The rate of return of social investment on post-secondary initial vocational education and training in Greece

Stefanos Chanis*

University of Piraeus,
80, Karaoli and Dimitriou, Piraeus 18534, Greece
E-mail: shunipi@gmail.com
*Corresponding author

Constantinos Tsamadias

Harokopio University,
70, El. Venizelos, Athens 17671, Greece
E-mail: ctsamad@hua.gr

Stamatina Hadjidema

University of Piraeus,
80, Karaoli and Dimitriou, Piraeus 18534, Greece
E-mail: shad@otenet.gr

Abstract: According to the human capital theory education and training produce, accumulate and diffuse human capital. They are a type of consumption but they are mainly considered as investments. In Greece, the Post Secondary Initial Vocational Education and Training is a sub-system of the Life Long Learning. The present study provides ex post estimates of the rates of return on the social investment to Post-Secondary Initial Vocational Education and Training by using a cost-benefit approach. Stratified sampling has been employed with a proportional distribution throughout the country in order to derive a sample on the private sector's earnings data. Data on social costs have also been used in this study. The empirical results showed that, in general, the rate of return on the social investment to Post-Secondary Initial Vocational Education and Training has been satisfactory. Moreover, sensitivity analysis showed that the rate of return increases slightly, when the duration of studies and the social cost of Post-Secondary Initial Vocational Education and Training system are decreased.

Keywords: vocational education and training; human capital; cost-benefit analysis; evaluation; planning.

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Biographical notes: Stefanos Chanis is a PhD at the University of Piraeus, Piraeus, Greece.

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Constantinos Tsamadias is an Associate Professor at the Harokopio University, Athens, Greece.

Stamatina Hadjidema is an Associate Professor at the University of Piraeus, Piraeus, Greece.

1 Introduction

After World War II, several economists (Schultz, 1961; Becker, 1964; Mincer, 1974) developed the 'human capital' theory as a component of economic theory. Human capital theory examines the economic value of education and training for both individuals and societies. According to the economics literature, education and training systems are the principal, but not exclusively, institutional mechanisms of production, accumulation and diffusion of human capital. During the last five decades, it has been theoretically supported and empirically proved that human capital constitutes a basic factor of production and a crucial factor of the economic, social, cultural and political development. Education and training are both consumption, but mainly they are considered as investment.

Educational planners are facing problems in allocating resources to education and training, as well as in allocating resources between different levels or types of education and training in order to maximise the society's goals. The estimation of the rates of return on social investment or policies to education and training in total, by level, type and subject could provide some indicators for making rational social choices concerning the distribution of the insufficient- in relation to the needs – public resources among their alternative uses.

There have been many empirical studies on the returns of social and private investment to education and training in a number of countries, which cover the period from 1960 up today. All these studies showed that the investment in education and training is a 'good' investment both from the private and the social point of view (Psacharopoulos and Patrinos, 2004a).

Since 60s, in Greece there is a 'high' social demand for education and training despite the enlargement of the education and training systems by the state. The Post Secondary Initial Vocational Education and Training (PSIVET) is a sub-system of the life long learning (Law 2009/1992 and Law 3369/2005).

Only a few empirical studies have been so far carried out, assessing the rate of return on investment to education in Greece. It should be noted that there is no published work on the lifelong learning and particularly on the PSIVET.

The purpose of this study is the (ex post) evaluation of the social investment to PSIVET. In order to achieve this, the internal social rate of return has been estimated followed by a sensitivity analysis. The earnings data were derived by using a stratified sampling with a proportional distribution during the year 2009. This year has been of great importance for Greece. In fact, the global financial and economic crisis (2007–2008) has triggered the diachronically underlying structural and functional deficiencies of the economy and public administration in Greece. The Greek economy was characterised by the 'expansion' of the fiscal deficit, the current account deficit and

the public debt. In 2010, Greece entered the Support Mechanism (European Commission, European Central Bank, International Monetary Fund) and thereafter a strict fiscal policy is pursued. Structural changes are implemented and privatisations are planned. These policies resulted to the decrease of the fiscal deficit (2009: 15.4% of GDP; 2010: 10.7% of GDP; 2011: 9.4% of GDP), the deep recession (2009: –3.1%; 2010: –4.9%; 2011: –7.1%), the increase of unemployment (2009: 9.4%; 2010: 12.5%; 2011: 17.6%), the rise of public debt (2009: 129% of GDP; 2010: 145% of GDP; 2011: 170% of GDP) and the reduction of the real unit labour cost (2009: 99.9; 2010: 98.6; 2011: 95.8) (ELSTAT, 2012).[1]

The paper is organised as follows: Section 2 describes briefly the Greek PSIVET system. Section 3 presents a review of the empirical literature. Section 4 presents the empirical analysis, i.e., methodology and models, sources and data. Section 5 shows the empirical method, calculations, results and discussion. Finally, Section 6 summarises the main concluding remarks of the study.

2 The Greek post-secondary initial vocational training system

In Greece, the lifelong learning system is running in parallel with the formal educational system. The basic component of the lifelong learning is the training system (Law 3369/2005). The training system consists of the initial training and the continuing training. Table 1 shows the structure of the educational system.

Table 1 The structure of the Greek formal educational system (2008–2009)

Levels	*Duration of studies*	*Age*	*ISCED**	*Compulsory or non-compulsory*
	Post-graduates studies			
PhD	3 years	≥ 24	Level 6	Non-compulsory
Master's degree	2 years	≥ 22		
	Higher education			
Universities	4–6 years	≥ 18	Level 5	Non-compulsory
Technological education institutions	4 years			
	Secondary education			
Upper (higher) secondary education [Lyceum]	3 years	15–17	Level 3	Non-compulsory
Technical-vocational school	2 years	15–16		Non-compulsory
Lower secondary education [Gymnasium]	3 years	12–14	Level 2	Compulsory
	Primary education			
Primary (elementary) school	6 years	6–11	Level 1	Compulsory
	*Pre-school education***			
Nursery school		4–5	Level 0	Non-compulsory

Notes: *International Standard Classification for Education prepared by UNESCO
**Compulsory since 2010–2011.

Table 2 The structure of the Greek formal initial training system (2008–2009)

Levels	*Duration of training*	*Age*	*ISCED**	*Compulsory*
	Post-secondary level			
Initial Vocational Training Institutes	2 years	≥ 18	Level 4	No
	Post-compulsory level			
Initial Vocational Training Institutes	2 years	≥ 15	Level 4	No

Note: *International Standard Classification for Education prepared by UNESCO.

The educational system, especially the secondary level of education, provides general skills with a particular emphasis on humanities. Thus, the educational system does not intensively contribute to the acquisition of practical or vocational skills. The structure of the formal initial training system (post-compulsory and post-secondary) is summarised in Table 2 (Law 1992).

The Initial Vocational Training System is supervised by the Ministry of Education and it is mainly provided by both the public and the private Vocational Training Institutes (IEKs). However, some IEKs are under the supervision of other ministries and agencies. The IEKs provide all types of vocational training and ensure that students obtain all necessary qualifications by imparting scientific, technical, vocational and practical knowledge and cultivating skills to facilitate students' occupational integrations and adaptations to the changing needs of the production process. Graduates of compulsory education may enrol the post-compulsory IEKs, as well as graduates of every type of Lyceum and Technical Vocational Schools (TVS) may enrol the post-secondary IEKs. The duration of training for the Unified Lyceum certificate holders is four semesters. Each training year consists of two self-contained semesters. TVS or Technical Vocational Lyceum (TVL) cycle two certificate holders are directly admitted to the third semester of the IEK in their specialisation area (total duration of study: one year) or they may choose another IEK specialisation area, in which case they study for the regular module of four semesters. Gymnasium graduates over 18 years old are accepted by certain IEKs and they may study for up to two semesters. During the terms, the students attend compulsory theoretical, laboratory and mixed classes in the framework of the educational curricula, which cover a wide range of branches and specialisations in the following fields: Information Technology – Telecommunications – Networks, Financial and Management Services, Food and Drink, Transport and Tourism, Electronics – Electrics – Engineering, Construction, Industrial Chemistry, Applied Arts, Energy-Environment, Health-Cosmetics-Social Services, Communications and Mass Media, Clothing and Footwear, Culture and Sport and Agriculture. Students in public IEKs are charged fees for each semester. Scholarships are available in certain circumstances. In addition, students have the opportunity to participate in subsidised practical exercises. The fees charged by the private IEKs vary and they are annually adjusted to allow for the current regulations. Trainees, who completed successfully their training in public and private IEKs, are awarded a Vocational Training Certificate, which allows them to take the qualifying examinations leading to the award of a Vocational Training Diploma at the level of post-secondary (3+) vocational training. Nationwide examinations, held twice a year, include theoretical and practical tests.

The Greek PSIVET is an Institution-based system. It is a full-time vocational education and training in institutions. However, institution-to-work transition is not

well-developed. Links with firms are scarce and there is no formal way to absorb and channel graduates into the labour market.

According to the literature, there is substantial evidence suggesting that the quantity of education and training are complements. Furthermore, some evidence suggests that the strength of this complementarity depends on whether training is provided on-the-job or off-the-job. The quality depends on the design of institutions (Ariga and Brunallo, 2002).

3 Review of the empirical literature

The main objective of the public activity should be the maximisation of the social welfare. Public authorities should allocate the available social resources – which are insufficient in relation to the needs – on the basis of their significance concerning their contribution to the social welfare. In Economics of Education, for the last five decades, one of the most popular methods that have dominated the research is the rate of return to investment and policies in education. Several methodologies and models, such as the cost-benefit analysis (short cut, elaborate or full discounting) and the Mincerian method have been employed in order to estimate the social and the private returns on investment to education (Psacharopoulos, 1994; Psacharopoulos and Patrinos, 2004b). The cost-benefit analysis has been extensively used in most economic analyses of public investment projects. It provides sufficient justification for its use in economic analysis of investment to education, since it has a powerful and strong logic. The rate of return to education, to be more precise, the internal rate of return to education is the rate of discount that equates the net present value of the life-time earnings of an individual, taken as the benefits of education, to the net present value of the costs of education. Alternatively, the rates of return to education can also be estimated by using the Mincerian earnings function (Mincer, 1974). These methods of estimating the rate of return have not been free from criticism (Merrett, 1966; Bennell, 1996, 1998). However, economics of education and the rate of return to education, in particular, have been useful in unravelling several phenomena in education. While the rate of return method is likely to stay, its value and relevance would certainly get enhanced considerably, if any attempt is made to capture the externalities and bring them into the rate of return calculations.

Since the very formal heralding of Economics of Education in 1960 by Schultz (1961), researchers have estimated the rates of return to education or training in many countries. Among those who popularised the method of rates of return is Psacharopoulos with a series of studies in various countries and a series of global updates (Psacharopoulos and Patrinos, 2004a).

There have been many studies on the returns to investment in education, vocational education and training concerning more than a hundred countries. In this section, we present some of those employed the elaborate method.

Okpako Enaohwo and Osakwe (1986) estimated the rate of return on private investment to vocational education (nursing field) in Nigeria. The data were collected by using a questionnaire. They found that the private rate of return was 146%. This high, positive rate was ascribed to the negligible impact of opportunity cost and its booster effects on expected income. Hinchliffe (1990) estimated the social rate of return on investment to vocational education in Botswana. The data were derived from the census workforce. The returns showed a similar structure for both types of instruction. All exceed 20%. Gomez-Castellanos and Psacharopoulos (1990) estimated the private and

social rates of return on investment at various levels of education in Ecuador. The data were collected from the 1987 household survey. They found that the social rate of return was 11.5% for the primary education, 9% for the secondary education (SE) and 12% for the higher education. The private rate of return was estimated by using the Mincerian method. Grootaert (1990) estimated the private and the social rates of return on investment to formal and non-formal vocational education in Côte d'Ivoire. The data were collected from a survey of living standards. He found that the private rate of return was 2.34% to 21.24%. The social rate of return was 2.34% to 4.37%. Psacharopoulos and Alam (1991) estimated the private and the social rates of return on investment at different levels of education in Venezuela. The data were collected from the 1987 household survey and they were compared to those available for 1975 and 1984. They found that the social rate of return was 14.5% for the primary education, 9.5% for the SE and 7.9% for the higher education. The private rate of return was 16.2% for the primary education, 10.9% for the SE and 14.9% for the higher education. Fiszbein and Psacharopoulos (1993) estimated the private and the social rates of return on investment to education in Venezuela. The data were collected from the 1989 household survey in Venezuela. They found that the private rate of return was 9.2% to 27.4%. The social rate of return was 5.4% to 18.2%. Bevc (1993) estimated the private and the social rates of return on investment to education in the former Yugoslavia. For 1986, she found that the social rate of return was 3.3% for the primary education, 2.3% for the SE and 3.1% for the higher education. The private rate of return was 14.6% for the primary education, 3.1% for the SE and 5.3% for the higher education. Nonneman and Cortens (1997) estimated the private and the social rates of return on investment to education in Belgium. The data were collected from the 1992 household survey. They found that the social rate of return for males was 2.28% to 12.63% and for females 3.49% to 15.96%. The private rate of return for males was 2.03% to 7.79% and for females was 3.44% to 10.13%. Odink and Kunnen (1998) estimated the returns on investment to education in the Netherlands. The paper used different data sets. Gross 1989-wages were used according to the Dutch CBS (1992) and net wages were used according to OSA 1990-panel data. They found that the social rate of return on higher vocational education was 2.2%, while for the university education was 5.7%. Moreover, the private rate of return on higher vocational education was 3.7%, while for the university education was 8.3%. Belli et al. (1999) estimated the private and the social rates of return on investment to tertiary education in Mauritius. The data were collected from the 1995 World Bank survey estimates, based on a special survey conducted on the occasion of this project. They found that all programmes considered were good investments from both the private and the social point of view, although some programmes were more profitable than others. Arias and McMahon (2001) estimated the dynamic rates of return to different levels of education in the USA. The data were collected from a Population Survey. They estimated the dynamic social rate of return from 1980 to 1995. For 1995, they found that the social rate of return for males was 4.5% to 11% and for females was 1.01% to 11%. Daly et al. (2006) estimated the private rate of return to higher education in Australia. The data were collected from the Australian Bureau of Statistics (cross section data, for cohorts studying at the time of the 1986 and 1991 Population Censuses). For 1986, they found that the private rate of return for males was 7% (ex post) and 5% (ex ante). For females was 7% (ex post) and 4% (ex ante). For 1991, they found that the private rate of return for males was 5% (ex post) and 2% (ex ante). For females was 3% (ex post and ex ante). Menon (2008) provided new estimates of the perceived rates of return to higher education in Cyprus and

compared them to previous estimates for the year 1994 in the same country. Primary data were collected through surveys. Questionnaires were completed by 611 students in their final year of SE during the spring of the academic year 2003/2004. Both general comprehensive schools and TVS were represented in the sample. She found that the rate of return for 2003/2004 was 8.7%. Cattaneo (2011) estimated the private rate of return to higher professional education and training. Data were collected from the Swiss Labour Force Survey (1996–2009). She found that regardless the amount of the financial support, individuals completed professional education and training has significant net-wage gains.

In the case of Greece, Leibenstein (1967) estimated the rate of return on secondary and higher education. The earnings' data were collected from a small number of enterprises in Athens. He found that the rate of return on higher education is slightly higher than the rate of return on SE. Psacharopoulos and Kazamias (1985) estimated the rates of return on the private and the social investment to education. The data were derived from the National Statistical Service of Greece (NSSG). They found that the social rate of return was 4.5% to 16.5%, while the private rate of return was 5.5% to 20%. Hadjidema (1998) estimated the rates of return on the private and the social investment to higher education (for five subject groups, i.e., economics, law, mathematics, medicine and engineering). The earnings' data were derived from the pay scales of the Public Sector, the Banks and the Social Insurance Institution. The direct cost's data were obtained from the Ministry of Education, Lifelong Learning and Religion. She found that the social rate of return for males was 7.4% to 13.4% and for females was 5.6% to 13.2%. The private rate of return for males was 9.6% to 17.3% and for females was 7.4% to 16.9%. Magoula and Psacharopoulos (1999) estimated the rates of return on private and social investment to education. The income data were derived from ELSTAT (1993–1994 household survey). They found that the social rate of return (private sector) was 6.5% for the SE and 5.7% for the university education. Also, they found that the private rate of return (private sector) was 8.3% for the SE and 8.1% for the university education. Tsamadias (2001) estimated the rates of return on private investment to tertiary technological education (TTE). The earnings data and the cost data (1997) were collected via stratified sampling. He found that the private rate of return was 3.81% to 6.97%. Tsamadias (2002) estimated the rate of return on private and social investment to TTE. Both the earnings data and the cost data (1997) were collected via stratified sampling. He found that the social rate of return was 4.33% (4 educational years) and 4.93% (3.5 educational years). He also found that the private rate of return was 5.04% (4 educational years) and 5.66% (3.5 educational years). Tsamadias (2004) estimated the rate of return on social investment to TTE. The earnings data and the cost data (1997) were collected via stratified sampling. He found that the social rate of return was 2.93% to 6.22%.

Let us now consider some studies that apply sensitivity analysis. Grootaert (1990) found that, by increasing the cost by 25%, the private rate of return was 1.23% to 18.28%. Respectively, decreasing the cost by 25%, the private rate of return was 3.87% to 25.71%. When the social cost was increased by 25%, the social rate of return was 1.23% to 3.18% and when the social cost was decreased by 25%, the social rate of return was 3.87% to 6.04%. Tsamadias (2002) found that, by increasing the average direct private cost by 10 to 20%, the private rate of return was 4.96% to 4.89% and by decreasing the cost, it was 5.12% to 5.19%. Furthermore, the social rate of return was 4.25% to 4.17%, when the average direct public cost was increased by 10 to 20%, and it was 4.39% to 4.46%, when the cost was decreased.

4 Empirical analysis

In this section, we estimate the rate of return on social investment to PSIVET by using the cost-benefit analysis (elaborate or full method).

4.1 Methodology and model

According to the human capital theory, the economic evaluation of the social choices on investment to PSIVET is made by using the cost-benefit analysis (Schultz, 1961, 1963, 1971; Becke, 1964; Mincer, 1974; Sweetland, 1996; Psacharopoulos and Mattson, 1998).

Cost-benefit analysis is a type of marginal analysis and it does not offer an automatic solution to the resource allocation problems. It provides a conceptual framework for the examination of the costs of education and training in relation to the relative earnings of educated in the PSIVET manpower. The rates of return on the social investment to PSIVET could be used by the state as an economic criterion for making a rational choice either for further expansion or for shrinkage of such investments. Cost-benefit analysis provides indicators to technocrats, as well as to politicians, for the orientation of investment priorities, but it does not provide numerical targets. Moreover, it does not automatically provide solution to the problem of distributing economic resources. In a world of high uncertainty, the 'solution' which is given by the cost-benefit analysis method consists of suggestions for changing the number of students/graduates in several subjects. However, despite its limitations and weaknesses, it is deemed that the estimation of the rate of return on the social investment to PSIVET is a useful 'tool' for the evaluation and planning. On the other hand, in applying a cost-benefit analysis on investment to PSIVET, it is necessary to define costs in terms of the total opportunity cost, that is, all the real resources that are used up by the project. In contrast to the Mincer-type of analysis, the cost-benefits calculations allow to include the costs of education, direct and indirect, and the risk of unemployment (Cattaneo, 2011).

In the present study, the elaborate method has been employed. The estimation of the rate of return, by using the elaborate method, requires the calculation of the monetary benefits and the social cost of the PSIVET. However, there are market and non-market benefits, as well as externalities and spillovers of education and training, which have not been included in the model (Haveman and Wolfe, 1984; Wolfe and Zuvekas, 1997; McMahon, 1987a, 1987b; Psacharopoulos, 1999). The main monetary or market benefit of the PSIVET is the earnings' differentials between the PSIVET and the SE graduates. A key assumption for the social rate of return calculation is that observed wages are a good proxy for the marginal product of labour. In a competitive economy this is ensured by using data from the private sector of the economy. In this study, the earnings' differentials are used as a proxy in order to measure the difference in productivity of workers (human capital theory) (Woodhall, 1992). The ex post social rate of return is the traditional 'narrow social rate of return', which takes into account only the earnings' differentials (market benefits) and not the non-market benefits, the positive externalities and the spillovers.

4.1.1 The elaborate/full method

The elaborate method is the most suitable method for the estimation of the rates of return, because it takes into account the most important part of the individuals' earnings and the

social cost stream. However, it requires a significant amount of data on age-earnings profiles. It is a useful tool for government policy concerning the PSIVET, which effectively should be based on the rates of return estimates.

The estimation of the internal rate of return (r_{PSIVET}) on the social investment to PSIVET can be derived by solving the following general equation:

$$NPV = \sum_{t=1}^{43} B_t \cdot \left(1 + r_{PSIVET}\right)^{-t} - \sum_{t=0}^{1} C_t \cdot \left(1 + r_{PSIVET}\right)^{t} = 0 \tag{1}$$

where $B_t = (\hat{E}_{G,IEK} - \hat{E}_{G,SE})_t$ for $t = 1, \ldots 43$ is the difference of annual gross earnings (before taxes) between the IEK graduates and the SE graduates.

$C_t = \left(ASC_{PSIVET}\right)_t$, $t = 0,1$ is the annual average social cost

NPV is the netpresent value

The age-earnings' function for the PSIVET graduates and the SE graduates is specified as:

$$\hat{E}_G = a + b.A_i + c.A_i^2 + u_i \tag{2}$$

where

A_i is the age of the individual *i*

a is the constant

b and *c* are the slope coefficients and

u_i is the disturbance term

The annual average social cost (ASC_{PSIVET}) is calculated by using the formula:

$$\begin{aligned} ASC_{PSIVET} &= \text{Average Direct Private Cost} \\ &+ \text{Average Public Expenditure in PSIVET} \\ &+ \text{Foregone Students'Earnings in IEK}\left(_{\text{G,SE}}\right) \\ &+ \text{Alternative Cost for Buildings and Equipment} \end{aligned} \tag{3}$$

4.2 Sources and data

The current survey, which was conducted in the first semester of 2010, has employed annual earnings in the year 2009 of the hired labour of the IEKs and the SE graduates (control group). The questionnaires were addressed to the IEKs and the SE graduates who had not received any additional education or training and were employed as full-time workers. Productivity bonuses have been included in the annual earnings, while earnings from the overtime work have not been included. Self-employed IEKs and SE graduates have not been included, since it becomes too complicated when one attempts to separate the self-employment income from the income coming from other factors in the production process. Part-time employees have also been excluded.

In the public sector, the earnings of the IEKs and the SE graduates are the same (Law 3205/2003).

Our sample was divided into two sub-samples. Sub-sample 1 consists of the IEKs graduates who are employed in a full-time basis in the private sector, while sub-sample 2 consists of a control group of the SE graduates who work as full time employees in the private sector.

The sample has been stratified with a proportional distribution. The stratified sampling not only provides increased accuracy, but also allows separate estimates for each stratum. The proportional distribution is the most commonly used method of sampling by strata. This procedure is followed in the absence of information on the homogeneity of the strata to ensure a representative sample (Zairis, 1991).

At the beginning of this project, a pilot sample of 135 observations (80 SE graduates and 55 IEKs graduates) was collected.

The minimum size of each stratum of the sample is determined by using the following formula:

$$n_0 = \frac{\Sigma W_h S_h^2}{\bar{Y}^2 CV_0^2\left(\bar{y}_{AN}\right)} \tag{4}$$

where the standard error *SE* is estimated by using the formula:

$$SE\left(\bar{y}\right) = CV * \bar{Y} \tag{5}$$

where

W_h is the weight of each stratum in the population

S_h^2 is the variance of each stratum

$\bar{Y}$ is the mean gross earnings (from the pilot sample)

$CV_0^2(\bar{y}_{AN})$ is the desired coefficient of variation.

We note that, using the pilot sample, we calculated the mean earnings at 15.545 euros per year.

The CV_0 was defined at 0.01 (1%)

Table 3 presents the structure of the total population and the sample by employment sector and level of education or training.

Table 3 The structure of the population and the sample by level of education or training and by sector of employment, 2009

Educational – training level	*Population (%)*		*Sample*
	Public sector	*Private sector*	*Private sector*
SE graduates	27.53	72.47	1,400
IEKs graduates	26.36	73.64	462

Source: Labour Force Survey, Statistical Service of Greece

5 Applying the cost-benefit analysis (elaborate/full method)

The social rate of return was estimated by using the actual age-earnings profiles for each level of education and training and the annual social cost per student in IEK.

Table 4 presents the results of the regression analysis of the age-earnings function (2) of the private sector's PSIVET and SE graduates, by using the ordinary least squares (OLS) method.

Table 4 Regression analysis results of age-earnings function

Independent variables	*Employees (private sector)*	
	PSIVET graduates	*SE graduates*
Age^2	–0.22152**	–5.880184**
	(–4.04)	*(–4.79)*
Age	1,334.911**	954.2292**
	(6.55)	*(9.77)*
Constant	–15,831.46**	–10,391.60**
	(–4.08)	*(–5.62)*
R^2	0.4205	0.4678
Adj. R^2	0.4180	0.4670
F	166.52	613.98
Signif.	0.0000	0.0000
N	462	1,400

Notes: 1 **denote the statistical significance at the 5% level
2 numbers in parentheses show the t-statistic values
3 see equation (2).

The signs of the coefficients conform to human capital theory. The explanatory power of the model (R^2-adjusted) is consistent with previous research. The values of the R^2 are considered satisfactory for the cross-section data. Particularly, the t-statistic is satisfactory.

Applying the elaborate method, the calculation of the average social cost in the PSIVET is necessary in order to estimate the rate of return on social investments. In 2009, the average direct cost per student in the PSIVET was 3,771 €, the average indirect cost per student was 16.450 € and the average total cost per student was 20,221 €. These estimates are based on equation (3). It is clear that the direct average cost in the PSIVET is very low when compared to the indirect cost.

The calculated rate of return on the social investment to PSIVET is 4.16. A discount rate equal to 3.09 has been used for the calculations. This equals to the difference between the ten-year rates of Greek bond (5.69) and the inflation rate of Greece (2.6).

Note that the indicators of the participation of the PSIVET graduates in the labour market were 93.47% for the year 2009 and 92.68% for the year 2010. Respectively, for the SE graduates were 88.28% for 2009 and 84.13% for 2010 (Chanis, 2012). These estimates show that the probability of the labour market participation is higher for the higher-education graduates, even in times of recession as in the case of Greece. Moreover, the results indicate that the participation rate of the PSIVET graduates was decreased by less than 1% from 2009 to 2010, while the participation rate of the SE graduates was decreased by 4.93% for the same years. These results are consistent with the human capital theory.

5.1 Sensitivity analysis

The rate of return on the social investment to PSIVET depends upon the social cost and the monetary social benefit. In this section, we examine the effect of changing the duration of the vocational education and training and the direct cost on the social rates of return. Given that a number of assumptions are necessary to perform the cost calculations, we resort to a sensitivity analysis by changing the estimated average direct cost streams by 25% and 50% (with a ceteris paribus assumption holding all other constant) and the duration of studies by one or two semesters. The sensitivity analysis is being carried out with the elaborate method. The results are presented in Table 5.

Table 5 The social rate of return (%) of investment in PSIVET by changing the duration of studies and public expenditures

Scenarios	*Duration (semesters)*	*Direct social cost*	*Internal rate of return (%)*
Base	4		4.16
Scenario 1	3	–25%	4.45
Scenario 2	2	–50%	4.77

The results of the sensitivity analysis showed that when both the duration of studies and the direct social cost are reduced by 25%, the social rate of return is increased by approximately 7%. Moreover, when the duration of studies and the direct social cost are reduced by 50%, the social rate of return is increased by approximately 14.7%.

6 Concluding remarks

In this study, the (ex post) rates of return on the social investment to the Greek PSIVET were calculated by using the elaborate method. The application of the elaborate method implies the use of cross-sectional data on the age-earnings profiles and the social cost in the year 2009. Sensitivity analysis takes into account different scenarios by changing the duration and the average social cost of the vocational education and training. Note that the results reflect past conditions, concerning the demand and supply of work for the PSIVET and the SE graduates.

The results show that:

a The rate of return on the social investment to PSIVET is rather satisfactory. It should be noticed that the calculated rate of return has been underestimated, since the non-monetary benefits, externalities and spillovers of the PSIVET have not been taken into account. Moreover, the residual value of the human capital after leaving the labour market has not been included in the calculations. In addition, the PSIVET graduates are more likely to participate in the labour market than the SE graduates. Concretely, the social investment to PSIVET is profitable.

b Sensitivity analysis showed that the rate of return is increased, when the period of studies and the direct social cost are decreased.

Based on the findings of the empirical analysis, we propose no further expansion of the PSIVET system. Moreover, the period of the general vocational education and training in IEKs should be reduced by one or two semesters, while the training in jobs/firms should be increased respectively. For that matter, training in jobs/firms is generally considered to be the most promising approach. Furthermore, the revision of the training programmes and courses will improve the quality and the external efficiency as well. This will lead to an alignment of the PSIVET with the Greek labour market.

Since the social rates of return on the PSIVET have been estimated by using the earnings and the social cost data in 2009, a year in which the earnings had not been affected by the economic crisis, it would be interesting to calculate the social rate of return by using the earnings and cost data, as they are formed by the implemented economic programme. This seems to be an interesting issue for further research.

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Notes

1 Greek Statistical Authority.