Εκπαίδευση, Δια Βίου Μάθηση, Έρευνα και Τεχνολογική Ανάπτυξη, Καινοτομία και Οικονομία

Τόμ. 2 (2019)

Πρακτικά του 2ου Πανελληνίου Επιστημονικού Συνεδρίου με Διεθνή Συμμετοχή «Ελλάδα-Ευρώπη 2020: Εκπαίδευση, Δια Βίου Μάθηση, Έρευνα, Νέες Τεχνολογίες, Καινοτομία και Οικονομία», Λαμία 28, 29, 30 Σεπτεμβρίου 2018

The Size of Schools affects the Public Annual Average Cost? Empirical Evidence from Second Chance Schools in Greece

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Abstract

One of the problems that concern the economists of education and the decision makers of education and lifelong learning systems is whether the size of units of education and lifelong learning affects the annual public average cost and the approach of the optimal size of units. The paper investigates the above problem in the case of Second Chance Schools in Greece. The Second Chance Schools is a structure of lifelong learning. The paper is based on the cost theory and uses data which derived from the Ministry of Education, Research and Religions and from survey which was conducted the year 2015. The data cover the educational year 2014-2015. The empirical analysis reveals that when is raised the size of lifelong learning units, the annual public average cost is reduced to a minimum and then is raised. The optimal size of lifelong learning units is larger than the size of existing units. A new structure of the system with the adaptation of the units to the optimal size, will be reduced the annual public average cost.

Keywords: Lifelong Learning, Size of Educational Units, Average Annual Public Cost.

Περίληψη

Ένα από τα προβλήματα που αντιμετωπίζουν οι οικονομολόγοι στον χώρο της εκπαίδευσης και οι υπεύθυνοι για τη λήψης αποφάσεων για τα συστήματα της εκπαίδευσης και της διά βίου μάθησης είναι το κατά πόσον το μέγεθος των μονάδων εκπαίδευσης και δια βίου μάθησης επηρεάζει το ετήσιο δημόσιο μέσο κόστος, καθώς και την προσέγγιση του βέλτιστου μεγέθους των εκπαιδευτικών μονάδων. Η εργασία εξετάζει το παραπάνω πρόβλημα στην περίπτωση των σχολείων δεύτερης ευκαιρίας στην Ελλάδα. Τα σχολεία δεύτερης ευκαιρίας αποτελούν μια δομή της δια βίου μάθησης. Η εργασία βασίζεται στη θεωρία του κόστους και χρησιμοποιεί δεδομένα που προέρχονται από το Υπουργείο Παιδείας, Έρευνας και Θρησκευμάτων και από έρευνα που διεξήχθη το έτος 2015. Τα δεδομένα καλύπτουν το εκπαιδευτικό έτος 2014-2015. Η εμπειρική ανάλυση αποκαλύπτει ότι όταν αυξάνεται το μέγεθος των μονάδων δια βίου μάθησης, το ετήσιο δημόσιο μέσο κόστος μειώνεται στο ελάχιστο και στη συνέχεια αυξάνεται. Το βέλτιστο μέγεθος των μονάδων δια βίου μάθησης είναι μεγαλύτερο από το μέγεθος των υφιστάμενων μονάδων. Μια νέα δομή του συστήματος με την προσαρμογή των μονάδων στο βέλτιστο μέγεθος, θα μειώσει το ετήσιο δημόσιο μέσο κόστος.

Λέξεις Κλειδιά: Δια Βίου Μάθηση, Μέγεθος Σχολικών Μονάδων, Μέσο Ετήσιο Δημόσιο Κόστος.

1. Introduction

According to economics of education literature, Education (Ed) and Lifelong Learning (LLL) constitute the main constitutions of production, accumulation and diffusion of human capital. Following Schultz (1961) and Becker (1964), Human Capital is the set of Knowledge, Skills, Competencies and Abilities which are embodied to individuals and are acquired through Ed, LLL and experience. Human Capital Theory and empirical analysis has been identified that Ed - LLL is one of the key determinants for the economic growth, employment and the social cohesion. From

the perspective of economic, the structures of Ed and LLL, are production systems. One of the many problems that concern the economists of education, the designers and the policy makers of formal Ed and LLL system is whether the size of structures (Ed or LLL) affects the public annual average cost. The problem has become more pressing in all countries after the global economic crisis (2007) and its diffusion in Europe and other countries (2008-09). In all countries, the crisis has affected Ed and LLL budgets, especially those which had large public deficits, as Greece. Also, the limitation of resources makes it necessary the continuous improvement of the efficiency and effectiveness of public expenditures.

Indicative in European Union (EU), the Lisbon European Council (2000), committed to the objective of making Europe «the most competitive and dynamic knowledge economy in the world». The LLL is the guiding principle of the integrated policy cooperation framework «Education and Training 2010». It underlined the importance for the E.U. of improving of education and training systems. Also, it recognized the importance of Education and Training for competitiveness and as a part of Europe's response, to the challenges of globalization. Additionally, according to World Bank (2003), 'Lifelong learning is crucial to preparing workers to compete in the global economy. But it is important for other reasons as well. By improving people's ability to function as members of their communities, Ed and LLL increase social cohesion, reduce crime, and improve income distribution'.

Greece is country of southeastern Europe with a population of 11 million approximately. Administrative is structured into 13 regions and into 74 regional units. Since 1981 is member of the EU and since 2001 of the Eurozone. In spring 2010, due to budgetary imbalances, Greece was joined in European support mechanism (comprised of the European Commission, the European Central Bank and the International Monetary Fund), by result the implementation of strict restrictive fiscal policies, the effort to be aligned with the most advanced countries of the EU and the implementation of EU directives. Since then recorded economic recession and high unemployment. According to Eurostat in 2007 the rate of growth was 3.3% and the rate of unemployment was 8.4%, in 2008 was -0.3% and 7.8% respectively, in 2009 was -4.3% and 9.6%, in 2010 was -5.5% and 12.7%, in 2011 was -9.1% and 17.9%, in 2012 was -7.3% and 24.5%, in 2013 was -3.2% and 27.5%, in 2014 was 0.4% and 26.5% and in 2015 was -0.2% and 24.9%. In Greece, the average years of education is moving in the average level of the EU countries and the OECD (about 10.4-10.8 years). Pegkas and Tsamadias (2014) founded that the average number of years of education for non-employees was more than for employees. Liagouras et al. (2003) report that there is international evidence that Greece forms the most notable exception in EU or OECD countries regarding the high unemployment rates of young graduates. These findings show that there were mismatches between education and the labour market. The European Commission (2003) suggests that Greek education systematically insists on not taking into account the needs of the labour market. The system of LLL is one of the factors that may contribute to reducing of the gap between education and labour market. During the period 2003-2010 was developed a new system of LLL which involved modern building infrastructures and technological equipment. This period is showed increase of participation rate of citizens in LLL services from 1.2% (2003) to 3.3% (2009). The participation rate is about the same until today. This rate is very low compared with the benchmark (15%) of E.U. The development of LLL system was funded by European and national resources. Basic structure of LLL system is the Second Chance Schools (SCS). They provide an important opportunity for those who left the school early to complete the compulsory level of secondary education, thereby increasing their knowledge, their skills and the chance of entering to the labor market or to retain their jobs.

The European Commission has highlighted the issue of the study of the effect of the size and the school combination in the cost, the quality and the equality in education (Knoth Humlum & Smith, 2015). According to the literature, the size of school unit affects the public cost per pupil. Stiefel et al., (2000), Walberg and Walberg (1994), found that larger schools are more economical than the

smaller schools (economies or diseconomies of scale). Also, Cubberly (1922) and Conant (1959) found that the larger schools have lower operating costs per student. In the USA, the number of schools decreased from 250,000 to 95,000 over a period of 75 years (Kennedy, 2003). The literature has not been determined the optimal size for the educational structures.

The purpose of this study is to investigate if the size of SCS affects the public annual average cost and determine, if possible, the optimal size. To our knowledge, this is the first paper which investigates this problem at LLL structures.

The rest of paper is structured as follows: the second section presents a brief review of LLL in Greece. The third section presents the empirical analysis and the fourth section presents the conclusions and the policy recommendations.

2. A Brief Review of Lifelong Learning in Greece

The LLL is defined as all learning activities which are undertaken throughout the lifecycle, with aim to improve the knowledge, skills and competences. It encompasses formal learning, non formal learning and informal learning. According to Faris (1995), the concept of "LLL" is a popular but vague concept. Some perceive this concept as the continuing vocational education, while others believe that the LLL is the educational process outside of the formal education and training system. The aim of LLL is the acquisition and the upgrading of knowledge, skills, interests and qualifications of individuals from preschool age and throughout their lifecycle. The LLL has the following features: a. is distinguished in formal and non-formal learning which takes place outside of the formal education and training system, b. the need of individual for learning is continuous, c. knowledge is a necessary qualification for an individual to be able to respond to changes in modern society, d. individuals and societies together, at local and global level, should be involved in identifying of the LLL needs, e. is both product and driver for the widespread use of new technologies, f. both individuals and societies have benefits from the L.L.L (Barker, 1998). For the successful participation of individuals in LLL, individuals should learn continuously, to be equipped with the necessary knowledge and skills, to have access to educational opportunities and to have financial and cultural incentives for their participation (Education Policy Analysis Branch of the OECD, 1998). The investment in LLL provides benefits to the individual and the society. It contributes to economic development. As regards the cost of LLL, the more and higher-quality learning opportunities are required higher expenditures. This cost is difficult to be met solely from public sources. For that, it is necessary so the involvement of private funding sources, as the reduction of public cost.

In Europe, the actions of EU actions are included the following: a. the European Commission has introduced a "portfolio" which enables to individuals to present their skills and qualifications in any Member State of the EU. The system includes the European CV, b. the European Commission has created a portal for learning opportunities with aim to exploit of opportunities for learning by individuals, by result to make the LLL more powerful, c. the European Funds are funding programs of LLL, d. the European Commission encourages the quality control, through the granting of a European label to firms, in order to reward and publicize the best practices in LLL. According to Commission of the EU (2011), some of EU benchmarks until 2010 were: a. No more than 10% early school leavers, b. At least 85% of young people should have completed upper secondary education, c. 12.5% of the adult population should participate in LLL. To 2020, some of EU benchmarks are: a. the share of early leavers from education and training should be less than 10%, b. at least 15 % of adults should participate in lifelong learning. The participation rate of population of EU-28 to LLL was 9.1% (2009), 9.3% (2010), 10.7% (2014, 2015). The countries of EU with the

highest rate are Denmark, Switzerland, Sweden, Iceland and Finland. In contrast, the countries of EU with the lowest rate are Romania, Bulgaria, Croatia, Slovakia and Greece.

In Greece from the third decade of twenty century, were operated various structures in the field of LLL. In the beginning of the final decade of the 20th century were constructed the Vocational Training Institutes (V.T.I.) and the Vocational Training Centers (V.T.C.). During the first decade of the 21st century were constructed the S.C.S., the LLL Centers, the parents' schools and the distance learning's LLL Centers. S.C.Ss. are a flexible innovative educational structure of LLL. In the context of non-formal adult education have been established structures and programs which are addressed both the general population and specific social groups. Their aim is to cover the specific needs of individuals and to offer basic and specialized knowledge. The duration of training is usually small and do not exceed the one year. The aim of S.C.S. is fight the social exclusion of individuals who do not have the necessary qualifications and skills to meet the current needs of the labor market. In S.C.S. can be participated individuals aged 18 and over. These individuals have not completed the nine-year compulsory education (gymnasium). Today are operated 62 S.C.S. across the country. Six of them are operated in prisons. This period, Greece prepares national strategic framework policy for LLL. It will include activities as a. the increasing of programs for adults, b. the intensifying of cooperation with stakeholders, c. the ensuring of the complementarity of LLL with other sectors of education, d. the development of skills of target groups that are a priority (e.g. older workers). Despite the efforts for the development of LLL, the participation of citizens in LLL programs remains low (see Table 1 and 2). This is probably due to the low reliability of the system and the prevailing perceptions.

Table 1: Lifelong learning, 2009 and 2014 (% of the population aged 25 to 64 participating in education and training)

Country	Total		Male		Female	
	2010	2015	2010	2015	2010	2015
EU-28	9.1	10.7	8.2	9.8	10.0	11.6
Belgium	6.8	7.1	6.4	6.7	7.2	7.6
Bulgaria	1.4	1.8	1.3	1.6	1.5	2.0
Czech Rpublic	6.8	9.3	6.5	9.1	7.0	9.6
Denmark	31.2	31.7	25.3	26.0	37.2	37.5
Germany	7.8	7.9	7.8	8.0	7.7	7.8
Estonia	10.5	11.5	7.5	9.2	13.2	13.7
Ireland	6.3	6.7	5.6	6.0	7.0	7.3
Greece	3.3	3.0	3.3	3.1	3.3	2.8
Spain	10.6	9.8	9.6	9.2	11.6	10.5
France	5.7	18.6	5.3	16.1	6.1	21.0
Croatia	2.6	2.5	2.8	2.4	2.5	2.6
Italy	6.0	8.0	5.6	7.7	6.3	8.3

Country						
Cyprus	7.8	6.9	7.7	6.3	7.8	7.3
Latvia	5.4	5.5	3.5	4.8	7.0	6.2
Lithuania	4.4	5.0	3.4	4.5	5.2	5.4
Luxembourg	13.4	14.0	13.4	13.4	13.5	14.5
Hungary	2.7	3.2	2.4	2.9	3.0	3.5
Malta	6.1	7.1	6.0	6.8	6.2	7.5
Netherlands	17.0	17.8	16.5	17.4	17.5	18.2
Austria	13.8	14.2	12.8	13.2	14.8	15.3
Poland	4.7	4.0	4.3	3.6	5.1	4.3
Portugal	6.0	9.3	5.6	8.9	6.4	9.6
Romania	1.5	1.5	1.3	1.6	1.6	1.3
Slovenia	14.6	11.9	12.9	10.4	16.4	13.6
Slovakia	2.8	3.0	2.2	2.8	3.3	3.1
Finland	22.1	25.1	18.5	21.6	25.9	28.8
Sweden	22.2	28.9	16.1	22.1	28.5	36.0
U.K.	20.1	15.8	16.7	14.2	23.3	17.4
Iceland	25.1	25.9	20.4	21.7	30.0	30.2
Norway	18.1	19.7	16.8	18.1	19.5	21.4
Switzerland	23.9	31.7	22.8	32.2	25.0	31.2
FYROM	3.3	3.1	3.2	3.0	3.4	3.2
Turkey	2.3	5.0	2.4	5.1	2.1	4.9

Source: Eurostat (online data code: trng_lfs_01)

Table 2: Lifelong learning, 2010 and 2015 (% of the population aged 25 to 64 participating in education and training)

Country	Total		Male		Female	
	2010	2015	2010	2015	2010	2015
EU-28	9.3	10.7	8.4	9.7	10.2	11.7
Belgium	7.4	6.9	7.2	6.5	7.6	7.3
Bulgaria	1.6	2.0	1.5	1.9	1.7	2.1

Czech Rpublic	7.8	8.5	7.6	8.3	8.0	8.6
Denmark	32.6	31.3	26.0	25.3	39.2	37.3
Germany	7.8	8.1	7.9	8.2	7.7	8.0
Estonia	11.0	12.4	8.6	10.6	13.1	14.1
Ireland	7.0	6.5	6.6	6.0	7.5	7.0
Greece	3.3	3.3	3.4	3.3	3.2	3.3
Spain	11.2	9.9	10.3	9.2	12.1	10.7
France	5.0	18.6	4.5	15.9	5.4	21.1
Croatia	3.0	3.1	3.0	2.7	3.0	3.6
Italy	6.2	7.3	5.9	6.9	6.5	7.7
Cyprus	8.1	7.5	7.9	7.0	8.2	8.0
Latvia	5.4	5.7	3.6	4.1	7.0	7.2
Lithuania	4.4	5.8	3.5	5.1	5.2	6.5
Luxembourg	13.5	18.0	12.9	18.2	14.2	17.8
Hungary	3.0	7.1	2.9	6.8	3.1	7.5
Malta	6.2	7.2	5.9	6.9	6.4	7.5
Netherlands	17.0	18.9	16.4	18.4	17.7	19.4
Austria	13.8	14.4	12.8	13.3	14.9	15.4
Poland	5.2	3.5	4.7	3.3	5.7	3.8
Portugal	5.7	9.7	5.7	9.7	5.7	9.8
Romania	1.4	1.3	1.3	1.3	1.4	1.3
Slovenia	16.4	11.9	14.3	10.7	18.5	13.3
Slovakia	3.1	3.1	2.5	2.7	3.7	3.4
Finland	23.0	25.4	18.9	21.8	27.1	29.1
Sweden	24.7	29.4	18.3	22.3	31.3	36.7
U.K.	20.1	15.7	16.9	13.9	23.3	17.5
Iceland	25.4	28.1	21.3	23.5	29.6	32.7
Norway	18.2	20.1	16.7	18.3	19.8	22.0
Switzerland	30.6	32.1	31.6	32.8	29.6	31.4

FYROM	3.5	2.6	3.4	2.7	3.6	2.5
Turkey	2.9	5.5	3.1	5.6	2.8	5.3

Source: Eurostat (online data code: trng_lfs_01)

3. Empirical Analysis

The paper uses data which derived from Youth and LLL Foundation and from survey which was conducted the year 2016. The data cover the educational year 2014-2015. More specifically, are included all SCS (62) and trainees (5.046). For the investigation of the effect of the size of SCSs in the annual public average cost, the paper uses the «tools» of descriptive statistic and estimates the function:

Annual Public Average Cost = f (Number of Trainees)   **(1)**

3.1. Descriptive Statistical Analysis

In table 3 are presented the headings of trainees, the number of S.C.Ss, the average number of trainees and the annual public average cost.

Table 3: Average Number of Trainees and Annual Public Average Cost

	S.C.S.		
Headings of Trainees	**Number of S.C.Ss**	**Average Number of Trainees**	**Annual Public Average Cost (€)**
20-40	10	32	2,814.75
41-60	12	53	1,955.61
61-80	8	70	1,882.22
81-100	16	91	1,612.50
101-120	7	109	1,536.39
121-140	3	125	1,418.65
141-160	4	150	1,379.16
161-	2	169	1,262.51

Source: Calculations of researchers

We note that at the total of S.C.Ss (62), the average number of trainees is 81 and the annual public average cost is 1,863.30€.

The above data shows that as is raised the number of trainees per S.C.S., is reduced the public cost per trainee. We note that in the calculation of public cost, is not included the cost of alternative uses of buildings and technological equipment.

In Figure 1 is presented the annual public average cost (A.P.A.C.) and the average number of trainees (A.N.T.) per heading of trainees.
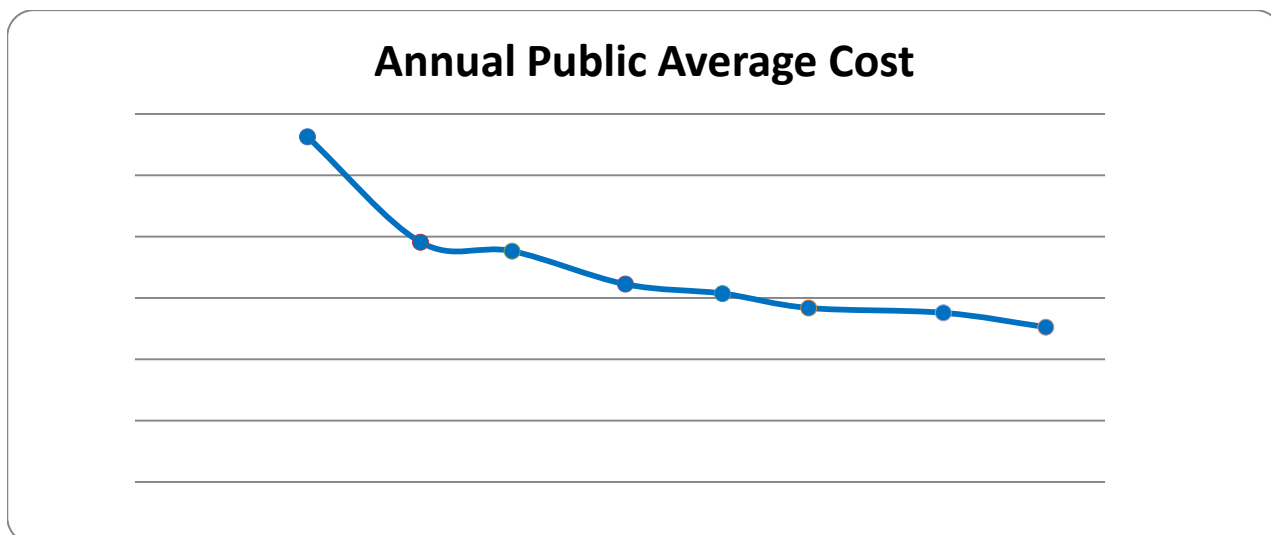
Figure 1: The A.P.A.C. and the A.N.T. per heading of trainees

Also, the correlation coefficient (Pearson) of the two co-changing variables for the S.C.S. is -0.6318. This means that the annual public cost per trainee and the number of trainees per S.C.S. co-move in the opposite direction.

The above findings are consistent with the economic theory of production cost. According to theory, the average cost to compare with the quantity of "product" has parabola with the hollow turned in upward. In Figure 2 is presented the dispersion of variables annual public average cost and trainees per S.C.S.
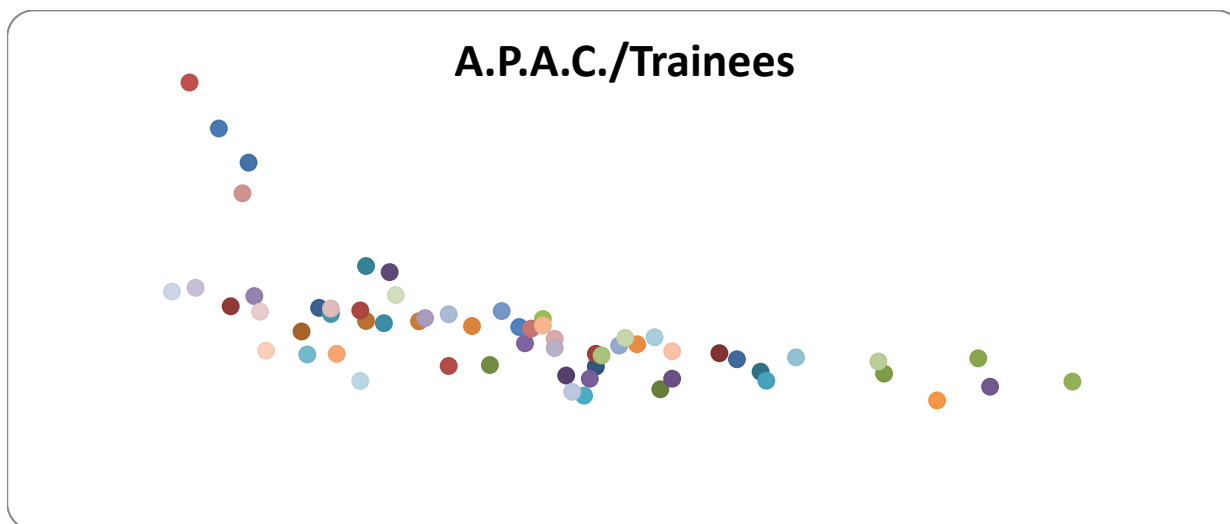

Figure 2: The Dispersion

As regards the ratio trainees/trainers, data which is included in table 4 shows that as is raised the number of trainees per SCS, is raised the ratio trainees/trainers.

Table 4: The Ratio Trainees/Trainers

Headings of Trainees	Number of S.C.Ss	Ratio Trainees/Trainers
20-40	10	3,3
41-60	12	4,1
61-80	8	4,97
81-100	16	5,14
101-120	7	5,38
121-140	3	5,87
141-160	4	6,52
161-	2	6,25

Source: Calculations of researchers

We note that at the total of S.C.Ss (62), the ratio trainees/trainers are 5.

3.2. Econometric Analysis

According to economic theory, the type of the function has the form:

$$A.P.C(s) = aS^2 + b.S + c + u_i, \ a > 0 \tag{2}$$

Where: $A.P.C(s)$, the annual public average cost

S, the number of trainees

c, the constant

u_i, the disturbance term

The results of regression are presented in table 5

The R^2-Adjusted value is considered to be satisfactory, given the fact that the data is cross-sectional.

The function (2) is:

$$A.P.C(s) = 0.12148S^2 - 33.14104S + 3,592.448 \tag{3}$$

Then the function is studied as to the extremities.

a. The first derivative is $A.P.C'(s) = 2*0.12148*S-33.14104$

$A.P.C'(s) = 0 <=> 2*0.12148*S-33.14104=0 <=> S=136$

b. The second derivative is $A.P.C''(s) = 2* 0.12148*S <=>$

$A.P.C.''(136) = 2*0.12148*136=33.04256>0$ therefore the function present minimum.

The minimum is A.P.C.(136) = $0.12148*136^2 - 33.14104*136 + 3,592.448 = 1,332$

Table 5: The results of regression

Independent Variables	Trainees of S.C.S.
S^2	0.12148[**]
	-3.31
S	-33.14104[**]
	(-4.82)
c (constant)	3592,448[**]
	(-12.38)
R^2	0.4933
Adj.R^2	0.4761
F	28.72
Signif	0.0000
N	62

Source: Calculations of researchers
Notes: 1.** Interval confidence 95%
    2. (t-statistic)

The study of function shows that the optimum number of trainees per second chance school is 136 and the minimum public cost per trainee is 1,332 €. The results of descriptive and econometric analysis are included in table 6.

Table 6: Results of Empirical Analysis

Average Number of Trainees		Annual Public Average Cost per Trainee	
Optimal	Existing	Minimum	Existing
136	81	1,332 €	1,863.30 €

Source: Calculations of researchers

The data of table 4 shows that the optimal size of S.C.S is significantly higher (67.9 %) than the existing size. In this case, the annual public average cost will be reduced by 39.88 %.

4. Concluding Remarks and Policy Recommendations

The paper studies the effect of the size of S.C.S. on the annual public average cost. Consequently determines the optimal size, in the sense that in this size is minimized the average annual public cost.

The Empirical analysis uses methodologies of descriptive statistics and econometrics. The findings show that if is raised the number of trainees per S.C.S., the annual public average cost is reduced. The optimum size of units is larger than the existing size of units.

From the above is concluded that the current system has the ability to train annually significantly higher number of individuals without additional charge of public cost.

Therefore the improvement of cost - effectiveness, can come only with the attracting of larger number of trainees per year in the S.C.Ss, since the reduction of cost is not possible through the merger of existing units, due to the limitations in the conformation of system (distances, etc.). Is required the individuals who leave the primary and the secondary (compulsory) education, the rate of them is about 9% annually, to be convinced that they will have consumer and investment benefits from their participation to the Second Chance Schools. The State and the administrations of the Municipalities and Regions should improve the reliability and quality of the LLL system and to demonstrate the benefits, (so in short term as in long term), for the trainees, the society, the local, the regional, the national and European economy.

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