Trends in spending on Higher Education per student in Europe countries: an analysis of convergence (1998-2006)

Carmen Pérez-Esparrells

Universidad Autónoma de Madrid

carmen.perez@uam.es

Tommaso Agasisti

Politecnico di Milano

Susana Morales

IES C. Madrid y UAM

Giuseppe Catalano

Politecnico di Milano

Abstract

Although there is a growing interest of European policy makers in Higher Education (HE) issues, especially on cross-national policy convergence, there is still a lack of empirical work of comparative analyses of HE policy. This paper shows the trend in *spending per student* at Higher Education Institutions (HEIs) in the EU-15 countries in the period 1998-2006. The results demonstrate that there was a tendency towards convergence (as measured through traditional convergence indicators). The ratio of convergence is higher after 2001, suggesting that the implementation of European-level policies (e.g., the Bologna Declaration, the Lisbon Strategy, etc.) had an impact not only in the political arena, but also at an economic level. The convergence has been driven more by private financial resources than by public ones, supporting evidence of a gradual transformation of the traditional patterns of financing HE in the old European countries' members.

Key words: Higher Education Institutions, expenditure in Higher Education, sigma and beta convergence, European policies

JEL Classification: H52, I20, I23, I28.

1. Introduction

After the Bologna Process, the analysis of the reforms in Higher Education in all European countries has highlighted in recent years. The objectives of these reforms ranged from improving the financial autonomy of universities, giving them autonomy in the organization of teaching matters, and establishing procedures for higher education assessment. But the most important change involved is the budget situation. In this context, potential convergence of European HE systems (and their funding models) in the course of the Bologna Process has become a topic of great interest, but such studies suffer from a thin empirical and comparative basis[1].

In current debates about funding of Higher Education, the demand for high-quality education, which may mean more spending per student, is often promoted for many European countries in the last decades. While it is difficult to determine the level of spending needed to prepare a student for the labour market, international comparisons can be helpful in assessing the level of public and private spending of different types of Higher Education systems.

In this context, it is useful to ascertain whether the potential effects of this process of convergence are actually influencing financial choices, with regards to levels of expenditure of different HEIs in European countries. One of the recent challenges for European HEIs is to accept the diversification of funding: public and private resources (this is the paradigm of "cost-sharing"; Johnstone, 2003). Nevertheless, the idea of maintaining a similar student budget in all European countries could be a guarantee of certain "equity" in the provision of this educational service and a convergence in HE expenditure per tertiary student. From this point of view, the adopted approach opens a new area of research. There is still attention paid to the empirical testing of "financial convergence" in HE hypotheses suggested by the convergence analysis. More specifically in this paper, the analysis through traditional convergence indicators can reinforce the idea that convergence in HE promoted by the Bologna Process (in academic terms) could have a reflect in a real convergence.

The aim of this work is to analyze whether a convergence of expenditure per student of higher education institutions has occurred in the EU-15[2]. To the best of the authors' knowledge, there are no empirical attempts in the literature to specifically study the topic of the financial

[1] A good theoretical analysis of the differential impact of the Bologna Process can be found in Heinze and Knill (2008). Similarly, another descriptive analysis of the role of finance in the Bologna Process can be found in Martín Vallespín (2009).

[2] We use data from Education at a Glance (OECD, several years). In this paper, we had to choose the EU-15, because data for the EU-19 are not available for all the considered period.

convergence in terms of expenditure per student[3]. One of the aims of the paper is precisely to fill this gap, shedding new light on the analysis of the convergence process in Europe sped up by Bologna Process. For this approach we use the traditional convergence indicators in the whole interval (years 1998-2006). Moreover, to observe whether the Bologna Process has influenced the convergence, the interval has been divided into two sub-periods (1998-2001; 2001-2006), making the same convergence analysis for each period and introducing the variable GDP per capita to control for countries' wealth.

The paper is organised as follows. Section 2 presents a brief analysis of several indicators of financial resources invested in HE between 1998 and 2006. Section 3 describes the methodology and the main results. Finally, Section 4 ends with the conclusions that can be drawn from our study.

2. Funding and Expenditures on Higher Education in Europe

The trends of European governments are to introduce more resources into HE systems, while enhancing greater transparency in management and accountability. On average, the UE-15 countries devoted 2.9% of their total public expenditure to HE in 2006[4]. HE is considering a priority in all European countries. Indeed, between 1998 and 2006 public expenditure on HE greatly increased, from 2.5% to almost 2.9% of the total public expenditure on average in the EU-15 countries (table 1). Nevertheless, levels vary greatly between countries: as a proportion of total public expenditure, France, Portugal and Italy spend less than 2.2%, while Denmark, Finland or Sweden devote between 3.5% and 4.5%, reflecting the fact that HE is considered to be a public good in all Scandinavian countries.

<Table 1> around here

Although budget consolidation puts pressure on HE along with other levels of education and every other public services, from 1998 to 2006, expenditure on HEIs typically grew faster than national income (OECD, 2009). Over this period, expenditure on HEIs as a percentage of GDP rose just from 1.2% to 1.3% (table 1). The figures suggest that there are important differences among countries. Again, Scandinavian countries present the highest levels in 2006. The figures suggest that there are important differences among countries. Scandinavian

[3] A contribution by Diebolt and Jaoul-Grammare (2006) studied the convergence of higher education loads in European countries, but not from a financial point of view.
[4] Public spending on HE includes expenditure by all public entities including ministries of education (or other ministries), local and regional governments and other public entities, organizations and agencies.

countries present the highest levels in 2006: Denmark (1.7%), Finland (1.7%) and Sweden (1.6%). By contrast, some Mediterranean countries spent the lowest percentages: Spain (1,1%) and Italy (0.9%). However, although there are still differences between countries, these differences have been shortened after the starting point of Bologna process, 1998.

Table 2 shows relative proportions of public and private funding[5] on HEIs. Differences in sources of HEIs are more striking between UE-15 countries and other OECD countries, such as the United States or Japan (with only around 33% of public sources). By contrast, the UE-15 countries have 82% of public sources and 18% of private sources and, over the period analysed, there has not been many changes in this average distribution. However, among countries there are differences. In the last years, the United Kingdom and Portugal are the countries with the highest levels of private expenditure on HEIs (over 33%), following by Italy, the Netherlands and Spain (with more than 22% in 2006). In general, between 1998 and 2006, countries with a lower percentage of private expenditure have increased it. Nevertheless, countries with an important proportion of public expenditure (more than 90%) continue with the same trend over the same period (Finland, Sweden and Greece[6]).

< Table 2 > around here

Table 3 shows the changes in expenditure on HEIs per student in equivalent USD[7]. At the tertiary level, expenditure per student increased in all EU-15 countries, as spending increased to keep up with rising students numbers (especially in Ireland, The Netherlands and Sweden). Such spending has increased between USD 8,390 in 1998 to USD 13,093 per student in 2006[8]. It is important to note that this variable has been increasing in the period considered (almost 40%, in terms of the UE-15 countries' mean). Also, it can be observed that the degree of dispersion has been increasing between 1998 and 2001 and falling between 2001 and 2006. However, the differences among countries continue, being more than double (Sweden, with expenditure per student of USD 16,990 and Italy with USD 8,720 per student). The gaps between countries are generally related to different levels of public/private mixtures in financing HE, and this fact also reflects differences in institutional structures and traditions. In

[5] Private funding is the proportion of expenditure on HEIs covered by individuals, businesses and other private sources, including subsidised private payments.
[6] In 2006 Portugal data are not available but in 2005 all the indicators are the lowest ones.
[7] This expenditure indicator is calculated by dividing the total expenditure on HEIs by the corresponding full-time equivalent enrolment. The data are expressed in equivalent USD $ instead of EUR because the OECD data uses this currency as a measurement.
[8] The USD $ 13,093 included all services (educative, ancillary services and particularly research and development activities).

2006, Sweden (USD 16,991), Denmark (USD 15,391) Austria (USD 15,148) and The Netherlands (USD 15.196) have reached the highest levels in expenditure on HEIs per tertiary students. On the other hand, Italy (USD 8,725) and Portugal (USD 9,724) have recorded the lowest expenditure per student.

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3. Main results

The concept of convergence plays a crucial role in HE funding. In the neo-classical convergence analysis, we can understand convergence in HE as a tendency towards reduction over time of expenditure per tertiary student disparities across countries. We can say that there is convergence in a given sample (the EU-15 countries) when the poorer country (in terms of expenditure per student) tends to grow faster than their richer neighbours, thereby reducing the expenditure on HEIs per student differential between them[9]. When we observe the opposite pattern (i.e. when the rich country grows faster and increases its lead) we can say that there is a divergence in this sample of the EU-15 countries.

Nevertheless, in many situations an *absolute convergence* cannot take place since there are different structural conditions across countries, so that they do not converge at the same steady equilibrium point. In these cases, we use what Sala-i-Martin (1996), Barro and Sala-i-Martin (1992) and Mankiw, Romer and Weil (1992) denominated *conditional convergence*[10]. Conditional convergence makes allowances for underlying factors (e.g. GDP per capita) that may condition the degree of convergence which can occur.

Finally, sigma convergence comes closest to the conventional understanding of convergence as the decrease in variation of expenditure per student over time. In its classic form the most important measure of cross-section analysis of dispersion that has been used essentially

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[9] For *absolute* β-convergence analysis, equation (1) proposed by Sala-i-Martin (1996) has been used.

(1) $$\frac{1}{T}\ln(\frac{H_{i,t}}{H_{i,j}}) = \alpha + \left[\frac{1-e^{-\beta T}}{-T}\right]\ln(H_{i,j}) + \mu_{i,t}$$

[10] The formula for conditioning a convergence study is introducing regional or additional explanatory variables (regression 2), which considers the structural differences of each country. In this case, the regression to estimate would be:

(2) $$\frac{1}{T}\ln(\frac{H_{i,t}}{H_{i,j}}) = \alpha + \left[\frac{1-e^{-\beta T}}{-T}\right]\ln(H_{i,j}) + \lambda\psi_{i,t} + \mu_{i,t}$$

is coefficient of variation (Barro and Sala-i-Martin, 1992). This kind of convergence, called σ-convergence, takes place when dispersion decreases over time, that is to say, inequalities on expenditure per student in HE among countries are reduced throughout the period.

In general terms, a reduction of the dispersion among countries has been produced as a result of *σ-convergence* (Figure 2). However, although the dispersion has been reduced over time, there have been very important differences throughout the entire period. In the first stage, the coefficient of variation increased until 2000, in this year at its maximum value, 0.33. From 2001 on there is a more or less continuous decrease, stabilising at 0.23 in the last year, 2006. This fact reinforces that Bologna Process has implied a convergence among European countries in terms of expenditure per student and, at this moment, we can say that we enter in a new period of "approach".

<Figure 1> around here

The results of β-convergence for the whole period (1998-2006) are also clear (Table 4). Convergence exists in the expenditure on HEIs per student among countries throughout the entire period (α and β estimated parameters are statistically significant), though the above-mentioned convergence is weak (with a speed of convergence of 5.3%). However, taking into account that the "spirit" of the Bologna Process could have had some influence on the expenditure per tertiary student, we find that, whereas in the first period, until 2001, convergence has not taken place. In the second period (2001-2006)[11], convergence has increased – observe that the parameters of the model have improved their significance, the R^2 has improved and the speed of convergence has been much higher (8.6%).

<Table 4> around here

We also investigated whether convergence during the period 1998-2006 has been affected by national wealth, in this case, GDP per capita. A new estimate of the model, including the new variable, has been done. This variable differentiates between rich and poor countries. The inclusion of GDPpc is only significant in the period 1998-2001 (Table 5), as estimated parameters have improved their significance and the goodness of fit increased to 52.64%. As a consequence, this implies that the growth rate of expenditure per student had actually been influenced by the level of GDPpc during the first period (1998-2001); that is to say, absolute

[11] The policy of R & D is very important in Higher Education and has become the key in the European Research Area promoted by the Lisbon Strategy. Therefore, we have analyzed that a convergence process of this expenditure on R&D per student has been produced in the period 2001-2006. The results of this analysis are available on request from the authors).

convergence had not taken place towards a steady state, because countries had different initial levels of wealth and these differences have "conditioned" the convergence process. In the second period (2001-2006) GDPpc variable does not explain cross-country patterns of growth in expenditure per student on HEIs.

<Table 5> around here

A further step would be towards understanding whether the convergence process has been driven by private or public resources. This is a crucial question, because a general recent tendency in HE around the world is to compress public resources and to increase the participation in funding from private actors (students, families, etc.) (Johnstone, 2003). Given the fact that a convergence process exists (both in expenditure per tertiary student and in expenditure in R&D per tertiary student), an analysis of the two components of the coefficient of variation was conducted (Figure 3). To obtain this, we calculated separately the public and private expenditure per student. The results show that the decrease in variation is higher for the private component. It is evident that in the period considered the convergence process has been due to a reduction in the variation of private sources (*sigma convergence*); in other words, the composition of total funds devoted to HE is changing and the differences between countries are being reduced because the proportion of private financing to HE is becoming more similar across European HE systems. A consequence is that the coefficient of variation of expenditure per student in HEIs is also being reduced more quickly due to the role of the private component of this expenditure. Therefore our results confirm not only a trend in the convergence between European countries in the expenditure per student, but also that this process has been guided not by public resources but by private ones, coherent with the recent "cost-sharing" theory (Johnstone, 2003).

<Figure 2> around here

Lastly, the β-convergence analysis for private sources confirms these previous results (Table 7). In the period (1998-2006) absolute convergence exists in the private expenditure per student in HEIs among countries (α and β estimated parameters are statistically significant), and, above all, the speed of convergence is very high (17%) and the adjusted R is 63.51%.

<Table 6> around here

When the variable is only public funding, there is empirical evidence of a process approach to public expenditure per tertiary student in the EU-15 for the entire period 1998-2006

with a speed of convergence of 5.5% and in the first sub-period (1998-2001) with a speed of convergence of 5.8%.

4. Further conclusions and future research

The funding process of HE in Europe are very close to quality of the service and one aspect of the "quality" can be measured as expenditure per tertiary student. In relation with this variable, the main results of the analysis show that expenditure on HEIs per student has converged in the whole period studied. Furthermore, in contrast the private spending per student has converged more than the public spending. This fact support the conclusion that if European universities employ more private funds in the near future, they converge more as a matter of market reasons.

In most European countries there are severe budgetary constraints, although we can divide Scandinavian countries and the Netherlands and Austria in one hand, and Mediterranean countries and other European in the other hand. Moreover, although most of the resources of European universities are public, other private funding sources should be explored and used. Among these sources of private funding, the most important are two: to increase cost-sharing of students (mainly tuition fees) and implement the fundraising (encouraging relation with enterprises).

At the same time, OECD data do not allow an institutional analysis. For future research it could be very interesting a study of cases with a deep analysis of the HIEs most prestigious (or located in richer regions) that it would allow a conditional convergence analysis of the GDP per capita.

References

Agasisti, T., Pérez-Esparrells, C., Catalano, G. y Morales (2009): "Bologna Process and Expenditure on Higher Education: A Convergente análisis of the EU-15", Colección de Documentos de Trabajo de la Fundación para las Cajas de Ahorros (FUNCAS), n. 448.

Alvarez-Ayuso, I., Delgado-Rodriguez, M.J., Salinas-Jimenez, M.M., (2006), "Disaggregate Analysis of the Effects of Education Investment and Fiscal Policy on EU Convergence", *European Journal of Scientific Research*, vol. 13, n. 3, pp. 414-425.

Barro, R., Salas-i-Martin, X. (1992): "Convergence", *Journal of Political Economy*, 2, n. 100, 223-251.

Diebolt, C., Jaoul-Grammare, M., (2006), "Convergence of Higher Education and Economic Growth during the European Construction: a contribution to the cliometrics of growth (EU-15)", *Research in Comparative and International Education*, vol. 1, n.1, pp. 14 – 29.

European Commission (2006), Delivering on the modernisation agenda for universities: education, research and innovation, COM (2006) 208 final, Brussels.

Heinze, T., Knill, C., (2008), "Analysing the differential impact of Bologna Process: Theoretical considerations on national conditions for international policy convergence", *Higher Education*, vol. 56, n.4, pp. 493-510.

Johnes, G., (2006), "Education and economic growth", *Lancaster University Management School*, Working Paper n. 2006/019.

Johnstone D.B., (2003), "The Economics and Politics of Cost Sharing in Higher Education: a Comparative Perspectives", *Economics of Education Review*, vol. 23, n. 3, pp. 403-410.

Lee, J., Barro, R., (2001), "Schooling Quality in a Cross-Section of Countries", *Economica*, vol. 68, pp. 465-488.

Mankiw, N.G., Romer D., Weil, D.N., "A contribution to the empirics of economic growth", *Quarterly Journal of Economics*, n. 107, pp. 407–437.

Martín Vallespín, E. (2009): "El papel de la financiación en el Proceso de Bolonia: un análisis de la suficiencia, eficiencia y equidad de los modelos de financiación universitaria en Europa", *Presupuesto y Gasto Público*, núm. 55, pp. 121-139.

OECD (several years), *Education at a Glance*, OECD, Paris.

OECD (2009), *Highlights from Education at a Glance 2008*, OECD, Paris.

Sala-i-Martin, X. (1996): "The classical approach to convergence analysis", *The Economic Journal,* n. 106, 1019-1936.

Witte, J., (2008), "Aspired Convergence, Cherished Diversity: Dealing with the contradictions of Bologna", Tertiary Education and Management, vol. 14, n. 2, pp. 81-93.

Table 1. Annual expenditure on Higher Education Institutions (HEIs) as a percentage of GDP, 1998 – 2006

COUNTRIES	Expenditure on HEIs as a percentage of GDP			Public expenditure on HE as a percentage of total public expenditure		
	2006	2001	1998	2006	2001	1998
Austria	1.3	1.2	1.5	3.0	2.6	3.2
Belgium	1.3	1.4	0.9	2.7	2.8	2.2
Denmark	1.7	1.8	1.5	4.4	4.9	3.9
Finland	1.7	1.7	1.7	4.0	4.2	4.0
France	1.3	1.1	1.1	2.3	2.0	2.0
Germany	1.1	1.0	1.0	2.5	2.4	2.3
Greece	m	1.1	1.2	m	m	2.1
Ireland	1.2	1.3	1.4	3.4	3.7	3.5
Italy	0.9	0.9	0.8	1.6	1.7	1.6
Luxemburg	m	m	m	m	m	m
Netherlands	1.5	1.3	1.2	3.3	2.8	3.0
Portugal	1.4	1.1	1.0	2.2	2.3	2.4
Spain	1.1	1.2	1.1	2.5	2.6	2.2
Sweden	1.6	1.7	1.7	3.4	3.6	3.6
United Kingdom	1.3	1.1	1.1	2.4	2.0	2.6
EU-15 mean	**1.3**	**1.3**	**1.2**	**2.9**	**2.9**	**2.8**
Min	0.9	0.9	0.8	1.6	1.7	1.6
Max	1.7	1.8	1.7	4.4	4.9	4.0
Standard deviation	0.24	0.28	0.29	0.78	0.94	0.77

Note: m: data non available

Source: Author's elaboration with data from *OECD (2001, 2004, 2008 and 2009)*

Table 2. Relative proportions of public and private expenditure on HEIs (%), 1998 – 2006

COUNTRIES	2006		2001		1998	
	Public sources	All Private sources	Public sources	All Private sources	Public sources	All Private sources
Austria	84.5	15.5	94.6	5.4	98.9	1.1
Belgium	90.6	9.4	84.1	15.9	m	m
Denmark	96.4	3.6	97.8	2.2	97.2	2.8
Finland	95.5	4.5	96.5	3.5	m	m
France	83.7	16.3	85.6	14.4	85.5	14.5
Germany	85	15	91.3	8.7	92.1	7.9
Greece	m	m	99.6	0.4	m	m
Ireland	85.1	14.9	84.7	15.3	72.6	27.4
Italy	73	27	77.8	22.2	74.7	25.3
Luxembourg	m	m			m	m
Netherlands	73.4	26.6	78.2	21.8	87.5	12.5
Portugal	66.7	33.3	92.3	7.7	92.3	7.7
Spain	78.2	21.8	75.5	24.5	72.1	27.9
Sweden	89.1	10.9	87.7	12.3	89.3	10.7
United Kingdom	64.8	35.2	71.0	29.0	62.7	37.3
EU-15 mean	**82.00**	**18.00**	**86.91**	**13.09**	85.0	15.0
Min	64.8	3.6	71.0	0.4	46.8	1.1
Max	96.4	35.2	99.6	29.0	98.9	37.3
Standard deviation	10.17	10.17	8.93	8.93	15.40	11.77

Note: m: data not available

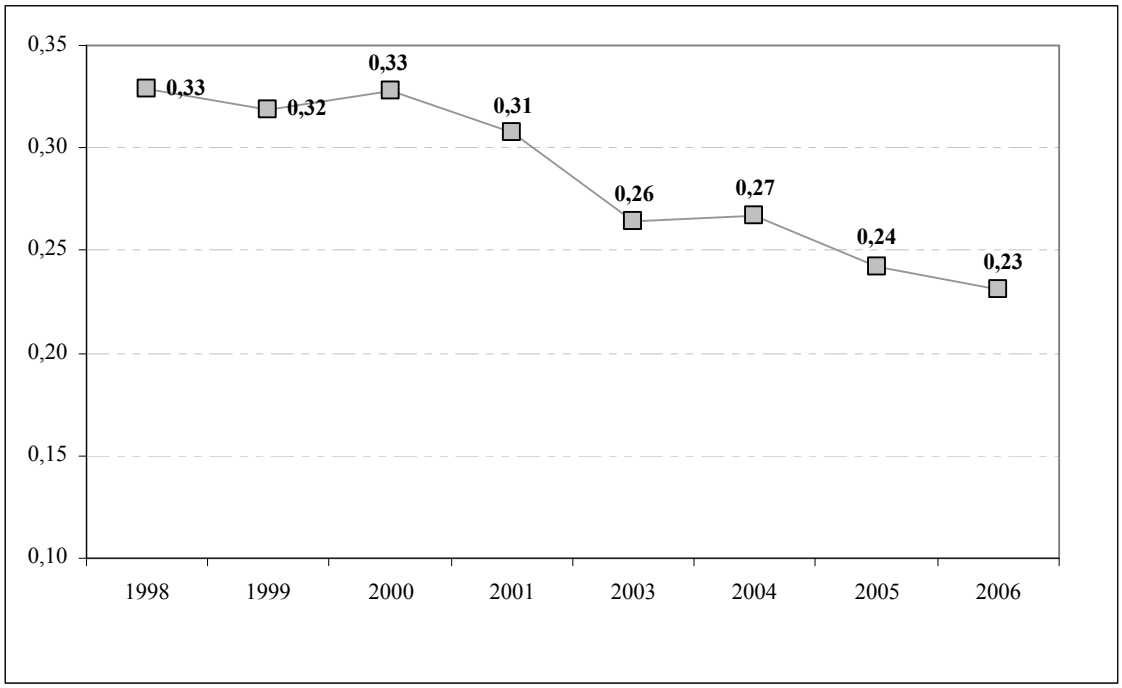
Source: Author's elaboration with data from *OECD (2000, 2004, 2008 and 2009)*

Table 3. Expenditure on HEIs per student (USD) in absolute terms, relative to GDP per capita and expenditure on Research and Development , 1998, 2001 and 2006

COUNTRIES	2006		2001		1998
	Exp	Exp R&D	Exp	Exp R&D	Exp
Austria	15,148	4,606	11,274	3,886	11,279
Belgium	13,244	4,748	11,589	3,505	6,508
Denmark	15,391	n	14,280	3,509	9,562
Finland	12,845	4,894	10,981	3,920	7,327
France	11,568	3,552	8,837	2,472	7,226
Germany	13,016	5,020	10,504	4,134	9,481
Greece	m	m	4,280	746	4,157
Ireland	11,832	3,425	10,003	1,917	8,522
Italy[1]	8,725	2,932	8,347	3,283	6,295
Luxemburg	m	m	m		m
Netherlands	15,196	5,478	12,974	4,899	10,757
Portugal[1]	9,724	2,515	5,199	5,199	m
Spain	11,087	3,242	7,455	1,504	5,038
Sweden	16,991	8,136	15,188	6,832	13,224
United Kingdom	15,447	5,733	10,753	2,652	9,699
EU-15 mean	**13,093**	**4,523**	**10,119**	**3,461**	**8,390**
Min	8,725	2,515	4,280	746	4,157
Max	16,991	8,136	15,188	6,832	13,224
Standard deviation	2,468	1,544	3,115	1,582	2,601

Note: USD PPPs
m: data non available
1: only public Institutions
Source: Author's elaboration with data from *OECD (2001, 2004, 2008 and 2009)*

Figure 1. Results of σ-convergence. Coefficient of variation for Expenditure on HEIs Per student in HEIs. 1998 - 2006



Source: authors' elaboration.

Table 4.Results of β-convergence of expenditure per student in HEIs

	1998-2006	1998-2001	2001-2006
β	0.053521** (2.755031)	0.028227 (0.560432)	0.086048*** (3.297536)
α	0.447926*** (3.950203)	0.315045 (0.760094)	0.690682*** (4.435724)
R^2	49.63%	2.77%	58.59%
Adjusted R^2	45.44%	-0.05%	55.14%
β (%)	**5.3%**		**8.6%**

Notes: t-Statistic in parenthesis. The coefficients are statistically significant with a confidence of 90% (*), 95%(**) or 99%(***)

Table 5. Conditional convergence of expenditure per student in HEIs – inclusion of GDP per capita

	1998-2006	1998-2001	2001-2006
β	0.069654 (1.861727)*	0.2511728* (2.126100)	0.032814 (0.728018)
α	0.508798 (3.241265)***	1.2238494** (3.038887)	0.428549 (1.562120)
λ	0.00000128 (0.579606)	0.0000194*** (3.386701)	0.00000398 (-1.153253)
R^2	51.1%	52.4 %	63.0
Adjusted R^2	42.2%	43.75 %	56.3
β (%)		**25.11%**	

Notes: t-Statistic in parenthesis. The coefficients are statistically significant with a confidence of 90% (*), 95%(**) or 99%(***)

Figure 2. Coefficient of variation for the public and private expenditure per student 1998 - 2006

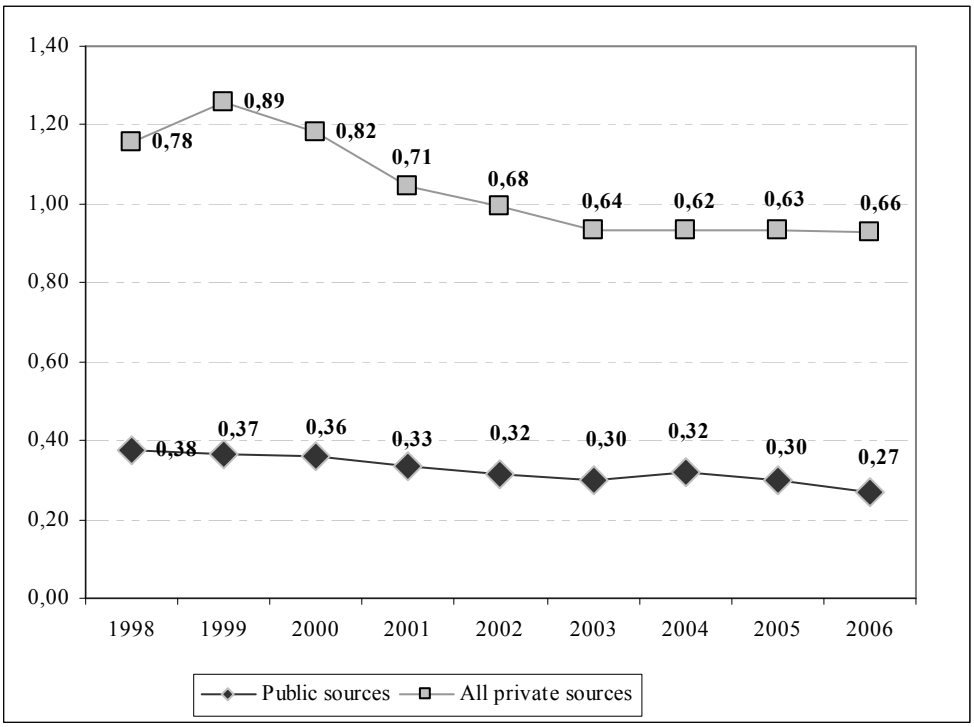


Table 6. Results of β -convergence of private and public expenditure per student in HEIs, 2001-2006

	Private expenditure			Public expenditure		
	1998-2006	**1998-2001**	**2001-2006**	**1998-2006**	**1998-2001**	**2001-2006**
B	0.173463* (1.981490)	0.140592* (2.136925)	0.134549*** (3.270087)	0.058353** (2.401431)	0.078263 (1.693568)	0.055097** (2.765144)
A	0.750426*** (4.993287)	0.875118** (2.949126)	0.793712*** (5.509532)	0.460623*** (3.41558)	0.684627 (2.116606)	0.474414*** (3.472961)
R^2	67.18%	43.98%	64.45%	51%	28.82%	45.79%
Adjusted R^2	63.53%	37.76%	61.49%	45.55%	20.91%	41.27%
β (%)	**17%**	**14%**	**13%**	**5.8%**		**5.5%**

Notes: t-Statistic in parenthesis. The coefficients are statistically significant with a confidence of 90% (*), 95%(**) or 99%(***)