Tuition Fees in Spanish Public Universities: A Regional Convergence Analysis

Precios de matrícula en las universidades públicas españolas: Un análisis de convergencia regional

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Resumen: Se examina la evolución, dispersión y movilidad de los precios de primera matrícula universitaria entre las Comunidades Autónomas (CCAA) españolas utilizando metodologías de convergencia sigma y gamma. El período de análisis varía en función del tipo de estudio considerado, siendo el máximo período entre 1992 y 2014. El análisis revela un incremento de los precios de matrícula en el tiempo. Con respecto a la σ-convergencia se ha producido un aumento de la dispersión de los precios de matrícula de todo tipo de estudio analizado: enseñanzas de grado (adaptados y no adaptados –licenciaturas y diplomaturas– al Espacio Europeo de Educación Superior (EEES), así como estudios de master (adaptados al EEES). Además, los resultados derivados del análisis de γ-convergencia muestran un aumento de la movilidad en las posiciones que las Comunidades Autónomas ocupan en un ranking de precios de matrícula (en especial en los master). Los resultados revelan que se ha ampliado la dispersión y la movilidad de los precios públicos universitarios entre las Comunidades españolas en un período de descentralización del sistema de educación superior español, adaptación al Espacio Europeo de Educación Superior (EEES) y la creación de un nuevo sistema de precios de la matrícula (a partir de 2012).

Palabras clave: precios públicos universitarios; Espacio Europeo de Educación Superior; convergencia sigma; convergencia gamma.

Abstract: We examine the regional evolution, dispersion and mobility of Spanish tuition fees using sigma and gamma convergence methodologies. The period of analysis varies depending on the type of study considered, being the maximum period between 1992 and 2014. The analysis reveals an increase of tuition fees over time. With regards to σ-convergence, there has been a growing dispersion of tuition fees of all type of studies considered among Spanish regions: undergraduate degrees adapted and not adapted to the European Higher Education Area (EHEA) as well as master studies (adapted to the EHEA). Moreover,

γ-convergence results show an increasing mobility of regions in a ranking of tuition fees in all type of studies (although especially in masters). These results illustrate that the dispersion and mobility of university fees among Spanish regions have increased during a period of decentralisation of the Spanish Higher Education system, adaptation to the EHEA and a new tuition pricing system (since 2012).

Keywords: tuition fees; European Higher Education Area; sigma convergence; gamma convergence.

Introduction

T he Bologna Process was set in motion in 1999 and convergence should be complete in 2020. As a direct consequence of this convergence process in European Higher Education, Spain and its European partners have overhauled the structure of their universities. Prior to the Bologna Process, undergraduate studies in Spain consisted, in the main, of a five-year degree (the licenciatura), though there was the possibility of completing a three-year course (the diplomatura), while some specific courses (including the health sciences, engineering and architecture) took six years to complete. Undergraduate courses could be followed by enrolment on a PhD programme.

As a result of adaptation to the European Higher Education Area (EHEA), Spanish university studies have moved towards the European model but they have not adopted it fully. Today, Spain's universities are characterised by what has come to be known as the 4+1 model, whereas most European countries have based their adaptation of Higher Education (HE) studies on the 3+2 model (although the debate is not yet closed in Spain, where the current government has proposed the possibility that universities choose a 3+2 or a 4+1 model). Currently, in Spain the new organisation comprises a four-year first cycle (the *grado*), introduced in the academic year 2009-10, followed by a one-year second cycle (the master's), implemented in 2006-07; thus, university studies not adapted to the EHEA co-exist with those that do comply with the EHEA, and there are a total of five years study before being able to embark on PhD studies (the EHEA third cycle), as was the case in the country before the Bologna Process was implemented. However, there are variants of this structure, including the 4+1.5 model and the 4+2 model. Equally, different kinds of master's courses are available: some with a stronger focus on research (non-enabling masters, the so called *máster oficial*), and others offering

professional training providing qualifications that legally allow to practice a given profession (enabling masters).

The Spanish HE sector has undergone a major process of decentralisation culminating in 1997, when all regional governments assumed responsibility for education policy (see Pereyra, 2002, for a comprehensive discussion of the evolution of this process). Since decentralisation and until the academic year 2011-12, tuition fees at the public universities were set as follows. First, the General Conference for University Policy *(Conferencia General de Política Universitaria)*, comprising the educational authorities of the central and regional governments, met each year to establish the lower and upper limits for any price increases. In recent years, these were the Consumer Price Index (CPI) for April and April's CPI plus four percentage points, respectively. Second, each regional government chose the percentage increase to be applied to the previous tuition fees in line with the limits imposed by the Conference. At this point, the regional governments also decided whether to apply different price increases to different types of studies, i.e., whether to apply values (up to seven) from a lab-based weighting factor (LWF) to each study programme, with different tuition fees for each LWF value assigned. For example, in Madrid, in the academic year 2013-14, Medicine (LWF=1) was more expensive than Economics (LWF=3): the fees being set at 1.98€ and 1.62€ per academic year, respectively. An examination of the evolution of the LWF shows that the number of values applied has decreased over the years, from seven down now to four or five increasing the fees of those studies with cheaper LWF as they have been merged with those with more expensive LWF values. In fact, this trend was accelerated following adaptation to the EHEA, that is, after the academic year 2008-09 (Ortega et al. 2011). Interestingly, Andalusia is the only region that has applied the same LWF to all university studies, setting the same single credit price for all courses (except Master programme after the academic year 2013-14).

The HE tuition pricing system outlined above underwent major changes in the academic year 2012-13 following the introduction, in May 2012, of Royal Decree-Law 14/2012 of 20th April, providing urgent measures to rationalize public expenditure in education (*Real Decreto-ley 14/2012, de 20 de abril, de medidas urgentes de racionalización del gasto público en el ámbito educativo)*. This new state legislation has introduced greater freedom in pricing policies with tuition fees being determined for the first time on the basis of the cost of the educational service offered, and not in line with national price inflation as under the previous incrementalist system. Thus, Royal Decree-Law 14/2012, while maintaining the (partially) decentralized character of the previous pricing system, establishes that the upper and

lower limits of the tuition fees set by the General Conference for University Policy must cover 15%-25% of the tuition costs in the case of EHEA first cycle studies and enabling masters, and 40%-50% in the case of non-enabling masters (*máster oficial*). Additionally, the governments of the Autonomous Communities can introduce regulatory elements, provided these do not contradict state legislation. Finally, for the first time the new regulation allows universities within a region to set different tuition fees, since these have to be linked to the cost of provision. In fact, Madrid and Catalonia already allowed this differentiation but the universities continued to set the same price per LWF.

The aim of this study is to analyse the evolution of tuition fees in Spain's public universities taking into consideration different LWF values for undergraduate studies not adapted to the EHEA (1992-93 to 2013-14); EHEA first cycle studies (2009-10 to 2013-14); and EHEA second cycle studies (2006-07 to 2013-14). The analysis is based on the evolution over time of σ- and γ-convergence, that is, the evolution during the study period of the dispersion in regional tuition fees (σ-convergence) and the mobility of the regions in a ranking of tuition fees (γ-convergence).

This paper is innovative in at least two respects. First, it analyses tuition fee systems in the various regions of a single country, a key feature of HE policy in decentralized (or federal) countries since differences in credit prices may influence student mobility between regions (see Bruckmeier & Wigger (2013) and Dwenger et al. (2012) for the German case, and Mueller & Rockerbie (2005) for Canada). Second, it applies an analytical methodology, namely, σ- and γ-convergence analyses, which is quite unusual in studies of HE. Only Lepori et al. (2014) have analysed certain HE domains in Switzerland employing similar indicators, while Agasisti et al. (2012) have studied the convergence among EU countries in university funding, distinguishing between public and private funding. In Spain, Escardíbul (1997a, 1997b) examined regional σ-convergence of educational enrolment and Pérez-Esparrells & Morales (2012) studied the convergence of public spending in non-university education. Therefore, we analyse tuition fees from a different perspective as the usually applied in previous studies in Spain, which focus on the analysis of university streams of income –see the recent works of Dolado (2010), Ortega et al. (2010, 2011), Escardíbul & Oroval (2011), Hernández Armenteros et al. (2011) and Perez Esparrells & Vaquero (2011)- or suggest criteria for government intervention and funding in HE, such as Albert & Roig (2011) and Del Rey (2011). We also consider convergence in higher education from a quantitative perspective, different from other qualitative approaches made for other countries (see Tauch, 2004; Dobbins & Knill, 2009).

In this article, we first describe the evolution of tuition fees in Spanish public universities. Then, we explain the data and methodology of the analyses performed. The next section contains the findings by type of qualification and the results of the σ- and γ-convergence analyses are reported together. Finally, a discussion section and main conclusions are displayed.

<div align="center">EVOLUTION OF TUITION FEES</div>

As indicated in the introduction section, the adaptation to the EHEA of different types of university degrees was implemented in different years; therefore, we consider different periods for the analysis of the evolution of the tuition fees of each type of study. We analyse fees for undergraduate degrees not adapted to the EHEA from academic year 1992-93 to the last academic year for which data are available (2013-14). We start from academic year 1992-93 because 1992 was the year the Spanish Ministry of Education introduced a scale of different tuition fees per credit depending on the university programme chosen. This scale comprises seven values (or levels) of a LWF (the so-called 'Model 92'). In the case of fees for first and second EHEA cycle studies, our period of analysis starts in the academic year in which these studies were introduced in Spain: i.e., 2009-10 and 2006-07, respectively. In addition, Figures 1 to 6 also highlight the academic year 2009-10, which allows us to compare the evolution of the tuition fees of all types of studies henceforth, as both the first and second cycle studies had already been adapted to the EHEA.

Figures 1 and 2 show the credit price in each region of undergraduate studies not adapted to the EHEA, considering the minimum (the cheapest) and maximum (the most expensive) levels of the LWF respectively. We cannot compare other LWF levels since regions have established different number of levels. At the beginning of the period (academic year 1992-1993), all regions charged similar tuition fees in terms of the minimum LWF value (Figure 1), with the exception of Navarre and Andalusia (whose prices were higher). This finding is attributable largely to the fact that ten of the seventeen regions still formed part of the Ministry of Education (MEC) territory (i.e., education was still administered by the central government in the regions of Aragon, Asturias, the Balearic Islands, Cantabria, Castile and Leon, Castile-La Mancha, Extremadura, La Rioja, Madrid and Murcia). In the case of the maximum LWF level (Figure 2), the regions with the lowest tuition fees were, by and large, those that had been the first to assume responsibility for administering their education policy, and which hence had the opportunity of competing with other regions in terms of price (with the exception of Navarre and the Basque Country, which charged prices above the national average). Recall that Andalusia

applies the same LWF to all university studies and so it is the only region setting the same tuition fees across the board. This explains why its prices are well above the national average in relation to the minimum LWF and below the average in the case of the maximum LWF.

The price differentials between regions have increased over time. In 1992-93, the national credit price of undergraduate studies not adapted to the EHEA at the minimum LWF level was 5.10 euros, with the lowest regional price (the Canary Islands) being 2.6% lower than the national average, and the highest regional price (Andalusia) being 18% higher. However, by the end of the period (2013-14), the national average price was 13.04 euros, with the lowest fee (the Canary Islands) being 32.6% lower, and the highest price (Madrid) being 70.6% higher. However, this increased dispersion was observed in only a few regions, since most set average tuition fees between 10 and 13 euros.

Figure 1. Credit price of undergraduate degrees not adapted to the EHEA. Minimum lab-based weighting factor. Academic years 1992-93, 2009-10, and 2013-14
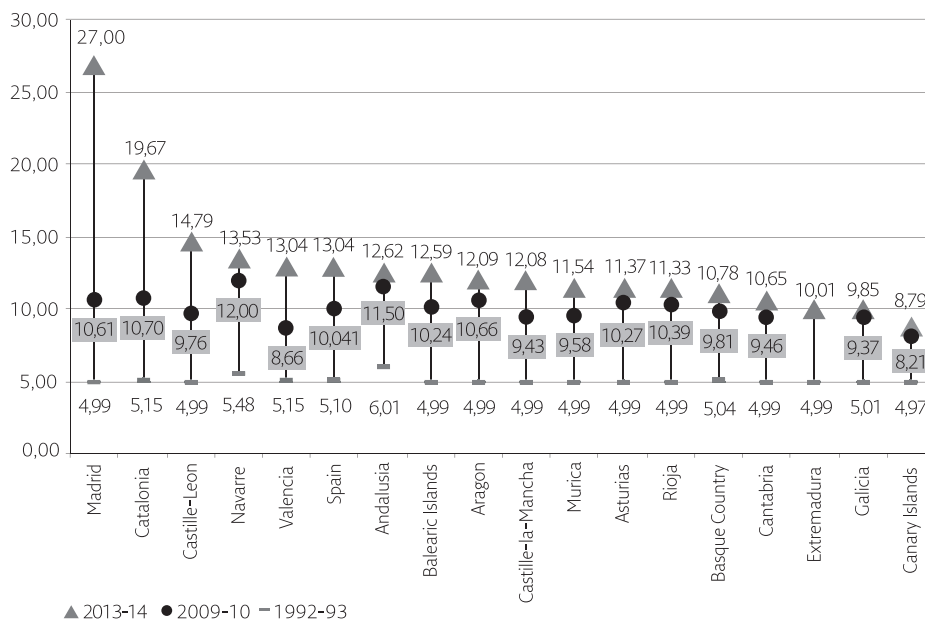
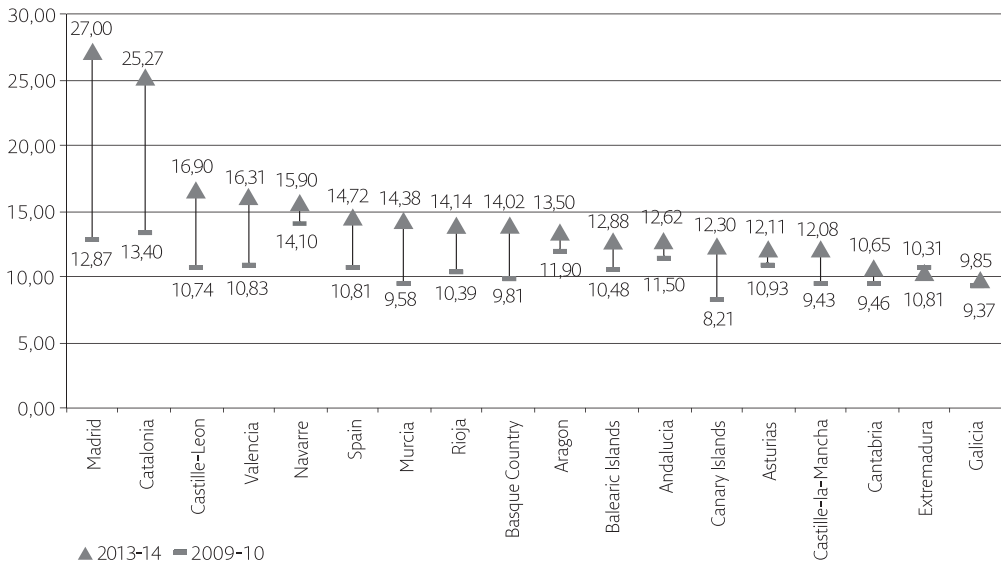Source: Authors' elaboration based on MEC (2013).

Figure 2. Credit price of undergraduate degrees not adapted to the EHEA. Maximum lab-based weighting factor. Academic years 1992-93, 2009-10, and 2013-14
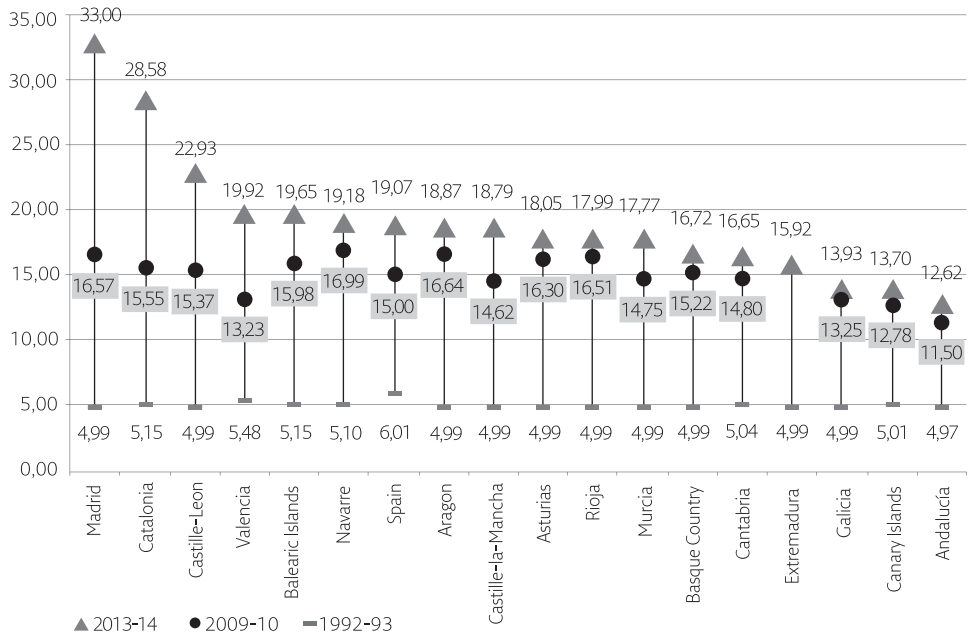
Source: Authors' elaboration based on MEC (2013).

As for the credit price of EHEA first cycle studies (Figures 3 and 4), in the academic year 2009-2010 six regions showed a credit price well below the Spanish average for both the LWF minimum and maximum levels: the Canary Islands, Extremadura, Galicia, Cantabria, Castile-La Mancha and Murcia. The entry into force of Royal Decree-Law 14/2012 resulted in rapid price rises in Catalonia, which at the end of the period had the largest differential with respect to the national average in the case of the maximum LWF level, and in Madrid, where the differential with the Spanish average was greatest in the case of the minimum LWF level.

Figure 3. Credit price of EHEA first cycle studies (*grado*). Minimum lab-based weighting factor. Academic years 2009-10 and 2013-14
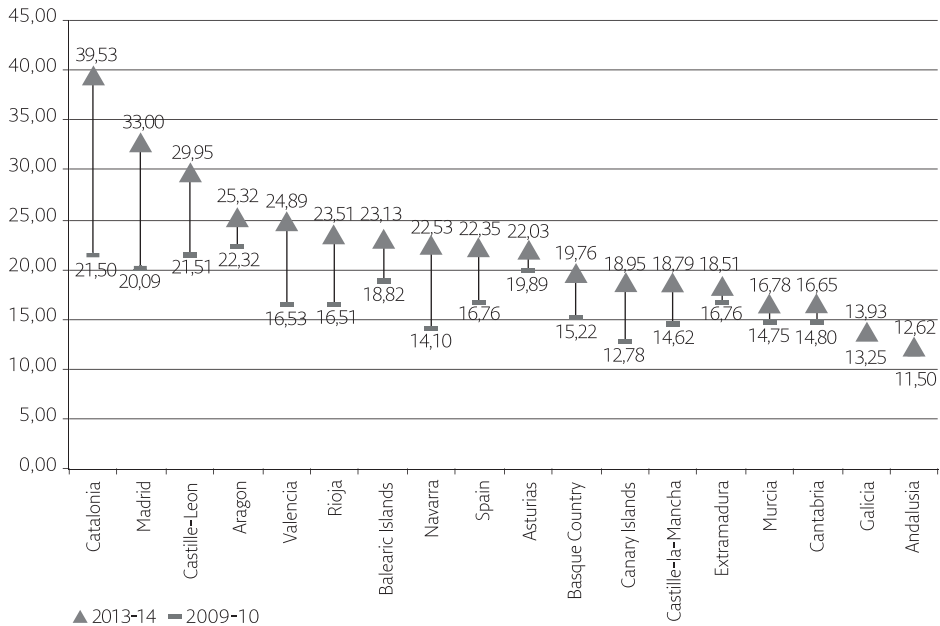

Source: Authors' elaboration based on MEC (2013).

National average fees have risen along the period by around 35% in the case of both the minimum and maximum LWF levels. This rise has been uneven across the regions, emphasising the heterogeneity in the tuition fees of the EHEA first cycle studies, but most regions that showed a credit price above (below) the national average in 2009-10 were also above (below) that average in 2013-14.

The heterogeneity in tuition fees is even more evident in the case of EHEA second cycle studies. In the academic years 2012-13 and 2013-14, the tuition fees for enabling and non-enabling masters became clearly differentiated as a consequence of Royal Decree-Law 14/2012. As a result the prices of non-enabling masters (*máster oficial*), which are in fact the most numerous, became markedly heterogeneous (Figures 5 and 6), while the prices of *enabling* masters remained

Figure 4. Credit price of EHEA first cycle studies *(grado)*. **Maximum lab-based weighting factor. Academic years 2009-10 and 2013-14**

Source: Authors' elaboration based on MEC (2013).

largely uniform across the regions. With regard to non-*enabling* masters, it has to be highlighted that Madrid and Catalonia show by far the highest increment of tuition fees, with prices around 65 euros per credit, whereas in 2006-07 the most expensive prices set by regions where at around 28 euros per credit, being no more than 25 euros in the case of minimum LWF. This strong increment of non-enabling masters' tuition fees in Madrid and Catalonia suits the new 'high price' policy in HE set by both regions and illustrated in Figures 1 to 6.

Figure 5. Credit price of EHEA second cycle studies (*máster oficial*). Minimum lab-based weighting factor. Academic years 2006-07, 2009-10, and 2013-14
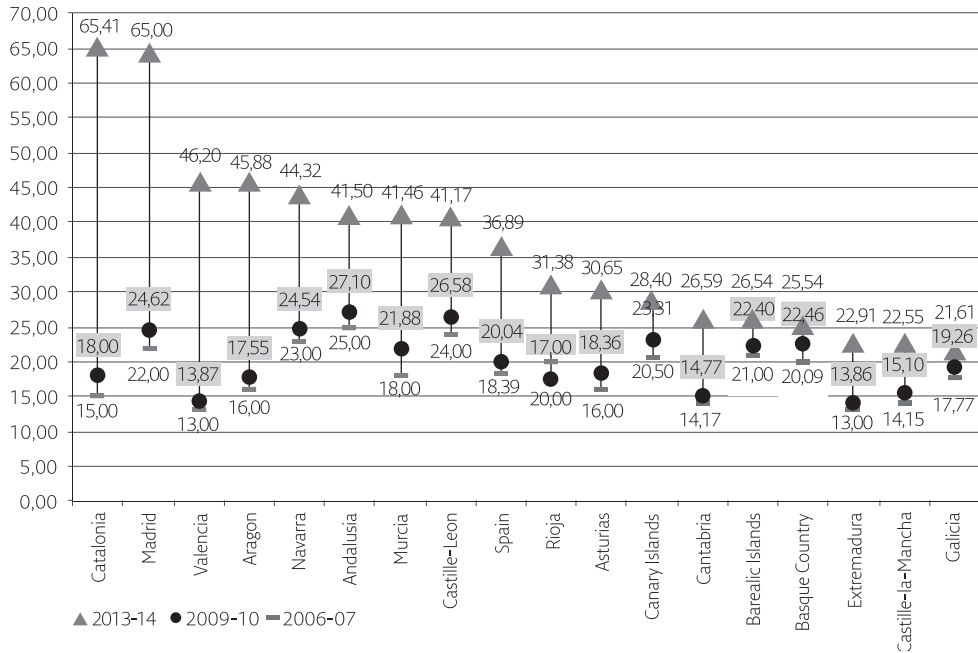
Source: Authors' elaboration based on MEC (2013).

Regarding the evolution of tuition fees of all types of studies since the academic year 2009-10, figures show for undergraduate studies that those not adapted to the EHEA have increased in average less than 30% from 2009-10 to 2013-14 (29.9% in the case of the minimum levels of the LWF and 27.1% for the maximum level), whereas those adapted to EHEA (*grado*) have increased more than 30% (36.2% and 33.4% respectively). In the case of masters, prices have substantially increased in comparison (84.1% in the minimum LWF level and 55.5% in the maximum one). Finally, it has to be pointed out that the tuition fees cited throughout this paper are always those charged the first time a student registers for a subject. However, we highlight that the cost of enrolling for the second (third or fourth) time in a subject previously failed has increased drastically. As an example, in the case of EHEA first cycle studies, the cost of enrolling for the second time in a subject with the maximum LWF level was in average 22% higher than the first enrolment in 2010-11,

Figure 6. Credit price of EHEA second cycle studies (master oficial). Maximum lab-based weighting factor. Academic years 2006-07, 2009-10, and 2013-14
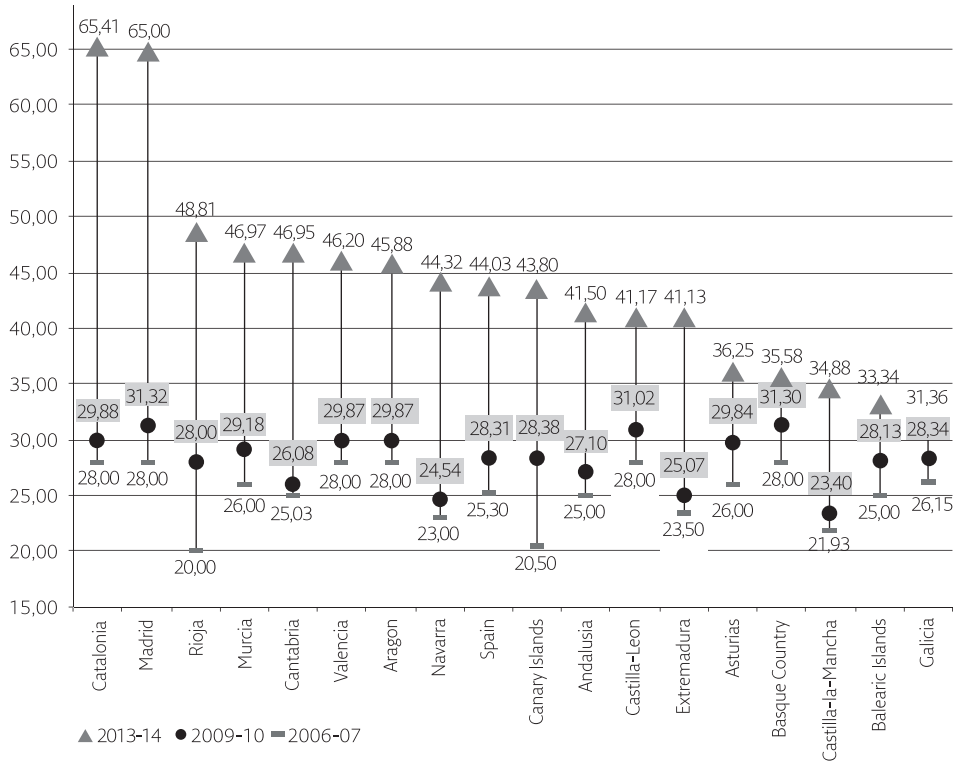
Source: Authors' elaboration based on MEC (2013).

and 72% in 2012-13 (figures are quite similar for subjects with other LWF levels). If a student kept failing a particular subject, the cost of subsequent enrolments was even higher (in the case of the third enrolment the credit price in 2010-11was only 86% higher than the first enrolment but in 202-13 it was 257% higher).

CONVERGENCE ANALYSIS OF TUITION FEES: DATA AND METHODOLOGY

As we have done for the analysis of the evolution of Spanish tuition fees, we analyse the tuition fees for undergraduate studies not adapted to the EHEA, for the EHEA first cycle studies, and for the EHEA second cycle studies (non-enabling masters) separately, taking into account the same two levels of the LWF (minimum

and maximum, i.e., the cheapest and most expensive tuition fees, respectively) and considering the same analysis periods for each type of university degree as in the previous section. Therefore, for undergraduate degrees not adapted to the EHEA we consider the period from 1992-93 to 2013-14; for first EHEA cycle studies, the period from 2009-10 to 2013-14; and for second EHEA cycle studies the period form 2006-07 to 2013-14. Note that tuition fees are examined by considering the price of the university credits established by the regional governments, where a standard subject comprises six credits and one academic year corresponds to sixty credits.

The paper adopts an analytical methodology for studying the evolution over time of regional tuition fees per credit in terms of sigma (σ) and gamma (γ) convergence. The former, σ-convergence, refers to a reduction in the dispersion of a particular variable in a set of units and so, here, it denotes a decrease in the dispersion of university tuition fees between Spanish regions. The latter, γ-convergence, quantifies the changes in the rank position of the regions in relation to a specific variable under study. Here, it analyses the mobility of the Spanish regions in a ranking of their tuition fees and its existence is indicative of an increase in mobility of the regions' rank position.

The economic literature has chiefly calculated σ-convergence using two measures of dispersion: the coefficient of variation (CV) and the standard deviation (SE) of a log-transformed variable, which are defined as follows:

$$CV = \frac{\sqrt{\frac{1}{17}\left(p_{i,t} - \overline{p}_t\right)^2}}{\overline{p}_t} \qquad (1)$$

$$S_e = \sqrt{\frac{(\ln p_{i,t} - \ln \overline{p}_t)^2}{17}} \qquad (2)$$

where $p_{i,t}$ is the average credit price in each region and $_t$ is the average credit price in Spain. In this paper, we use the CV as a dispersion measure to assess σ-convergence. Nevertheless, we also calculated the SE of the log-transformed variable, but the results of both indicators were equivalent. The value of this index is between 0 and 1. A reduction of the index value shows convergence.

Sala-i-Martin (1996a, 1996b) first used σ-convergence to analyse income distribution among countries. As mentioned in the introduction, this type of analysis

was applied to HE in Spain in the work of Escardíbul (1997a, 1997b) in which he examined educational enrolment, and Pérez-Esparrells & Morales (2012) who studied the convergence of public spending in non-university education.

In economics, γ-convergence was also originally applied to the analysis of country income levels, on this occasion by Boyle & McCarthy (1997, 1999) who proposed it as a complement to σ-convergence analysis. For a set of units to show γ-convergence, alterations are needed in the ranking over time. Gamma convergence is calculated using the binary-Kendall index of rank concordance (Kendall & Stuart, 1968), whose definition for comparing ranks at time t with respect to time 0 is given by equation (3), where R is the rank of each region and $var(R)$ is the variance of this rank. This index can take values between 0 and 1, where 1 is the value taken in the initial year. An index value close to 0 means high mobility within the ranking of regions and, hence, is indicative of convergence; while a value of 1 throughout the period indicates a total absence of variations in the ranking and, hence, no convergence.

$$\gamma = \frac{var\ [(R(\gamma)_{it} + R(\gamma)_{i0}]}{var\ [2*R(\gamma)_{i0}]} \qquad\qquad (3)$$

CONVERGENCE ANALYSIS OF TUITION FEES: SIGMA AND GAMMA CONVERGENCE RESULTS

In this section the results of the σ- and γ-convergence are analysed by type of university programme and LWF level (minimum and maximum) and all results are compared.
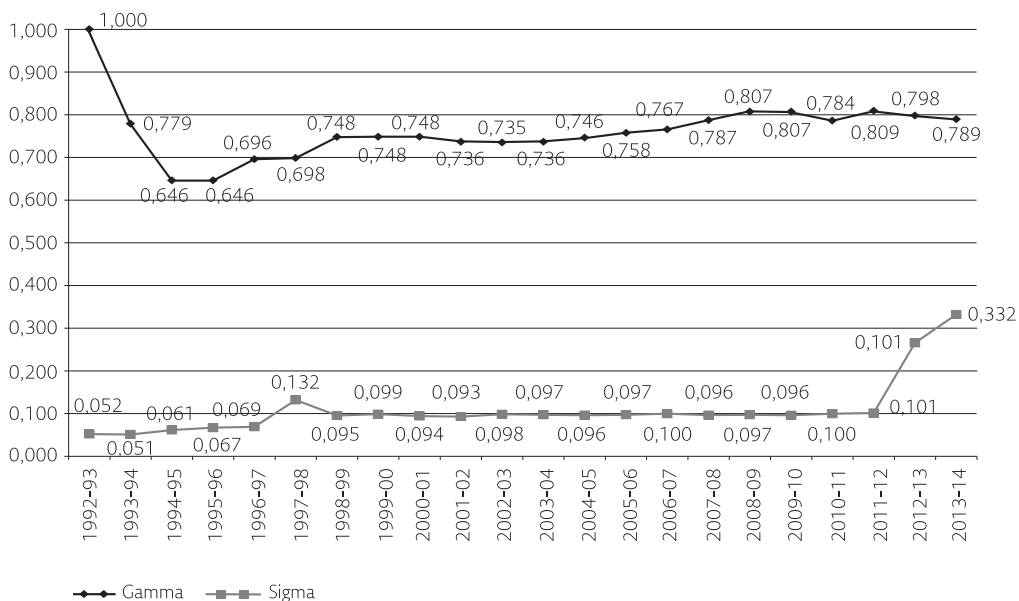
Undergraduate studies not adapted to the EHEA (licenciatura and diplomatura)

In the case of the fees of undergraduate programmes not adapted to the EHEA (*licenciaturas* and *diplomaturas*) to which the minimum LWF level is applied, the evolution of σ-convergence can be broken down into three periods (Figure 7). In the first (from 1992-93 to 1996-97), a low level of dispersion is observed, reflecting the fact that until 1997 the regions in the MEC territory operated a common pricing system. The second period (from 1997-98 to 2011-12) is characterised by a higher level of dispersion (peaking in the first academic year), since the regions had by now abandoned the MEC territory and assumed responsibility for education policy and, as such, had more freedom when setting tuition fees; nevertheless, the level of dispersion remained quite stable. In the third period, which comprises the

last two academic years, a rise in the level of dispersion is triggered by the change in the pricing system introduced by Royal Decree-Law 14/2012.

As for the evolution of γ-convergence in tuition fees, the index presented high values, which increased slightly over the analysis period, indicating divergence (a reduction in the Spanish regions' rank mobility), with the exception of the first three academic years (1992-93 to 1994-95). However, rank mobility has slightly increased since 2012-13 for the minimum LWF level studies, and it has sharply increased in 2012-13 for maximum LWF level studies (when the coefficient fell from 0.928 to 0.725).

Figure 7. σ and γ-convergence of the credit price of undergraduate degrees not adapted to the EHEA. Minimum lab-based weighting factor. 1992-93 / 2013-14

Source: Authors' elaboration based on MEC (2013).

Figure 8. σ and γ-convergence of the credit price of undergraduate degrees not adapted to the EHEA. Maximum lab-based weighting factor. 1992-93 / 2013-14
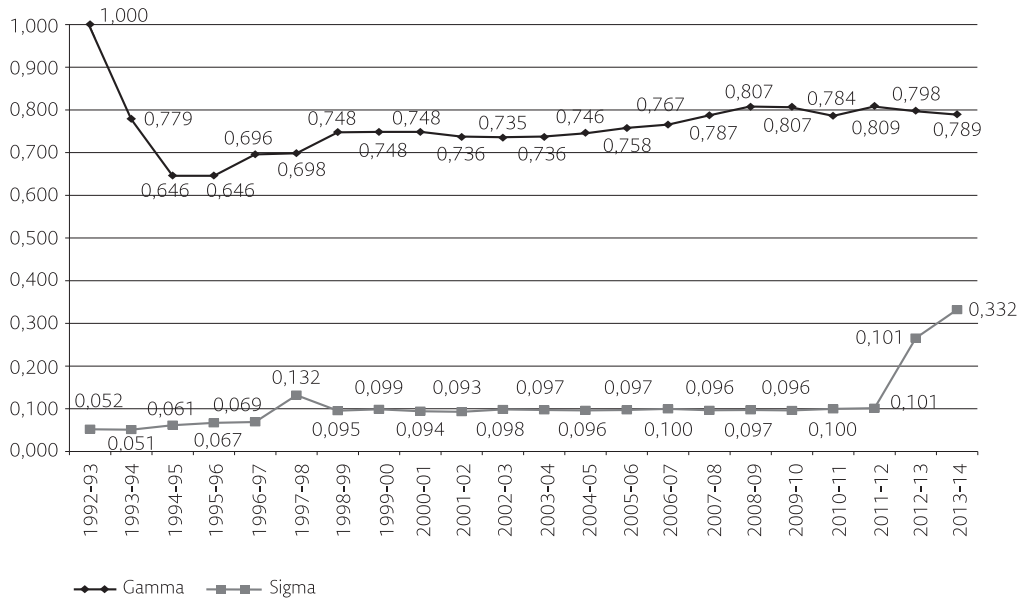
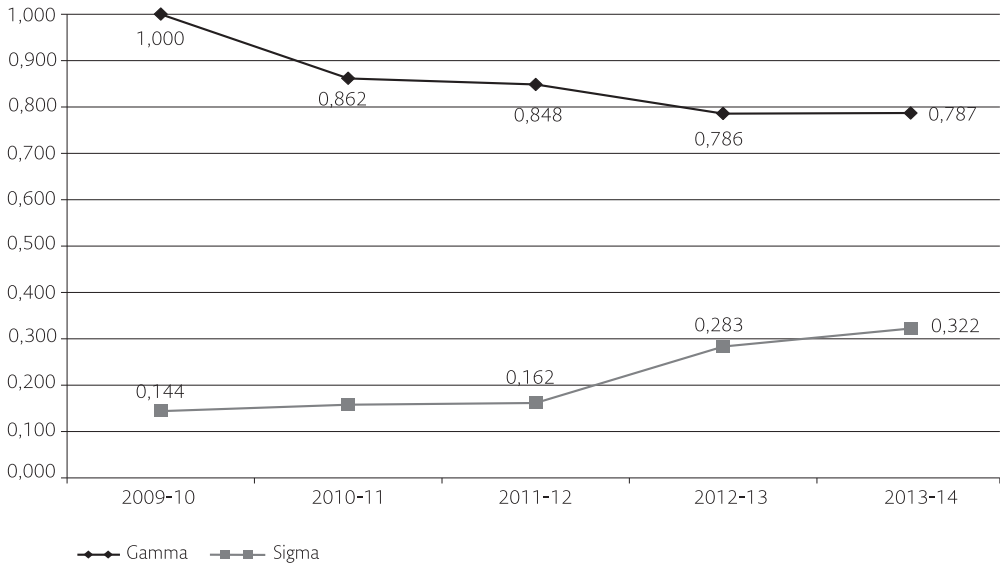Source: Authors' elaboration based on MEC (2013).

EHEA first cycle studies (grado)

In the case of the fees of EHEA first cycle studies (Figures 9 and 10), the five academic years considered show a stable evolution of the σ coefficient except in the last two academic years when the coefficient increased sharply after the introduction of Royal Decree-Law 14/2012. The heterogeneity is greater in the case of studies to which the maximum LWF level is applied than it is in the case of those governed by the minimum level (around 20 and 15%, respectively, during the first three academic years). However, since the academic year 2012-13, the σ coefficient has virtually been the same for both the minimum and the maximum LWF levels (slightly above 30%).

As for the evolution of γ-convergence, in the case of programmes to which the maximum LWF is applied, the Spanish regions presented a low level of mobility in terms of their ranking based on tuition fees, with coefficient γ taking values very

close to 1. The increase in mobility was somewhat higher in the case of the minimum LWF level with the γ-convergence coefficient falling from 1 to 0.79 while for the maximum level it fell to 0.90.

Figure 9. σ and γ-convergence of the credit price of EHEA first cycle studies (grado). Minimum lab-based weighting factor. From academic year 2009-10 to 2013-14
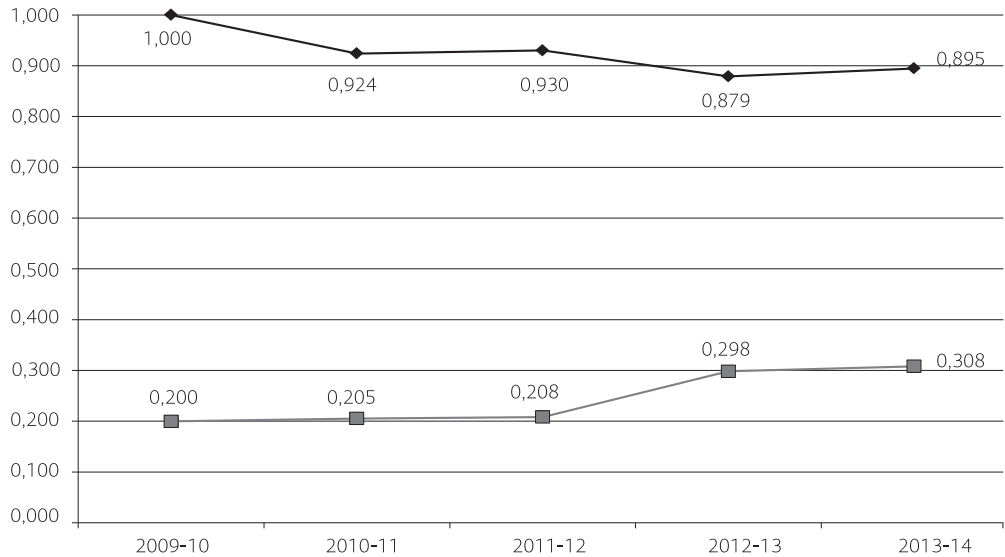

Source: Authors' elaboration based on MEC (2013).

EHEA second cycle studies (master oficial)

The dispersion of the average credit price of EHEA second cycle studies to which the minimum LWF is applied (Figure 11) fell slightly after 2009-10, but it almost doubled in the academic year 2012-13 (the σ coefficient increasing from 0.21 to 0.41). However, in 2013-14 the dispersion decreased to 0.37. Compared to the minimum LWF level, tuition fee dispersion of those studies to which the maximum LWF level is applied was lower from the beginning of the period under analysis (Figure 12). For the maximum level, dispersion was decreasing until the academic year 2011-12. It then increased sharply in 2012-13 (to 0.318), and decreased again in the last academic year (to 0.217).

Figure 10. σ and γ-convergence of the credit price of EHEA first cycle studies (grado). Maximum lab-based weighting factor. From academic year 2009-10 to 2013-14

Source: Authors' elaboration based on MEC (2013).

As for the evolution of γ-convergence, over the period analysed the coefficient took values between 0.9 and 1 for both LWF levels, indicating low mobility; however, the γcoefficient fell in 2012-13 (0.69 in the case of the minimum and 0.54 in the case of the maximum LWF levels). As such, the mobility of regions within the ranking increased sharply. Regarding the last academic year, the increase of mobility continued for the minimum LWF level but it slightly reduced for the maximum level.

Figure 11. σ and γ-convergence of the credit price of EHEA second cycle studies (master). Minimum lab-based weighting factor. From academic year 2006-07 to 2013-14
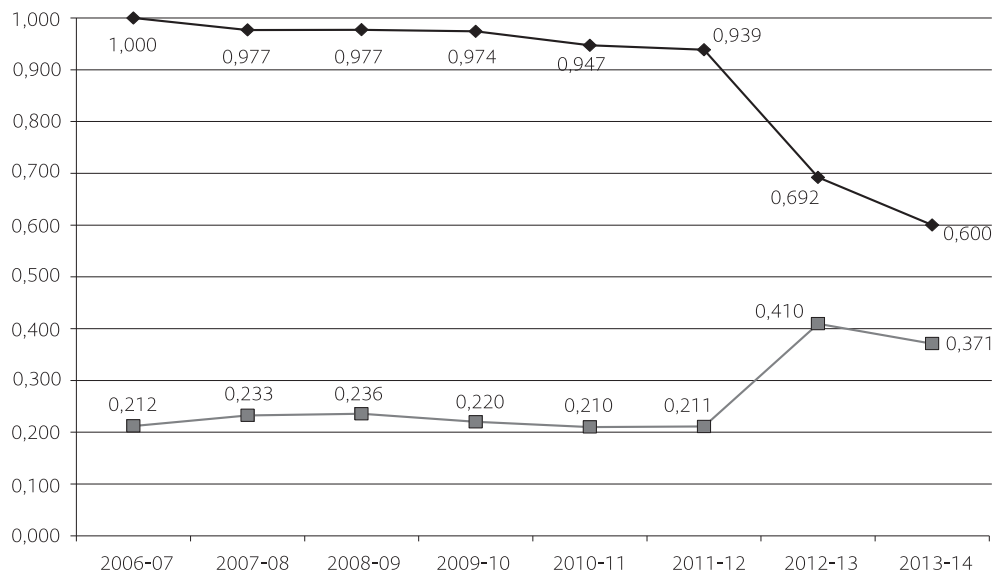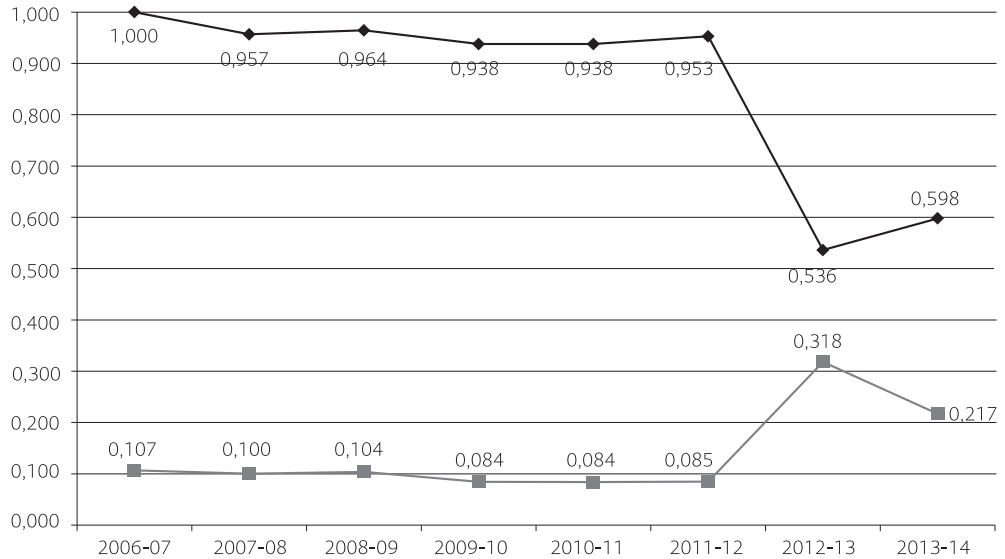

Source: Authors' elaboration based on MEC (2013).

Comparative convergence analysis

The results obtained from the σ-convergence analysis show that the evolution of undergraduate degrees adapted or otherwise to the EHEA, and applying minimum and maximum LWF levels, is quite similar. Thus, we find a slight increase in the dispersion over the whole period that only becomes more marked since the new price system established by the Royal Decree-law 14/2012. When we compare EHEA adapted and non-adapted studies, the coefficient of σ-convergence is higher (divergence) for the former (*grado*). Our analysis of master's programmes finds a stable evolution (there being a very slight reduction in the coefficient) until 2012-13, when divergence increased significantly.

If we compare the analyses' results by LWF level, in the case of EHEA adapted studies, the dispersion of EHEA first cycle studies to which the maximum LWF

Figure 12. σ and γ-convergence of the credit price of EHEA second cycle studies, non-enabling (master). Maximum lab-based weighting factor. 2006-07 / 2013-14

Source: Authors' elaboration based on MEC (2013).

level was applied was lower than the dispersion in the case of studies to which the minimum level was applied, whereas the dispersion of master's studies to which the minimum LWF was applied was higher than the dispersion of studies with the maximum level of the factor.

The results obtained from the γ-convergence analysis show a similar slight increase in the coefficients for both undergraduate degrees not adapted to the EHEA with the minimum and maximum levels of the LWF, but with higher overall values for studies to which the maximum of the factor is applied. Here, an increase is indicative of divergence in the sense that mobility among the rank orders of the regions is reduced. However, since 2012 there is an increase in mobility, especially in studies with maximum LWF. For undergraduate degrees adapted to the EHEA, there was a decrease in the coefficient during the whole period (although the reduction was most marked in the last academic year). Thus, the mobility of regions as regards their position in the ranking has increased. The γ coefficient shows that

convergence was strongest in those studies to which the minimum LWF value was applied. The values of EHEA adapted and non-adapted studies are similar, except in the last year in the case of studies with the maximum LWF when the coefficient falls considerably. Master's studies show a slight reduction that became particularly marked in the 2012-13 academic year, especially in the case of studies with a maximum LWF level. Thus, γ convergence (mobility between regions) seems to be relevant only after the publication of the Royal Decree-Law of 2012.

<h2>DISCUSSION AND CONCLUSIONS</h2>

The analysis presented shows that there has been an increase in tuition fees in Spain in all type of studies. This increase has been most marked in the case of EHEA second cycle studies, perhaps because master's courses are not considered basic university training but rather provide high level, specialised knowledge. Moreover, Catalonia and Madrid, the two regions that play host to most students and which have the highest ranking universities (see, for example, the ARWU or QS University Rankings), are the regions that have increased the most the tuition fees of EHEA first cycle studies and, more particularly, of graduate EHEA second cycle studies. In addition, the cost of re-registering for a previously failed subject has increased notably in the last years.

With regard to σ-convergence, all types of university studies present evidence of a slight divergence process (i.e., increasing dispersion), which is particularly marked in the last two academic years analysed here (2012-13 and 2013-14), although only in 2012-13 for master studies. As for mobility in the positions held by the Spanish regions in a ranking based on their tuition fees, the γ-convergence analysis shows increasing mobility over time in the case of (undergraduate and graduate) studies adapted to the EHEA, especially in the academic year 2012-13 and in the case of master's programmes. As for undergraduate studies not adapted to the EHEA, there is no γ-convergence except for those studies for which the maximum level of the lab-based weighting factor (LWF) is applied after 2012-13.

Thus, the σ- and γ-convergence analyses allow us to conclude that the dispersion and mobility of tuition fees have increased among Spanish regions. This can be accounted largely for three factors: first, education policy in ten regions remained under central government control up to 1997; second, the above-mentioned adaptation of courses to the EHEA: and third, credit prices rose markedly in some regions in 2012-13, when the new state regulation changed the pricing system from an incrementalist system based on the evolution of the national Consumer

Price Index to one in which tuition fees were fixed in proportion to tuition costs. However, more research on the determinants of tuition fees is needed including other factors such as the financial situation of regional governments, the party in power, the role of quality in the establishment of prices, etc.

Although more time is needed to determine whether the effects observed will persist in the medium and long-term, the new pricing system has meant that cost-sharing has become quite important in some regions (such as Madrid or Catalonia), a change from the Spanish traditional pricing system based on low tuition fees and low levels of financial support to students. This finding is in line with most international evidence because, as Vossenstysen et al. (2013) report, with the exception of Germany (which has virtually withdrawn its policy of charging tuition fees in some *Länder*) and some countries that do not charge tuition fees (such as the Nordic countries), several countries are introducing (or reintroducing) tuition fees for regular students, while other economies are increasing them. In fact, countries such as the United Kingdom, Australia, New Zealand, the United States, Canada and the Netherlands have a tradition of fixing student tuition fees, in a more competitive model and with higher rates than the rest.

Given this new Spanish scenario of higher tuition fees, increasing regional dispersion of tuition fees and still low financial support for students, the recent increases in prices need to be offset with higher levels of grants and loans (a policy that is yet to be forthcoming) in order to preserve the equity of access that was previously ensured through low tuition fees. In other words, policymakers and politicians need to rethink student funding and financial support policy, which is particularly undeveloped in Spain compared to policies operated in other European countries (OECD, 2013), in order to enhance social equity in this period of strong economic recession and thus ensure that all students can access the Spanish HE system regardless of their region of residence. It should be beard in mind that if increases in tuition fees are implemented together with increases in scholarships (and other students financial support) the attendance ratio at university may not decrease -see Dynarski (2002, 2003, 2008), Hemelt & Marcotte (2008), Nielsen et al. (2010), Dearden et al. (2011, 2013) and Dynarski & Scott-Clayton (2013). This is especially the case for a decentralized country such as Spain where regional fee dispersion has increased. Thus, it is reasonable in a decentralised model for regions to differentiate themselves in terms of their regional policies (e.g., by setting different tuition fees). However, access to university studies should be guaranteed to all citizens under similar income conditions. Thus, grants, loans and tuition fees discounts depending on family income should be implemented to guarantee that students' access to university is not limited by economic reasons in any region,

regardless of the cost of living and the level of fees setting by each region (see a review of the Italian and the recently implemented Catalan price system that consider family income in Gil and Carta (2014).

In addition, differences in tuition fees should not only be among universities in different regions, but rather universities should set their own tuition fees in accordance with their teaching and research strategies and the services that they provide. This would strengthen university autonomy in the sense that each institution would be able to specialise and to set their prices accordingly, without the limitations currently imposed by the regional governments' LWF levels. Nowadays, Royal Decree-Law 14/2012 of 20th April allows universities to set different tuition fees as these can now be defined in relation to the cost of the service provided, although universities cannot directly relate those fees to their teaching and research strategy yet. In this context, since the Royal Decree-Law 14/2012 relates fees to production costs, it is essential to have a common accounting system for all universities (not fully developed yet) to meet the actual cost of the studies (see Rodríguez Plaza, 2012).

Finally, although it is out of the scope of this paper, future research should considered whether increases in public universities' fees alter private universities' prices. No data for the whole country is available. However, a study for the region of Madrid (see FUCI, 2013) allows us to conclude that whereas prices reduced in private universities (5.3% from 2008 to 2011) after the entry into force of the Royal Decree Law 14/2012 (when public universities increased significantly their fees) private universities' prices increased by 17.3%.

REFERENCES

Agasisti, T., Pérez-Esparrells, C., Catalano, G., & Morales, S. (2012). Is expenditure on higher education per student converging across EU-15 Countries? *Studies in Higher Education*, *37*(2), 235-252.

Albert C., & Roig, J. M. (2011). La financiación de la educación superior. En *Lecturas sobre Economía de la Educación. Homenaje a María Jesús San Segundo*. Madrid: Ministerio de Educación, Cultura y Deporte.

Boyle, G. E., & Mccarthy, T. G. (1997). A simple measure of beta convergence. *Oxford Bulletin of Economics and Statistics*, *59*(2), 257-264.

Boyle, G. E., & McCarthy, T. G. (1999). Simple measures of convergence in per

capita GDP. A note on some further international evidence. *Applied Economics Letters*, *6*(6), 343-347.

Bruckmeier, K., & Wigger, B. U. (2013). The effects of tuition fees on transition from high school to university in Germany. *CESifo Discussion Paper 4237*. Retrieved November 2, 2013 from http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2267731##

Dearden, L., Fitzsimons, E., & Wyness, G. (2011). The impact of tuition fees and support on university participation in the UK. *Centre for the Economics of Education Research Paper 126*. Retrieved November 2, 2013 from http://cee.lse.ac.uk/pubs/abstract.asp?index=3872

Dearden, L., Fitzsimons, E., & Wyness, G. (2013). Money for nothing, estimating the impact of student aid on participation in Higher Education. *Department of Quantitative Social Science Working Paper 13-04*. Retrieved March 8, 2014 from http://repec.ioe.ac.uk/REPEc/pdf/qsswp1304.pdf

Del Rey, E. (2011). Deferring higher education fees without relying on contributions from non-students. *Education Economics*, *20*, 510-521.

Dolado, J. J. (2010). Disfunciones en el sistema universitario español, diagnóstico y propuestas de reforma. En D. Peña (Ed.), *Propuestas para la Reforma de la Universidad Española* (pp. 13-26). Madrid: Fundación Alternativas.

Dynarski, S. (2002). The behavioral and distributional implications of aid for college. *The American Economic Review*, *92*(2), 279-285.

Dynarski, S. (2003). Does aid matter? Measuring the effect of student aid on college attendance and completion. *The American Economic Review*, *93*(1), 279-288.

Dynarski, S. (2008). Building the stock of college-educated labor. *Journal of Human Resources*, *43*(3), 576-610.

Dynarski, S., & Scott-Clayton, J. (2013). Financial aid policy. Lessons from research. *The Future of Children*, *23*(1), 67-91.

Dobbins, M., & Knill, C. (2009). Higher education policies in Central and Eastern Europe: convergence toward a common model, *Governance*, *22*, 397-430

Dwenger, N., Storck, J., & Wrohlich, K. (2012). Do tuition fees affect the mobility of university applicants? Evidence from a natural experiment. *Economics of Education Review*, *31*(1), 155-167.

Escardíbul, J. O. (1997a). Convergencia educativa, un análisis de las Provincias españolas. En *Libro de Actas de las VI Jornadas de la Asociación de Economía de la Educación* (pp. 212-220). Vigo: AEDE.

Escardíbul, J. O. (1997b). Educación, nivel de renta y convergencia educativa. Un análisis de las Comunidades Autónomas españolas. En *Libro de Actas de las*

VI Jornadas de la Asociación de Economía de la Educación (pp. 198-211). Vigo: AEDE.

Escardíbul, J. O. y Oroval, E. (2011). Análisis del sistema actual de precios públicos y ayudas al estudio en la universidad española y de su previsible evolución. En *Lecturas sobre Economía de la Educación* (pp. 61-78). Madrid: Ministerio de Educación, Cultura y Deporte.

FUCI (Federación de Usuarios Consumidores Independientes). (2013). *El coste del primer curso en las universidades públicas y privadas de la región.* Madrid: Federación de Usuarios Consumidores Independientes de la Comunidad de Madrid.

Gil Izquierdo, M., & Carta, F. (2014). Una alternativa progresiva a la estructura lineal de precios públicos en la financiación del sistema universitario en España. *Estudios de Economía Aplicada*, *32*(3), 1097-1116.

Hemelt, S. W., & Marcotte, D. E. (2008). Rising tuition and enrollment in public higher education. *IZA Discussion Paper 3827*. Retrieved September 3, 2013 from http://ftp.iza.org/dp3827.pdf

Hernández Armenteros, J., Moreno, D., Pérez, J. A., & Sánchez, J. (2011). La financiación como instrumento de mejora de la eficacia de las universidades. Un enfoque regional. En *Lecturas sobre Economía de la Educación* (pp. 95-126). Madrid: Ministerio de Educación, Cultura y Deporte.

Kendall, M., & Stuart, A. (1968). *The advanced theory of statistics (3 Vols)*. London: Charles Griffin.

Lepori, B., Huisman, J., & Seeber, M. (2014). Convergence and differentiation processes in Swiss higher education, an empirical analysis. *Studies in Higher Education*, *39*(2), 197-218.

MECD. (2013). *Estadísticas de precios públicos universitarios*. Madrid: Ministerio de Educación, Cultura y Deporte.

Mueller, R. E., & Rockerbie, D. (2005). Determining demand for university education in Ontario by type of student. *Economics of Education Review*, *24*(4), 469-483.

Nielsen, H. S., Sorensen, T., & Taber, C. (2010). Estimating the effect of student aid on college enrolment. Evidence from a government grant policy reform. *American Economic Journal, Economic Policy*, *2*(2), 185-215.

OECD. (2013). *Education at a Glance 2013. OECD Indicators.* Paris: OECD.

Ortega, V., Pérez Esparrells, C., & Morales, S. (2010). *Los precios públicos y las subvenciones y ayudas a los estudiantes universitarios y sus familias.* Madrid: Consejo Social de la Universidad Politécnica de Madrid.

Ortega, V., Pérez Esparrells, C., & Morales, S. (2011). *Análisis de los precios públicos de las matrículas universitarias y de los sistemas de becas y ayudas a los estudiantes en*

España y Europa, una visión crítica y prospectiva. Madrid: Conferencia de Consejos Sociales de las Universidades Públicas. Comunidad de Madrid.

Pereyra, M. A. (2002). Changing educational governance in Spain, decentralization and control in the autonomous communities. *European Educational Research Journal*, *1*(4), 667-675.

Pérez Esparrells, C., & Vaquero, A. (2011). Hacia un nuevo modelo de financiación universitaria en Europa. En *Lecturas sobre Economía de la Educación* (pp. 33-60). Madrid: Ministerio de Educación, Cultura y Deporte.

Pérez Esparrells, C., & Morales, S. (2012). La descentralización de la enseñanza no universitaria en España, análisis de convergencia desde la perspectiva del gasto. *Presupuesto y Gasto Público*, *67*, 137-160.

Rodríguez Plaza, S. (2012). *El modelo CANOA/Universidades, Características generales. Personalización e implantación. Problemas prácticos y resumen de la situación actual. Proceedings.* Jornada sobre Implantación de la Contabilidad Analítica en las Universidades Españolas. Retrieved February 3, 2014 from www.uv.es/ aico/documentos/ponencias2012/Ponencia%20III/EL%20MODELO%20 CANOA%20UNIVERSIDADES.pdf

Sala-i-Martin, X. (1996a). Regional Cohesion. Evidence and theories of regional growth and convergence. *European Economic Review*, *40*(6), 1325-1352.

Sala-i-Martin, X. (1996b). The classical approach to convergence analysis. *The Economic Journal*, *106*(437), 1019-1036.

Tauch, C. (2004). Almost half-time in the Bologna Process. Where do we stand? *European Journal of Education*, *39*, 275-288.

Vossensteyn, H., Cremonini, L., Epping, E., Laudel, G., & Leisyte, L. (2013). *International experiences with student financing. Tuition fees and student financial support in perspective*. Enschede: CHEPS-University of Twente. Retrieved january 15, 2014 from the Website of the University of Twente: http://doc.ut- wente.nl/86587/1/international-experiences-with-student-financing-tuition- fees-and-student-financial-support-in-perspective.pdf