance on the cyclical evolution of European GDP. The situation changes in relation with the national GDP of each European country are strongly procyclical. The co-movements are strongly pro-cyclical but with different degrees of delay or advance. It shows that exists a weak relation among cyclical evolution of total employment by country and the cyclical evolution of EU GDP as a whole. European

GDP is an aggregated of the national GDPs, so it hides the differences by countries. To summarise, although the co-movements are those expected, the cyclical responses of employment in each of the EU countries are very different.

Table 2 Cyclical co-movements between employment and the cyclical variables: European GDP and national GDP.

Countries	European GDP		Nacional GDP	
	Type of comovement	Coef.	Type of comovement	Coef.
Austria	Strongly procyclical (Coincident)	0.516	Strongly procyclical (Coincident)	0.670
Belgium	Strongly pro-cyclical (Ahead 2)	0.722	Strongly pro-cyclical (Ahead 2)	0.646
Germany	Strongly procyclical (Ahead 1)	0.757	Strongly procyclical (Coincident)	0.656
Denmark	Strongly procyclical (Delayed 2)	0.578	Weakly procyclical (Ahead 1)	0.472
Spain	Strongly procyclical (Ahead 2)	0.629	Strongly procyclical (Coincident)	0.793
Finland	Strongly procyclical (Delayed 1)	0.523	Strongly procyclical (Ahead 3)	0.863
France	Strongly procyclical (Ahead 2)	0.756	Strongly procyclical (Ahead 1)	0.755
Greece	Weakly procyclical (Delayed 5)	0.413	n.d.	n.d.
Ireland	Strongly procyclical (Delayed 1)	0.515	Strongly procyclical (Ahead 4)	0.685
Italy	Strongly procyclical (Ahead 3)	0.599	Strongly procyclical (Ahead 5)	0.551
Luxembourg	Strongly procyclical (Ahead 2)	0.562	n.d.	n.d.
Netherlands	Weakly procyclical (Ahead 3)	0.464	Strongly procyclical (Ahead 2)	0.648
Portugal	Strongly procyclical (Ahead 3)	0.510	n.d.	n.d.
Sweden	Strongly procyclical (Ahead 1)	0.724	Strongly procyclical (Ahead 2)	0.680
United Kingdom	Strongly anti-cyclical (Ahead 4)	-0.462	Weakly procyclical (Ahead 1)	0.391
EU-15	Strongly procyclical (Ahead 2)	0.790	-	-

Nota: n.d. Not available for lack of data

(Source: Own elaboration from data from the statistics of Population and Social and Economic Conditions and Economy and Finance. 1 Quarter 1993 – 1 Quarter 2002. Eurostat).

To complete the analysis, the co-movements between national employment and European employment have been estimated (table 3). The results obtained are not without interest in as much as they cover all possible situations. Given that the European employment cycle is assimilated with the average cycle, these results indicate how different European countries are from each other. Although in all the member countries employment has grown in similar form, the behavioural cycles have turned out to be very different.

Table 3. Cyclical co-movements between national employment and European employment.

Countries	Type of co-movement	Coef.
Austria	Strongly procyclical (Delayed 2)	0.665
Belgium	Acyclical	0.131
Germany	Strongly procyclical (Ahead 1)	0.643
Denmark	Acyclical	0.119
Spain	Strongly anti-cyclical (Ahead 5)	-0.557
Finland	Strongly anti-cyclical (Coincident)	-0.501
France	Strongly procyclical (Ahead 3)	0.672
Grece	Strongly procyclical (Delayed 1)	0.508
Ireland	Strongly anti-cyclical (Ahead 5)	-0.592
Italy	Weakly anti-cyclical (Delayed 1)	-0.301
Luxembourg	Strongly procyclical (Delayed 1)	0.802
Netherlands	Strongly anti-cyclical (Ahead 4)	-0.659
Portugal	Strongly procyclical (Delayed 5)	0.729
Sweden	Strongly procyclical (Ahead 4)	0.542
United Kingdom	Strongly procyclical (Ahead 5)	-0.512

(Source: Own elaboration from statistics from Population and Social Conditions. 1 Quarter 1993 – 1 Quarter 2002. Eurostat).

3. Tertiariation and its influence in the employment cycles in Europe.

The previous analyses have served to confirm the existence of very different behaviours in the cyclical patterns of employment by community countries. Now, we will find out the part played by the processes of tertiariation.

The differences in terms of sectorial structures of employment are shown as a relevant variable in the analysis of the relation between the general economic cycle and the different cycles of the integrated economies (Koupatissas 2002). As the different countries present different sectorial structures (presence of employment in services), the changes in the general cycle produces different effects (or the same effects but in different intensity) in each case. In this way, the national specifications will be due to the different links with the EU cycles and by the different effects induced by this on the national cycles. These can be explained by the divergences observed in sectorial structures.

Tertiary employment, has undergone continuous growth in latter years in all the EU countries, although to greater extent (table a.2 of the annex). We also know that the different member states present appreciable differences in the size of their tertiary activities. Based on these arguments, it is relevant to analyse the cyclical patterns from the service perspective. For this, first, we must know what is the cyclical behaviour of tertiary employment. Later, we will try to find out the type of effect introduced by the presence of services in the cyclical behaviour of employment in the different countries, first by means of descriptive analysis and then by VAR estimation models.

3.1 Cyclical patterns in tertiary employment.

In order to know the cyclical patterns of employment in service activities, we have first estimated the co-movements between tertiary employment and the principal variables which reflect the general cyclical evolution: the GDP aggregate for the EU group and GDP within each European country (table 4) and then between the cycles of tertiary employment and the total (table 5)

Table 4. Cyclical co-movements between tertiary employment and the economic activity (European and national GDP).

Countries	PIB European		PIB national	
	Type of co-movement	Coef.	Type of co-movement	Coef.
Austria	Strongly procyclical (Delayed 1)	0.520	Weakly procyclical (Ahead 1)	0.451
Belgium	Strongly procyclical (Delayed 1)	0.502	Strongly procyclical (Coincidente)	0.541
Germany	Strongly procyclical (Ahead 4)	0.558	Weakly procyclical (Ahead 4)	0.345
Denmark	Strongly procyclical (Delayed 2)	0.518	Weakly procyclical (Delayed 1)	0.288
Spain	Strongly procyclical (Delayed 2)	0.511	Strongly procyclical (Ahead 4)	0.579
Finland	Weakly procyclical (Ahead 3)	0.343	Strongly procyclical (Delayed 1)	0.602
France	Strongly procyclical (Ahead 3)	0.594	Strongly procyclical (Ahead 3)	0.806
Grece	Débilmente Procíclico (Ahead 1)	0.395	n.d.	
Ireland	Acyclical	0.138	Acyclical	0.158
Italy	Strongly procyclical (Delayed 1)	0.567	Strongly procyclical (Delayed 1)	0.549
Luxembourg	Weakly procyclical (Ahead 5)	0.441	n.d.	
Netherlands	Weakly procyclical (Ahead 5)	0.449	Strongly procyclical (Delayed 2)	0.724
Portugal	Weakly procyclical (Ahead 3)	0.403	n.d.	
Sweden	Strongly procyclical (Ahead 5)	0.555	Strongly procyclical (Ahead 2)	0.595
United Kingdom	Weakly procyclical (Delayed 5)	0.472	Strongly procyclical (Ahead 1)	0.405
EU-15	Strongly procyclical (Ahead 3)	0.592		

(Source: Own elaboration from data from the statistics of Population and Social Conditions and Economy and Finance. 1 Quarter 1993 – 1 Quarter 2002. Eurostat).

According to the economic theory, all the co-movements are pro-cyclical with respect to the evolution of the general economic activity, although the relations in the case are not so strong as in the case of total employment. Again, temporal coincidence does not exist and each country shows advances or delays of different levels. The cycles of tertiary employment are joined to the general cycle under a less intense relation presenting, in addition, a greater degree of heterogeneity in comparison with that observed for total employment.

Table 5. Cyclical Co-movements between tertiary employment and total employment for the countries of the EU.

Countries	Type of co-movement	Coef.
Austria	Strongly procyclical Coincident	0.685
Belgium	Strongly procyclical Coincident	0.761
Germany	Strongly procyclical Ahead 1	0.731
Denmark	Strongly procyclical Coincident	0.521
Spain	Weakly procyclical Coincident	0.423
Finland	Strongly procyclical Ahead 1	0.787
France	Strongly procyclical Coincident	0.668
Grece	Strongly procyclical Coincident	0.922
Ireland	Strongly procyclical Delayed 5	0.633
Italy	Strongly procyclical Ahead 1	0.618
Luxembourg	Strongly procyclical Coincident	0.853
Netherlands	Strongly procyclical Coincident	0.933
Portugal	Strongly procyclical Ahead 5	0.738
Sweden	Strongly procyclical Coincident	0.573
United Kingdom	Strongly procyclical Coincident	0.857

(Source: Own elaboration from data from the statistics of Population and Social Conditions. 1 Quarter 1993 – 1 Quarter 2002. Eurostat).

Table 5 shows the cyclical co-movements between total employment and tertiary employment for each of the countries in the EU. As expressed, all the cycles are procyclical. In this case, there is a greater temporal coincidence. All the correlations are high revealing an intense relation in the cyclical evolution of both variables. The high weight of service employment guarantees a strong influence of its cycle on the evolution of total employment, constituting an important component in its behavioural cycle.

3.2 Tertiariation and cyclical behaviour of total employment: first signs.

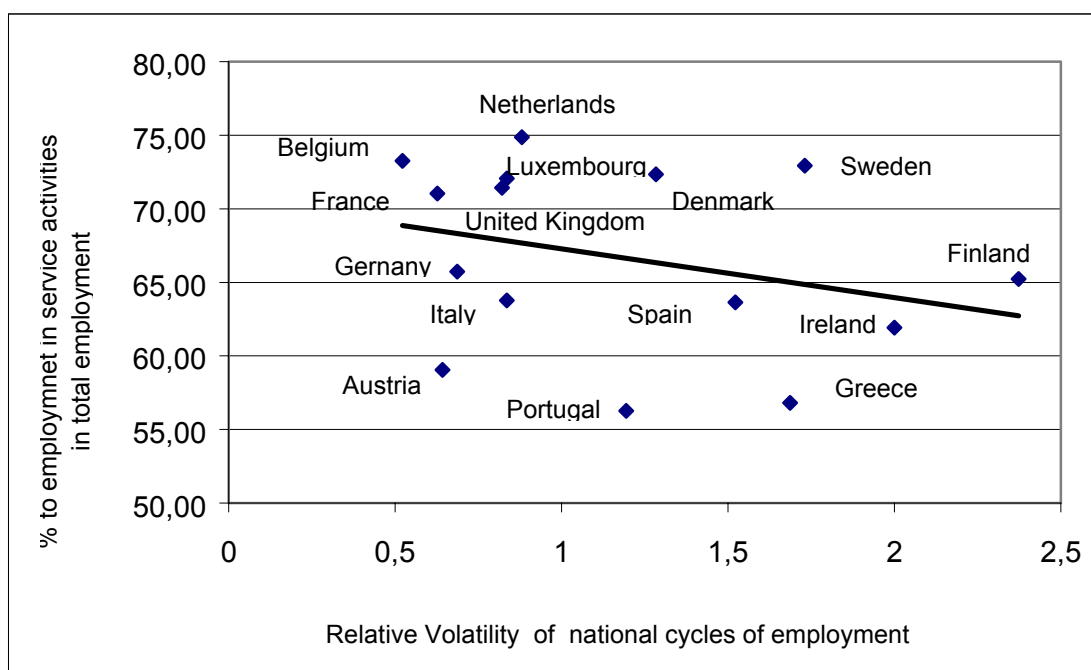
Now we want to know if all the countries with a greater degree of teriarization present a greater similarity between tertiary cyclical patterns and total employment in such a way that tertiary employment can be seen as a determining factor of the latter. For this, we consider both the aspects related to the co-movements and the volatility of the cycle.

From co-movements perspective (figure a.3 of the annexe) it can be seen how countries with a greater presence of services are not always those that present the most intense cyclical synchrony between tertiary and total employment. So, it can be said that the terciarization degree is not relevant to the co-movements.

The points expressing the said relation does not allow us to estimate a clear and significant relation. Although countries with a high tertiary labour presence and intense relation between co-movements exist (Netherlands or Luxembourg), countries can also be observed with a high weight of tertiary labour but a less intense relation between co-movements (Sweden and Denmark).

A second perspective consists in analysing this relation from the point of view of volatility in labour cycles. This new perspective is shown in figure 4, where the weight of services on total employment is related to the relative volatility of the labour cycle for each EU country. In this case, a significant relation is produced. It is confirmed that a greater presence of services contributes to a lower volatility of general employment, which is coherent with results obtained in previous studies (Cuadrado *et al*, 1999). The existence of a high percentage of tertiary labour acts as a stabilising mechanism in the cycles of total employment. Consequently, services contribute to the existence of a lower volatility within the labour market.

Figure 3. Relation between the weight of tertiary employment and total employment and the intensity of the co-movement between these variables.



(Source: Own elaboration from statistic data of Population and Social Conditions. 1 Quarter 1993 – 1 Quarter 2002. Eurostat).

3.4 Tertiariation and cyclical behaviour of total employment: a VAR analysis

Previous analysis have shown us that tertiary employment has pro-cyclical behavioural patterns, although these are notably different by countries. It has also been concluded that tertiary employment and total employment move in the same direction. There does not seem to be a clear pattern relation between both cycles in terms of co-movements (greater presence of services does not imply common patterns in the synchrony of cyclical evolution) but does in as far as its volatilities. The countries with greater presence of employment in services have less range in the cyclical patterns of their employment.

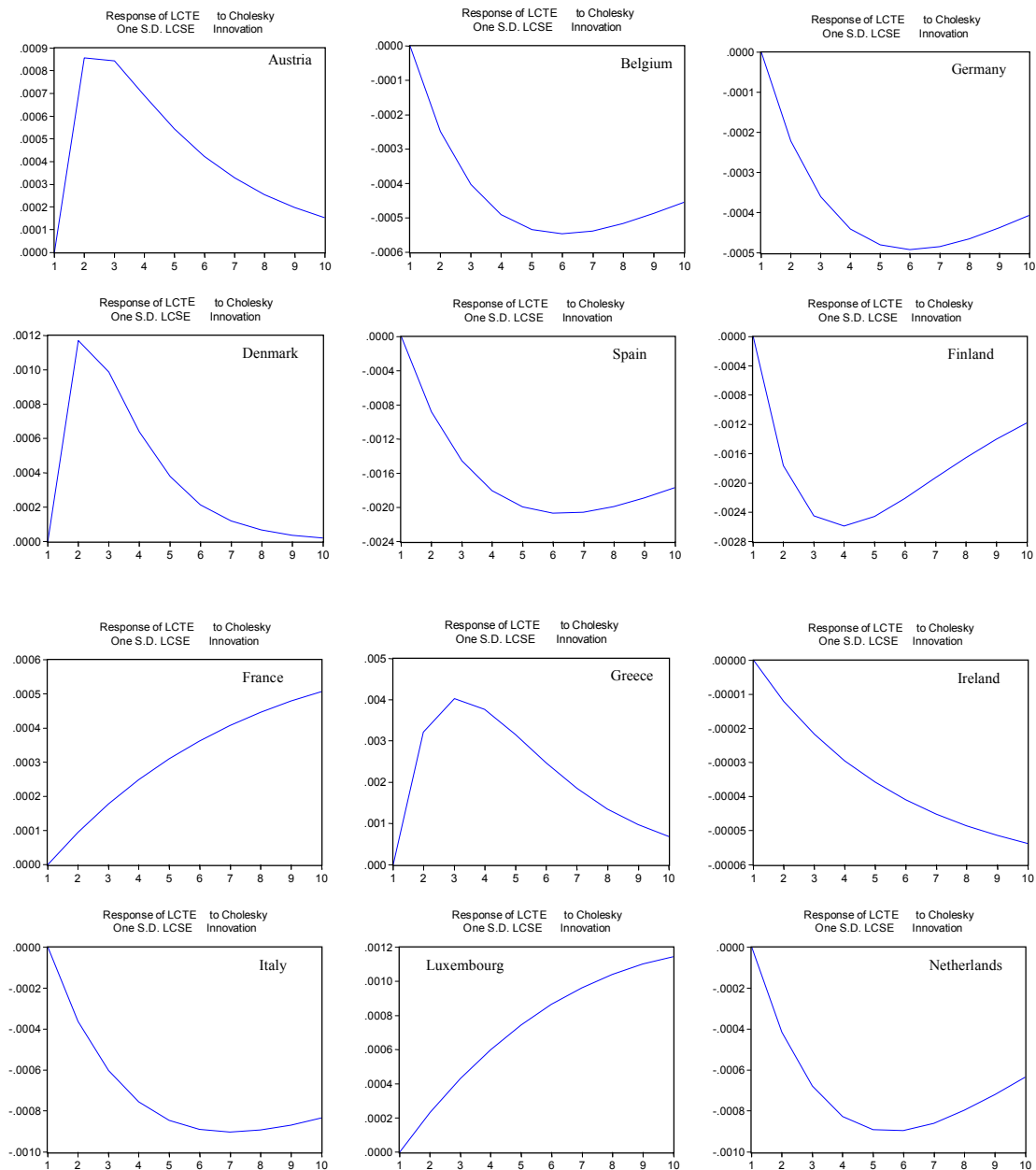
To confirm the last of these conclusions more strongly a series of vector autoregressive models or VAR^{iv} model have been estimated with the aim of been able to determine how the tertiary labour cycle influences the total labour cycle. This type of model

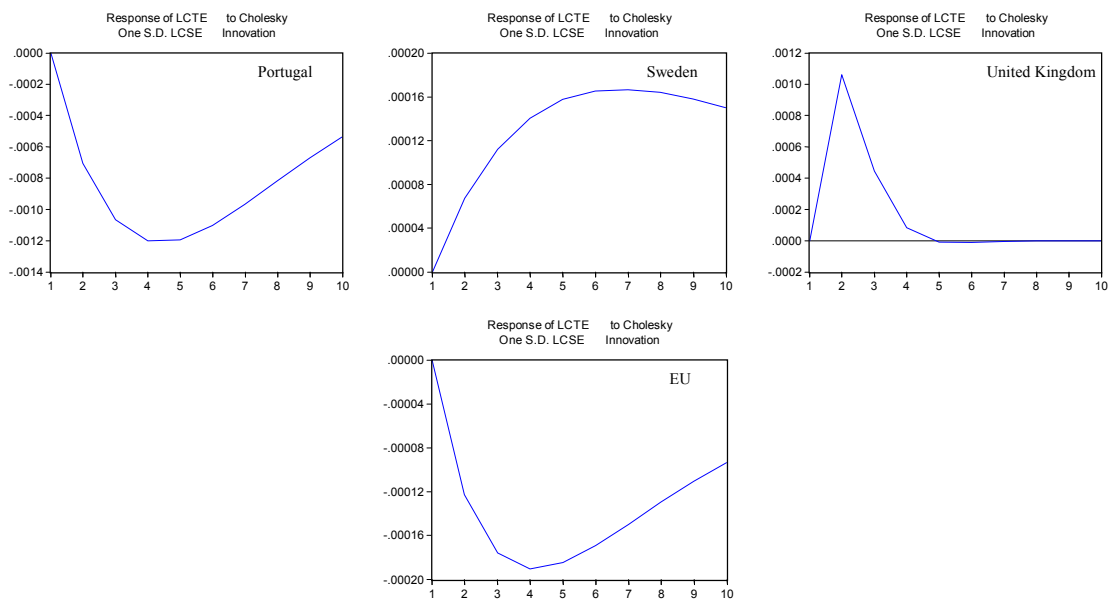
estimates the evolution of a variable in function of its previous history and a series of additional variables. For us the model has been the following:

$$LCET_{i,t} = C_1 + C_2 * LCET_{i,t-1} + C_3 * LCES_{i,t-1} + u$$

In this equation LCET and LCES are the cycle of total employment and the cycle of employment in services respectively expressed in logarithms so that the model allows us to observe the cyclical behaviour of total employment faced with changes in the cycle of tertiary employment.

Figure 4. Response of the employment cycle faced with a change of 1% in the tertiary employment cycle for the countries of the EU.





(Source: Own elaboration from data from the statistics of Population and Social Conditions. 1 Quarter 1993 – 1 Quarter 2002. Eurostat).

The results obtained are very different for countries, confirming the high heterogeneity which exists among European members (figure 4). In the majority of countries (nine of the fifteen) a shock to 1 per cent in the cycle of tertiary employment produces a reduction in the variability of the cycle of the total employment. In Austria, Denmark, Greece and -to a lesser degree- United Kingdom, the shock in tertiary employment provokes a negative effect at short term but which lessens at long term, making the cyclical variability for the total period practically void. Finally, in France, Luxembourg and Sweden the effects are negative at both long and short term.

From the previous results and despite not being able to establish a common pattern of behaviour, the methodology applied allows us to analyse study in greater depth the influence of services in the employment cycle. By introducing an increment in the cycle of tertiary employment, a variation or dispersion is produced in the dependent variable which can be broken down in function of the variables which make up the model, in our case, the cycle of previous employment and the cycle of tertiary employment. Table 6 shows what the percentage of variation of the cycle of total employment would be corresponding to a shock in the cycle of tertiary employment^v. The difference up to 100 is the corresponding variance to the cycle of total employment.

Table 6. Percentage of the variance produced in the cycle of total employment faced with a change of 1% in tertiary employment for the EU countries.

Countries	Varianza contemporánea	Varianza a largo plazo Tras 10 trimestres
Austria	4.62	12.71
Belgium	0.93	16.74
Germany	0.38	6.52
Spain	3.85	50.78
Finland	8.32	35.67
France	0.13	4.76
Grece	18.33	53.09
Ireland	0.001	0.01
Italy	1.22	15.11
Luxembourg	0.42	14.67
Netherlands	0.92	11.90
Portugal	0.98	10.70
Sweden	0.005	0.096
United Kingdom	3.41	3.96
EU-15	0.36	2.34

(Source: Own elaboration from statistic data from Population and Social Conditions. 1 Quarter 1993 – 1 Quarter 2002. Eurostat).

In the majority of countries the dispersion produced by tertiary employment, both contemporaneous and long term, is very reduced. Those patterns that differ from the generality have been underlined. The dispersion comes mainly from the general employment cycle. The cycle of services is not the cause of the dispersions produced in the cycle of total employment. So we may conclude that the services are a stabilising activity which do not contribute to the increase of cyclical volatility in total employment.

4. Patterns of cyclical fluctuation in employment in the EU: an analysis of synthesis.

The analysis carried out have allowed the identification of some of the characteristics that underlie the patterns of fluctuation of employment in the EU:

- the diversity of national behaviours,
- the effects induced by the services on cyclical patters of total employment
- and the different degrees of tertiarization existent in the member states.

With the aim of formalising these results to a greater degree, a model on the evolution of total and tertiary employment in the different countries has been estimated on the basis of GDP, total employment and service employment. In this way we try to demonstrate that national behaviours are defined by their heterogeneity, that the services posses a lower volatility in the cycle of their employment and that tertiary employment influences the evolution patterns of total employment. For this reason, this model synthesises the previous analysis but also goes a step forward in completing the objective of the study. By adequately adapting the approach of Rissman (1999), the

growth of employment in each of the countries can be determined by the following equation.

$$y_{it} = \alpha_i + \beta_1 * C_{it} + \beta_2 * C_{i,t-1} + \beta_3 * C_{i,t-2} + \gamma_i y_{it-1} + \varepsilon_{it}$$

where C is an indirect variable which reflects the cyclical evolution of the variable of interest and y_{it} represents the annualised growth of employment^{vi}. As the cycle is not directly observable, the variable C shows a simulation of cyclical behaviour in the economy. The influence of the cycles has been approximated by means of a series of delays which show the contemporaneous effect (C_t) and at short term (C_{t-1} and C_{t-2}). The effects of the change of C extend in time with the delay of two period^{vii}. In order to determine what the variables are that reflect cyclical behaviour (the variables C) three different models have been developed.

1. Firstly the evolution of employment as consequence of the general cyclical evolution has been contrasted. In this case the logarithm of the cycle of GDP for the group of the EU has been considered as a cyclical variable. In this case, the coefficients of the cyclical variables (of β_1 to β_2) will give us an idea of the degree of coordination of the labour market of each country with respect to the general economic context of the EU. That is to say, we will know if the changes in growth intensity of the GDP affect the growth of employment and to what extent.
2. Secondly, the relation between the evolution of tertiary employment and the general cyclical evolution is analysed in order to contrast the differences and similarities with respect to the previous general case. Again the European GDP is considered as a cyclical variable. The coefficients of C will be an indicator of the degree of linkage of tertiary employment in the different countries with respect to the general economic cycle.
3. Finally, the evolution of employment has been estimated in function of the cycles of tertiary employment, trying to determine the relation which joins both variables. In function of the results obtained for C an approximation is attempted as to whether the cycle of tertiary employment influences the behaviour of total employment on the one hand, and if the European countries differ from each other in function of the intensity of influence exercised by the cyclical patterns in services.

Table 7. Growth of total employment in function of the cyclical evolution of GDP.

Countries	α_i	β_1	β_2	β_3	γ_i
Austria	0.604*	0.927	0.113	-0.021*	-0.008*
Belgium	-0.243	1.029	0.060	-0.078	0.1807
Germany	0.372*	0.964	0.232	0.092	-0.096
Denmark	0.888	0.887	0.305	0.007*	0.011*
Spain	-0.316	1.033	-0.056*	0.392	-0.117*
Finland	0.043*	0.994	0.531	-0.171*	0.063*
France	-0.523	1.052	0.187	0.017*	-0.066
Greece	1.185	0.856	-0.077*	0.341	-0.101*
Ireland	-1.116	1.017	0.147*	-0.127*	-0.296
Italy	0.058	0.994	0.219	-0.031	0.233
Netherlands	-0.296	1.033	0.111*	-0.021*	-0.118
Luxembourg	-0.211	1.040	-0.004*	0.135	-0.155
Portugal	-0.177*	1.021	0.327	-0.139*	0.037
Sweden	1.220	0.853	0.641	0.424	-0.239
United Kingdom	0.853	0.916	0.148	0.067*	0.028*

* Values not significant below a probability of 95%.

(Source: Own elaboration from data of the statistics of Population and Social Conditions and Economy and Finance. 1 Quarter 1993 – 1 Quarter 2002. Eurostat)

The results obtained permit to remark some points:

- It is possible to observe a large group of responses in employment in the presence of general cyclical evolution. Although employment is affected by the GDP cycle in the same sense (pro-cyclical behaviour), the relation between both variables differs considerably from one country to another (table 7).
- Tertiary employment is less linked to the general economic cycle and behaves as relatively more stable variations. The coefficients that determine the relation between growth of tertiary employment and the cyclical evolution also mark the existence of a large group of national characteristics. The heterogeneity existing between European countries is even more accused in terms of tertiary employment (table 8).

Table 8. Growth of tertiary employment in function of the cyclical evolution of the GDP.

Countries	α_i	β_1	β_2	β_3	γ_i
Austria	-0.412	1.053	-0.185	0.081*	0.144
Belgium	-0.211*	1.027	-0.050*	0.140*	0.245
Germany	0.372*	0.964	0.232	0.092	-0.096
Denmark	0.282	1.037	-0.086*	0.004*	-0.241
Spain	-0.201	1.022	-0.200	0.343	0.013*
Finland	-0.048*	1.007	0.092*	0.134*	0.065*
France	-0.523	1.052	0.187	0.017*	-0.066
Greece	1.185	0.856	-0.077*	0.391	-0.101
Ireland	-0.037*	1.007	0.226*	-0.265*	-0.025*
Italy	-0.133*	1.014	-0.018*	0.193	0.197
Netherlands	-0.180	1.037	-0.095	0.019*	-0.214
Luxembourg	-0.113	1.010	-0.133	0.160	-0.099
Portugal	-0.207*	1.026	0.323	-0.168*	0.043*
Sweden	-0.295*	1.037	0.349	0.411	-0.349
United Kingdom	0.599	0.939	0.108*	0.035*	0.003*

* Values not significant below a probability of 95%.

(Source: Own elaboration from data of the statistics of Population and Social Conditions and Economy and Finance. 1 Quarter 1993 – 1 Quarter 2002. Eurostat).

- The influence of service employment is high. The cycles of service industry employment influence in a positive way the evolution of total employment, although they have very different intensities with respect to the group of countries considered. Although with some exceptions, a positive relation is observed between the degree of tertiarization in employment in the different countries in the EU and intensity with which the cycle of service industry employment influences the evolution of total employment (table 9).

Table 9. Growth of total employment in function of the cyclical evolution of service industry employment.

Country	α_i	β_1	β_2	β_3	γ_i
Austria	0.257*	0.969	0.345	-0.271	-0.050*
Belgium	-0.490	1.059	0.835	-0.967	0.030*
Germany	-1.086	1.103	0.701	-0.772	-0.181
Denmark	0.290*	0.963	0.728	-0.562	-0.118*
Spain	-0.430	1.045	0.491	-0.653	-0.207
Finland	-0.248	1.032	0.282	-0.340	-0.159
France	-0.593	1.059	0.627	-0.603	-0.128*
Greece	0.530	0.935	0.609	-0.193*	-0.332
Ireland	3.680	0.734	0.359*	-0.347*	-0.374*
Italy	-1.030	1.103	0.420	0.344	-0.243
Netherlands	-0.191	1.022	1.363	-1.522	0.041*
Luxembuorg	-0.187	1.036	0.656	-0.914	-0.294
Portugal	-0.528	1.062	0.323	-0.494	0.017*
Sweden	-0.123*	1.015	0.801	-0.637	-0.167
United Kingdom	0.214*	0.979	0.964	-0.828	0.018*

* Values not significant below a probability of 95%.

(Source: Own elaboration from data of statistics of Population and Social Conditions and Economy and Finance. 1 Quarter 1993 – 1 Quarter 2002. Eurostat).

The relation between the service industry cycle and the evolution of general employment is actually positive in as much as the coefficients obtained at short are generally negative. This fact may be induced by causes of complementary character. Firstly, an increase in the cycle of tertiary employment of contemporaneous form increases the total employment but also increases the weight of this activity in employment. Due to the fact that the productivity of the tertiary sector is lower than other activities (Baumol 1967), the product increase in later stages does not go side by side with an increase in employment. Therefore, at short term adjustment of the labour force may be produced the existence of negative coefficients. This means that as the productivity of the system is less than expected, there is a certain adjustment of total employment. Secondly, and at the same time, we have seen that the service industries offer a stabilising pattern on total employment and so the increase in the tertiary employment cycle has positive contemporaneous effects which will compensate at short term. It is for this reason that, in our case, the coefficients are negative when compensating the contemporaneous effect.

Contrary to Rissman (1999) who found a significant synchrony between regional (states) cycles in the U.S., the European economics are very heterogeneous getting similar behaviours only in aggregated level. Each European country shows a difference cyclical pattern, so it is possible to say that there is not a real economic integration in the EU, as it is between the US states.

4. Final remarks.

The paper has developed a series of analysis with the aim of knowing in more depth the employment cycles of the EU and the possible influence that the growing tertiarization in the member countries may exercise. The results obtained lead to the following fundamental conclusions:

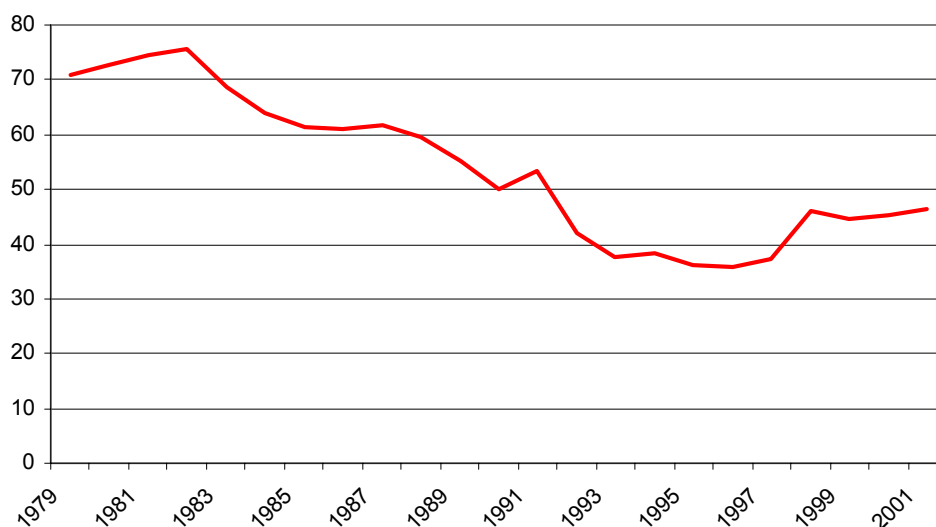
- a) Firstly, the cyclical patterns of employment in the EU are a result of the different national behaviours in terms of their cyclical variations.
- b) The co-movements between the macroeconomic variables considered (employment, service industries and GDP) follow the pattern indicated by economic theory. Employment and the service industry in relation to the GDP are strongly pro-cyclical. Also, total employment and the service industry have the same synchrony. However, this relation is produced in each EU country in a different temporal area.
- c) Although the influence of the service industry is different from one country to another, a greater presence of employment in services implies a lower volatility in total employment. Tertiary activities fluctuate less than others thus converting in a stabilising component of employment. The VAR models developed show this by establishing a lesser variance for the service industry when faced by shock.
- d) The econometric models developed on behaviour of growth in total and tertiary employment in function of the GDP cycles confirm that tertiary employment is less affected by the GDP cycles. Consequently, the service are a stable activity far to economics fluctuations.
- e) If the cyclical behaviour of employment is used as indicator to the performance to differences European labour markets, the conclusions would be that the EU is just far to have a unique labour market, although, the continuous convergence between their sectorial structures.
- f) This last result is not similar to others obtained in the literature about the labour market in the U.S. The differences existing in labour institutions between the European countries, the lower labour mobility and the disparities in terms of sectorial composition are surely the factors explaining the differences.

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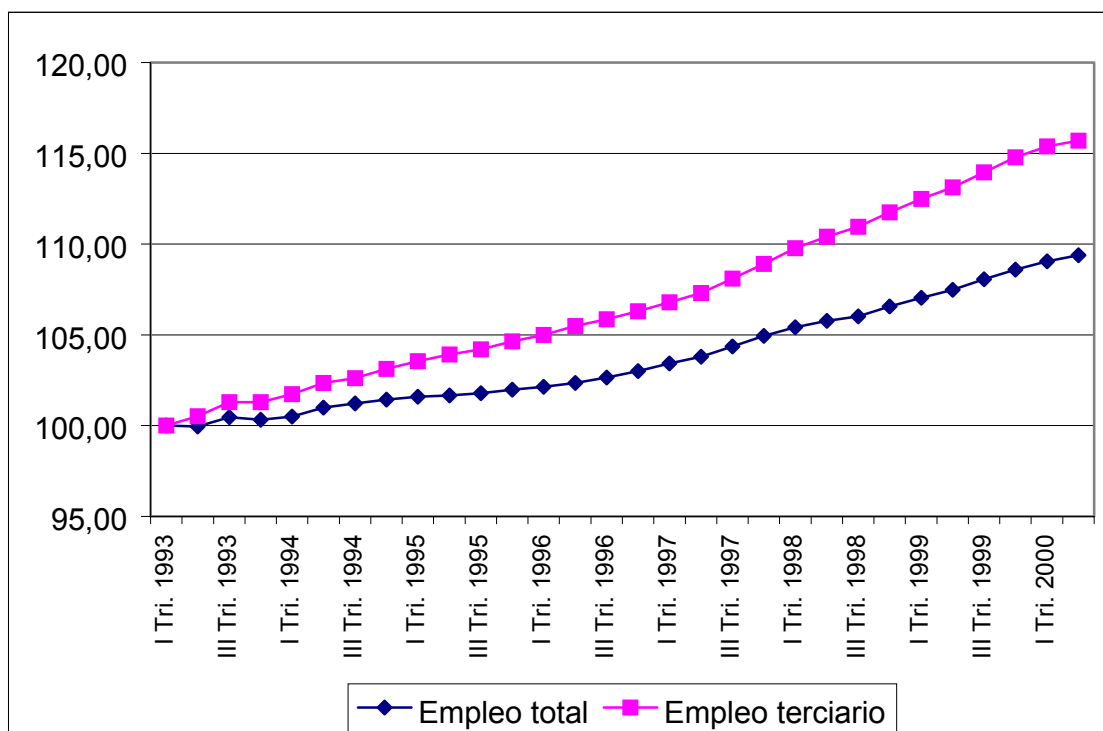
ANNEX

Figure A.1. Variance to employment weigh in services over total employment. (Sigma-convergence).



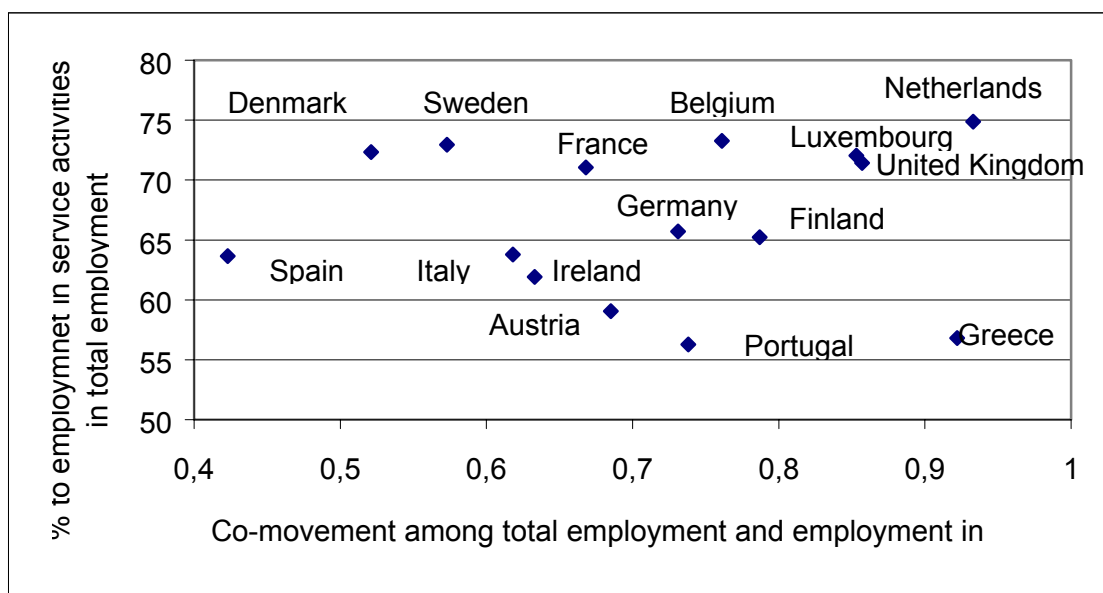
(Source: Own elaboration from data the statistic of Population and Social Conditions and Economy. 1 Quarter 1993 – 1 Quarter 2002. Eurostat).

Figure A.2. Evolution in index numbers to service and total employment to UE-15.



(Source: Own elaboration from data the statistic of Population and Social Conditions and Economy and Finance. 1 Quarter 1993 – 1 Quarter 2001. Eurostat.)

Figure A.3. The relation between weight of tertiary employment over total employment and the intensity of the co-movement among the variables.



(Source: Own elaboration form data statistics from the Population and Social Conditions. 1 Quarter 1993 – 1 Quarter 2001. Eurostat).

ⁱ The content of this paper is based on some of the provisional results included in the Research Project “Characteristics and functioning of the labour markets in the European Union: Towards a single labour market? National Plan I+D+I. Ministry of Science and Technology, being carried out by a working group directed by J.R. Cuadrado-Roura and integrated by C. Iglesias- Fernández, R. Llorente –Heras, E. Núñez-Barriopedro, Javier Callealta and Ruben Garrido-Yserte.

ⁱⁱ In order to differentiate the tendency of the cycle, the methodology followed has always been the same. In the first place, the original series has been de-seasonalized by means of multiplicative adjustment. This step is fundamental when working with quarterly series as is our case. Secondly, a filter of Hodrit and Prescott has been applied to these logarithms to obtain the trend of the series. The cyclical component is obtained by subtracting its trend from the original series. Finally, antilogarithms have been taken to obtain the cycle and the trend in the same initial units.

ⁱⁱⁱ In this sense, Enrique M. Quilis has realised a interesting recompilation on the theory of the cycles in his “Notes on Theory of the Cycles” available in the DOC. N°1/189 of the Institute of Fiscal Studies.

^{iv} For the majority of European countries in function of the availability of data.

^v Measured through the variance

^{vi} The original model proponed by Rissman has been estimated but with some differences. In order to extract the cyclical component from the variables we have used the Hodrick – Prescott filter instead of the Kalman. Also, our model is based on temporal series of a quarterly character and not annual, so the dependent variable is not the growth of annualised employment but simply the growth of employment.

^{vii} Up to a second delay has been considered with the aim of homogenizing the estimation to all the countries of the EU. This model is more favourable to the group of the countries although not in an individual form. For each one of the countries independently better estimations can be reached by the inclusion of more or less retards and in some cases by eliminating the constant term.