Tax burden convergence in Europe

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ABSTRACT

This paper studies the degree of convergence in tax burden registered in the European Union during the 1967-95 period. To that end, OECD data is used, and the traditional cross-sectional convergence indicators are examined.

Key words: Fiscal coordination, convergence, European Union.

RESUMEN

Este trabajo estudia el grado de convergencia en la carga fiscal registrado en la Unión Europea durante el períod0 1967-1995. Para ello, a partir de datos de la OCDE, se examinan los indicadores tradicionales de convergencia en datos de corte transversal.

Palabras clave: Coordinación fiscal, convergencia, Unión Europea.

1. Introduction

Economists expect that increasing integration within the European Union (EU) will contribute to a major convergence among the European economies. The main problem concerning this process is that the countries started with different economic conditions. It is difficult to design a common economic policy because they all had different growth, inflation and unemployment rates.

It was expected that the integration process in the EU would lead to a faster average growth. This means that less developed countries would grow more rapidly that the more developed ones, reducing the gap in terms of *per capita* income (see, e. g. Andrés *et al.,* 1996). Therefore, the convergence analysis has enjoyed great relevance in the literature and it has become important to show the elements that could affect such convergence.

On the other hand, it was necessary to introduce some rules or objectives to be achieved by the countries in order to reduce problems. Fiscal convergence is necessary to stave off market and political pressures and inflation rate convergence may be needed to stave off political pressures (see, e. g., Kenen, 1995). This is the main reason why the Maastricht convergence criteria on inflation rate, interest rate, public deficit and public debt ratios have been approved.

From this perspective, it is necessary to add that the fiscal convergence also has a special relevance in the integration process because the countries have traditionally designed counter-cyclical policies to eliminate their economic problems. Fiscal variables played an important role in those policies. With the convergence criteria this was more difficult to do.

The EU countries have been forced to reduce their public expenditure. However, reducing the Welfare State is very difficult and time consuming. The policy makers cannot drastically reduce some kinds of expenditure (for instance pensions or public deficit charges), and sometimes there have been rises, especially when the growth rates were low and unemployment increased. In this case it was necessary to reduce other public expenditures that could improve physical capital or human capital, which affect growth negatively. The alternative was to increase the burden[1].

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1. On the effects of public expenditure on growth see, among others Barro (1989, 1990), Diamond (1989), Easterly and Rebelo (1993), Barro and Sala-i-Martin (1995) and Dowrick (1996). The question in this field is whether such public expenditures always generate positive effects on growth. It is necessary to take into account the increase in taxation to finance them, and its negative effect on growth.

Our main goal in this paper is to analyse whether the European countries have followed a similar policy in terms of taxation. To that end, we make use of the indicators developed by Barro and Sala-i-Martín (1991 and 1992).[2] This approach constitutes the traditional cross-sectional test for convergence and is applied to data on tax burden gathered by the OECD, covering the 1967-1995 period.

The remainder of the paper is organized as follows. The traditional convergence indicators are presented in Section 2. Section 3 reports the empirical results, and some concluding remarks are offered in Section 4.

2. Tax convergence indicators

In the convergence analysis of EU integration we should consider two aspects. Although it is relevant to determine how convergence is affecting income distribution in each country, this paper focuses on a second aspect: convergence takes time, especially in countries with structural problems and with high inflation rates and excessive public deficits. They cannot eliminate their economic problems through more expansive fiscal policies, because they would not be able to achieve the convergence criteria. Therefore, they have to adjust their expenditures, by increasing some and reducing others, or increase taxes. Both possibilities affect growth.

In this sense, it is relevant to know if there has been public expenditure convergence and tax burden convergence. The former has been analysed in a previous paper (Alonso *et al.*, 1998) considering the social protection benefits. Our results suggested that some countries have worked harder in order to make their situation converge with that of other countries where public expenditure was much more significant.

Tax burden convergence is going to be analysed in this paper. But first of all it is necessary to state the convergence definitions that can be used. Although there are many definitions of convergence in the literature (see, e. g., Quah, 1993), there are two convergence indicators that have been widely used: β-convergence and γ-convergence (see, e. g., Barro and Sala-i-Martín, 1992). The former takes place if it is found that, for a group of countries, those that start the sample period with below-average incomes tend to grow faster than do countries that start with above-average incomes, whereas the latter is found when there is a decline in the dispersion of income as time passes.

We can also analyse convergence in taxation terms. In this case, some authors (for instance Messere, 1993) consider that tax convergence occurs when the deviation of

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2. There are some critics to these indicators, specially β-convergence [see Quah (1993) and Friedman (1992), among others]. It is argued that this convergence is irrelevant because it only shows that some economies approach others.

a country from an average tax ratio, OECD tax ratio for instance, is lower in the second year than in the first one. The opposite would imply divergence.

Traditionally, the taxation theory has not paid attention to this topic in spite of its importance. The studies on equalling among tax systems have mainly concentrated on getting optimal tax revenues (Musgrave, 1969) or comparing several taxation systems (OECD, 1993). It is not easy to understand the reasons for this lack of study on tax convergence[3]. It is important to determine the tax homogeneity degree to evaluate the design of the tax policy in the European integration process.

In our case, we will use these indicators to estimate the possible convergence in tax burden and, therefore, we will say that there is β-convergence if we find a negative relation between the average growth rate of such variable and the logarithm of its initial level. On the other hand, γ-convergence will appear when the standard deviation of the logarithm of the tax burden measure tends to decrease over time.

In this way, if B_{it} represents the level of tax burden of country *i* in the year *t*, β-convergence can be estimated through the following equation:

$$(1/T)\log(B_{iT}/B_{i0}) = a - b\log(B_{i0})/T + e_{it} \qquad (1)$$

where *0* and *T* represent the initial and final years, respectively, and ε_{it} is an error term. Estimation of parameter *b* allows us to obtain the annual rate of convergence β, since $b = (1-e^{-\beta T})$.

Finally, an alternative tax convergence indicator, not used here, is proposed in Messere (1993) and also used by Gago and Alvarez (1995). They use two indicators: "macro" and "micro". The first one tries to determine, in the tax burden case, if the tax burden deviation of a country with respect to the average is lower at the end of the period than at the beginning. The "micro" indicator determines the variance value of the most relevant magnitudes chosen in two different periods of time. These magnitudes could be the maximum and minimum marginal tax rates, relevant tax-total tax ratio, corporate taxation rates...

3. Empirical results

As is mentioned above, in this paper we have used data on total tax revenue (TTR), total population (POB) and Gross Domestic Product (GDP) collected by the Organisation for Economic Cooperation and Development (OECD). We compute the Frank's index, traditionally used as a measure of tax burden:

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3. Edwards and Keen (1994) state that tax coordination implies welfare gains to private agents.

$$FI = \frac{TTR * POB}{(GDP)^2}$$

Our sample covers the period 1967-95 (the latest available), and the countries under study are all the 14 members of the EU except Luxembourg (i. e., Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, the Netherlands, Portugal, Spain, Sweden, and the United Kingdom).

We initially measured σ-convergence using the standard deviation of the cross section of the logarithm of our burden measures:

$$\sigma = \sqrt{E[V - E(V)]^2}$$

where V is the logarithm of FI and E(V) denotes expected value of V. As can be seen in Figure 1, there is evidence of a tendency towards σ-convergence: the dispersion was initially reduced from 0.58 in 1967 to 0.22 in 1974, then it increased up to 0.27 in 1977, decreasing to 0.17 in 1980 and, after increasing to 0.26 in 1984, it eventually decreased to 0.06 in 1995. Therefore, we can distinguish three subperiods: an initial subperiod of sharp reduction in dispersion (1967-1974), a subperiod of ups and downs in the dispersion (1974-1984), and a new subperiod of reduction in dispersion (1984-1995).

Figure 1: Total dispersion of Frank index across the Europen Union, 1967-1995
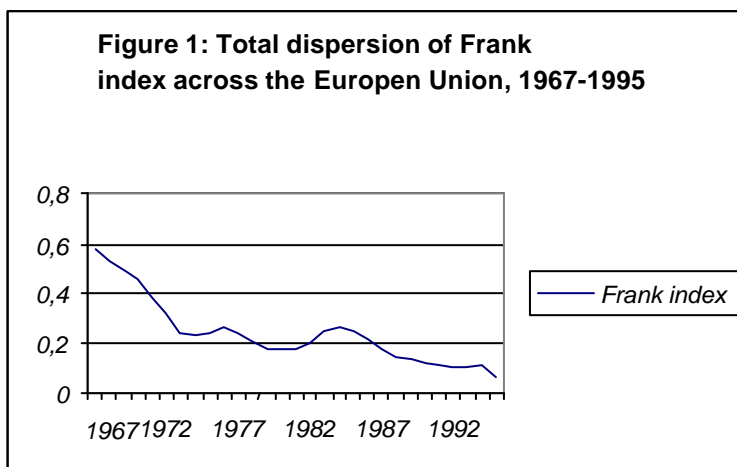
Concerning β-convergence, Table 1 reports the estimations of equation (1) for both the entire sample and the subperiods mentioned above. Columns 2 and 3 show the estimation results of the cross-section by ordinary least squares (OLS), whereas

columns 4 to 6 and 7 to 9 offer the results of panel data estimation of the fixed and random effects models, respectively.

Estimation results by OLS confirm the conclusions drawn from the γ-convergence analysis: an 3.8% annual convergence is attained for the subperiod 1965-74, a 2.8% annual divergence results during the subperiod 1974-84 and eventually a 2.5% annual convergence for the 1984-95 subperiod can be observed. The convergence rate for the whole of the sample is around 1.4%. However, the hypothesis that β has been constant along the whole sample is rejected using likelihood ratio test (RV = 29.12, significant at the 1% level).

When we perform panel data estimations (which is suitable given the nonequal individual effects as suggested by the F test values of Table 1, column 6 -all of them significant at the usual levels), results hardly change for the three subperiods considered, but a higher convergence rate is obtained for the entire sample period. Something similar happens when we estimate the random effect model. However, the values of the Hausman tests imply that the individual effects are correlated with the regressors and therefore the results obtained are not consistent, being the fixed effect model the proper estimation method.

Our results differ from those reported by Messere (1993) and in Gago and Alvarez (1995). For the European Union countries, the results from these studies suggest that for five European countries (Belgium, Denmark, Finland, France and United Kingdom), there have been tax burden divergence. Note, however, these different results could be because they considered a different period (1980-1990), they use a different indicator, and they analyse the case of the OECD countries. Nevertheless, these contradictory results call for further investigation improving the data, methods and indicators used.

Sample	OLS		PANEL					
			Fixed effects			*Random effects*		
	β	R^2	β	R^2	F	β	R^2	Hausman
	(se)	(sereg)	(se)	(sereg)		(se)	(sereg)	
1967-95	0.014***	0.49	0.017***	0.52	14.79***	0.015***	0.51	9.94***
	(0.003)	(0.13)	(0.004)	(0.16)		(0.003)	(0.18)	
1967-74	0.038***	0.47	0.039***	0.51	14.37***	0.037***	0.49	9.73***
	(0.004)	(0.10)	(0.005)	(0.14)		(0.009)	(0.15)	
1974-84	-0.028***	0.44	-0.026***	0.49	12.23***	-0.025***	0.48	11.07***
	(0.011)	(0.14)	(0.011)	(0.13)		(0.012)	(0.14)	
1984-95	0.025***	0.46	0.026***	0.52	13.06***	0.028***	0.47	11.52***
	(0.005)	(0.15)	(0.004)	(0.18)		(0.008)	(0.17)	

Notes: se is the standard error of b; sereg is the standard error of the regression; F is a test for the hypothesis of equality of individual effects; Hausman is a test for the hypothesis of independence of individual effects; *** denotes significance at the 1% level.

In order to check the robustness of our result to changes in the sample, we have analysed the sensitivity of the estimated β to the exclusion of each country one at a time. Again, the values of the F and Haussman tests suggest that the fixed effect model is the proper estimation model, yielding also the highest R^2. Therefore, in Table 2 we report the results for that model. As can be seen, the estimated degree of convergence remains relatively constant for the entire sample period, the lowest estimated coefficient being associated with the elimination of Finland and France and the highest associated with the exclusion of Greece. Regarding the subperiods, the estimated degree of convergence (divergence) also remains relatively constant. Nevertheless, it is interesting to note that the elimination of the Southern countries and Ireland subperiods increases the degree of convergence during the in the 1967-74 subperiod and reduces the degree of divergence during the and 1974-84 subperiod. Finally, for the last subperiod (1984-95), the lowest estimated coefficient is associated with the elimination of France and the highest associated with the exclusion of Greece. All the parameters are within the 95% confidence interval we have estimated [(0.009,0.025) for the entire sample period, (0.029, 0.049) for 1965-74 subperiod, (-0.048, -0.194) for the 1974-84 subperiod, and (0.018, 0.034) for the 1984-95 subperiod] suggesting that our results are based on a homogeneous sample of countries. To further assess the possibility of influential observations, we also evaluated the impact on the estimated β by the elimination of the so-called «peripheral countries» (i. e., Greece, Ireland, Portugal and Spain). As shown in the last row of Table 2, the exclusion of this group of countries is causing more than one standard error of change in the estimated coefficient (except for the 1974-84 subperiod).

Table 2: Sensitivity analysis to country exclusion

Countries excluded	1967-95	1967-74	1974-84	1974-84
None	0.017	0.039	-0.026	0.026
Austria	0.017	0.037	-0.025	0.026
Belgium	0.017	0.038	-0.026	0.026
Denmark	0.017	0.039	-0.026	0.026
Finland	0.016	0.034	-0.027	0.026
France	0.016	0.039	-0.025	0.024
Germany	0.017	0.036	-0.026	0.025
Greece	0.025	0.049	-0.020	0.030
Ireland	0.021	0.043	-0.023	0.025
Italy	0.017	0.040	-0.026	0.025
Netherlands	0.017	0.038	-0.025	0.026
Portugal	0.022	0.044	-0.023	0.027
Spain	0.021	0.043	-0.023	0.026
Sweden	0.017	0.038	-0.026	0.026
UK	0.018	0.041	-0.027	0.026
Periphery	0.022	0.046	-0.022	0.031

4. Concluding remarks

This paper has examined the degree of convergence in tax burden registered in the EU during the 1967-95 period. To that end, we used data from OECD for 14 of the 15 member countries that form the European Union. To that end, we have made use of traditional convergence indicators (β-convergence and γ-convergence).

The results from both indicators suggest that there has been certain convergence in tax burden during the 1967-74 subperiod, while evidence of divergence is found during the 1974-84 subperiod. Finally, for the 1984-95 subperiod convergence is again observed, albeit less intensive than in the initial period. Although our sensitivity analysis to the exclusion of individual countries shows that our results are based on a homogeneous sample of countries, there is some indication that the peripheral countries have experienced a different speed in this convergence.

Therefore, our results indicate that there have been some fiscal integration within the EU (at least within the «core countries»). This means that in the European integration process has achieved convergence not only in monetary but also in fiscal terms, which will make future economic policies easier to design, easing the smooth transition to a monetary union in Europe.

However, we have to stress two other important effects. Firstly, in the last few years private agents in these European countries have made a similar effort to fulfill the fiscal requirements.

Secondly, as Frankel and Razin (1996) claim, asymmetry in income tax rates is one source of disparity in income and population growth rates across countries. Obviously this also affects capital mobility and labour mobility in a negative way. With convergence in tax burden we can assume that these problems have been, or will be, eliminated.

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