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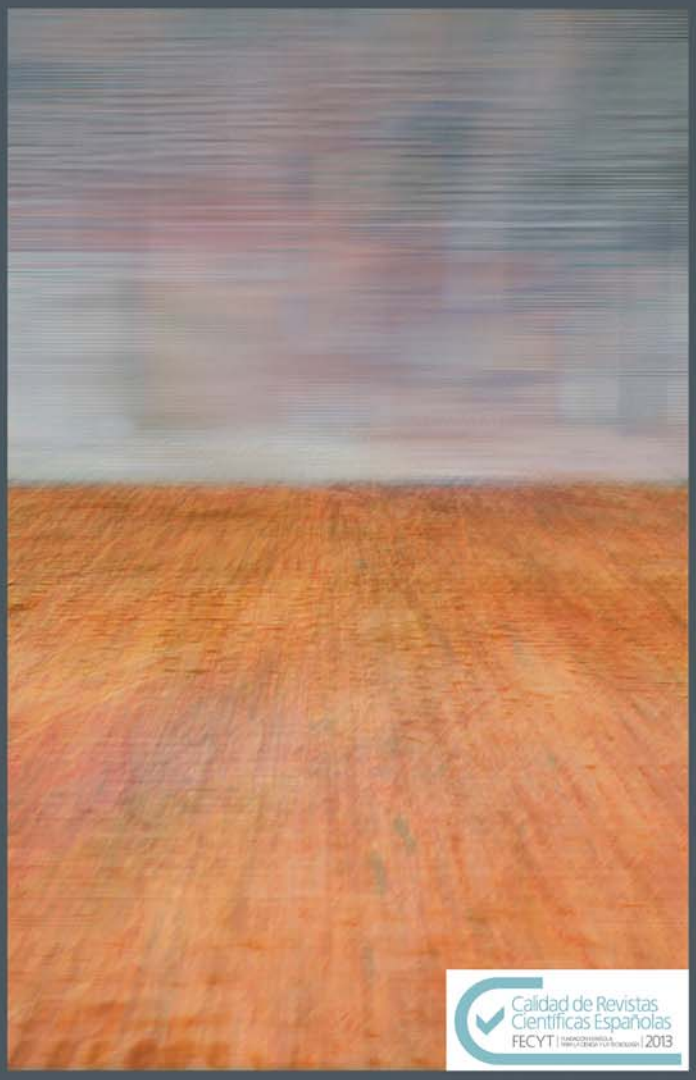

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Educación financiera y sistemas educativos en la OCDE: un análisis comparativo con datos PISA 2012

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Abstract

Using PISA 2012 data regarding financial literacy in thirteen countries members of the Organization for Economic Cooperation and Development (OECD), this paper analyses students and school variables, together with variables stemming from institutional factors -as a result of the different types of inclusion of financial education in the educational systems participating in the study-, that could affect the results obtained by students. The research carried out, using a multilevel methodology to estimate the education production function, shows that the degree of development of competence is negatively affected by a lower socio-economic status of families and peers, female gender, repeating grades and the immigrant status of students. Furthermore, in respect to organizational factors, the estimated models show that the educational systems in the OECD whose financial education programs have the greatest positive influence on the degree of development of this competence have based such programs on specific subjects with economic content that are integrated in the school curriculum.

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Although the amount of data is still small given the limited implementation of these subjects in some of the countries analysed, the results obtained allow making an initial comparison of different national initiatives and establishing the foundations to guide the educational policies that should be adopted in this field, using as a reference the steps taken by the educational systems that achieve the best results.

Key words: financial literacy, multilevel, educational systems, PISA 2012, institutional factors, OECD

Resumen

A partir de los datos facilitados por PISA 2012 para la competencia financiera en trece países miembros de la Organización para la Cooperación y el Desarrollo Económico (OCDE), este estudio analiza qué variables tanto individuales y de centro como derivadas de factores institucionales, por las diferentes modalidades de inclusión de la educación financiera en los sistemas educativos participantes en el estudio, pudieran afectar a los resultados obtenidos por el alumnado. La investigación realizada, que utiliza una metodología multinivel para la estimación de la función de producción educativa, indica que el grado de desarrollo de la competencia se ve negativamente afectado por el menor nivel socioeconómico de las familias y de los compañeros y compañeras de clase, el género femenino, el hecho de repetir curso y la condición de inmigrante del alumnado. Además, respecto a los factores organizativos, los modelos estimados reflejan que los sistemas educativos de la OCDE que logran mayor influencia positiva de sus programas de educación financiera en el grado de desarrollo de la competencia los han fundamentado en asignaturas específicas de contenido económico integradas en el currículo escolar. Aunque los datos son todavía limitados por la escasa implantación de estas enseñanzas en algunos países estudiados, los resultados obtenidos permiten una primera comparación entre diferentes iniciativas nacionales y la fundamentación de la orientación de las políticas educativas que deberían adoptarse en este campo, tomando como referencia las actuaciones de los sistemas educativos con mejores resultados.

Palabras clave: educación financiera, multinivel, sistemas educativos, PISA 2012, factores institucionales, OCDE

Introduction

One of the essential aspects of social reality is its economic dimension. In respect to the financial features of this economic dimension, high levels

of debt, lack of understanding of the contractual conditions established in increasingly complex products and the impact of the crisis of the last few years on large sectors of the population have highlighted the need to incorporate some type of Financial Education (FE) to the levels of obligatory schooling to enable citizens to make well-grounded financial decisions.

Moreover, there exist specific reasons of equity behind this objective, as different studies have shown that persons belonging to families with a lower socio-economic level are particularly affected by this lack of financial literacy in several ways: they do worse in managing their savings and borrowing decisions (Lusardi, 2009; Robson, 2012), they choose investment funds with higher commissions (Hastings and Tejada-Ashton, 2008), they have less capacity to participate in capital markets and do worse in planning for retirement (Van Rooij, Lusardi and Alessie, 2012). In addition, to the extent that a significant relationship has been established between the experiences of adolescence and subsequent behaviour in life (Friedline, Elliot and Nam, 2011; Ashby, Schoon and Webley, 2011), as well as a positive correlation between FE received at school and the development of financial competence (Lacuesta, Martínez and Moral, 2014), academic training in this field is a matter of great social importance. All of these reasons have led the OECD to promote initiatives to include FE in the educational systems and to assess the competencies acquired by students (OECD, 2012), stressing that the authorities must adopt measures to establish financial education in academic contexts so that all school children have access to said training, without prejudice to other supplementary initiatives geared at other social groups. However, there exists a large variety of models used to implement FE, and even within the same country major differences exist between schools and regions (Atkinson and Messy, 2013; OECD, 2014b). In consequence, it is necessary to identify which national initiatives implemented are the most appropriate.

The recent publication of 2012 PISA data (Programme for International Student Assessment), which for the first time includes information on the degree of development of financial competence, provides an opportunity to carry out in depth studies in connection with this matter. The initial analysis (OECD, 2014a) shows that, just like scientific competence, FE entails aspects that differ from competence in mathematics or in reading and which require specific analysis. In addition, it also highlights that in

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different countries, amongst which Spain stands out, part of student performance could be explained by the heterogeneous regulation adopted by the different educational systems on implementing FE and determining on that basis the type of teachers in charge of teaching the subject, the type of curricular programming of their teachings and the role assigned to external agents such as NGOs and private institutions.

In this sense, this research has two main objectives. The first is to use the educational production function to characterize the main variables that explain the development of financial competence, determining whether it is influenced by the other competences traditionally assessed and certified as relevant. The second objective is to determine the extent to which the different types of inclusion of FE in the thirteen educational systems of the OECD that were studied have contributed to different degrees of development of this basic competence, with the aim of identifying those that have achieved the most and establish the foundations for future educational policy measures in respect to the most suitable type of curricular programming, training of teachers responsible for the subject and the degree of collaboration with external agents, so that educational systems can achieve their objectives of efficiency and equity.

Financial Education and Production of Educational Services

The quantitative analysis of the relationship between individual, family, school and contextual variables that have an influence on school results uses as a general reference the educational production function, which represents the degree of development of a competence achieved by a subject taking into account available resources (Hanushek, 1979):

$$A_{ij} = f(S_{ij}, B_{ij}, P_{ij}, I_{ij}) \quad (1)$$

In this function, A_{ij} represents the degree of development of the competence by student *i* in school *j* (in this case, financial competence), which depends on a series of factors represented by school inputs (S_{ij}), the socio-economic characteristics of students (B_{ij}), the influence of classmates or the peer group effect (P_{ij}) and students' innate capacity (I_{ij}). Different reasons explain the disparities in the results obtained, both with

respect to differences in the effort and motivation of the agents involved (students, teachers and parents) as well as institutional aspects and socio-economic inequalities. Hanushek and Woessmann (2011), amongst others, have carried out thorough reviews of the international literature in this field, whereas Cordero, Crespo and Pedraja (2013), Marcenaro (2013) and Seijas (2004) have carried out such reviews in Spain.

The quantitative assessment of the production of educational services is divided into two groups: non parametric methods, based on mathematical optimization models, and parametric or econometric methods. The alternatives used most frequently in the second group to explain student performance are multilevel regression models recommended by PISA (OECD, 2014c), and are the models applied in this paper. For the case of Spain, the work performed (by Calero, Escardibul, Waisgrais and Mediavilla, 2007; Cordero, Manchón and Simancas, 2013 and Escardibul, 2008, amongst others), using PISA data with information regarding 2003, 2006 and 2009, indicate that variations of the degree of development of the competences studied attributable to the educational centres is relatively small in Spain as compared with the set of OECD countries: whereas in the latter case it is about 35% in the different years studies, for Spain it is about 20% in PISA 2003, 15% in PISA 2006 and 22% in PISA 2009.

In respect to data on financial competence assessed in 2012, the links between the degree of development of financial competence achieved and variables such as the efforts made (Fernández de Guevara, Serrano and Soler, 2014), the allocation of social and cultural capital of families (Verdú, Neira and García, 2014), and the results of mathematics (Jiménez and Vilaplana, 2014) have been described. The major contribution of this paper is to incorporate to the analysis the organizational aspects of the process of progressive implementation of FE in the different educational systems in order to detect excellent models of reference in the international sphere.

Methodology

This research uses multilevel regression (Snijders and Bosker, 2012). It begins with a simplified version of the production function described in (1) that will determine if there exist significant statistical relations

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between subject *i*'s degree of development of financial competence (Y_{ij}) in educational centre *j*. For that purpose it is used X_{ij}, a vector of student *i*'s individual and family characteristics in school *j*, and Z_j, which represents the vector of the characteristics of school *j*. The starting point is to estimate a model, called null model, without including the explicatory variables, which provides information regarding what proportion of inequality in the results of educational performance is due to differences between schools and what proportion is linked to internal inequalities:

$$Y_{ij}=\beta_{0j}+\varepsilon_{ij} \quad (2)$$
$$\beta_{0j}=\gamma_0+\mu_{0j} \quad (3)$$

The independent terms of each school (β_{0j}) are equal or very similar to the average of the educational centres, and consist of a fixed part common to all schools (γ_0), and a random part (μ_{0j}), with mean zero and variance τ^2, which represents the deviation of school *j* in respect to γ_0. Let us note that γ_0 is the result of the set of schools (average) whereas μ_{0j} is the deviation of *school j* from the average of the set of schools and represents the variance amongst the latter. As for ε_{ij}, this is the deviation of individual *i*'s results in respect to the average of his school *j* and has mean zero and variance σ^2. Below the analysis will be expanded by first including the variables related to students' individual and family characteristics:

$$Y_{ij}=\beta_{0j}+\beta_{1j}X_{ij}+\varepsilon_{ij} \quad (4)$$
$$\beta_{0j}=\gamma_0+\mu_j \quad (5)$$

It is possible to add to equation (5) the possibility that the regression slope may also vary; in other words, that the effect of X_{ij} over Y_{ij} varies between centres. In this case, as reflected in equations (7) and (8), both β_{0j} and β_{1j} have a fixed component and a variable one:

$$Y_{ij}=\beta_{0j}+\beta_{1j}X_{ij}+\varepsilon_{ij} \quad (6)$$
$$\beta_{0j}=\gamma_0+\gamma_1Z_{ij}+\mu_j \quad (7)$$
$$\beta_{1j}=\gamma_1+\pi_j \quad (8)$$

Lastly, it is incorporated Z_{ij}, the vector of variables related to the educational centres, which gives the full model:

$$Y_{ij}=\beta_{0j}+\beta_{1j}X_{ij}+\varepsilon_{ij} \quad (9)$$

$$\beta_{0j}=\gamma_0+\gamma_1 Z_{ij}+\mu_j \quad (10)$$

$$\beta_{1j}=\gamma_1+\pi_j \quad (11)$$

This approach allows decomposing the variance of the independent variable Var $(Y_{ij})=\sigma^2+\tau^2$ and studying the variance between educational centres on the basis of the expression $\tau^2/(\tau^2+\sigma^2)$ also known as Intracluster Correlation Coefficient, ICC or ρ. Starting with the null mode, if r is positive this will indicate the existence of differences between centres and the suitability of applying multilevel estimations. The analysis of the changes of ICC at each level of the module will allow analysing the influence of each group of variables in order to explain the changes in the development of the competence analysed.

Samples and variables used

PISA 2012 assessed the financial literacy of young people aged 15 in eighteen countries, 13 of which belong to the OECD and will be analysed in this paper. The two-stage cluster sampling design used (OECD, 2014c) presents particularities that were considered to obtain the statistics and to calculate the estimates. Thus, the BRR (Balanced Repeated Replication) procedure was applied with 80 replicated samples and the Fay correction coefficient set to 0.5. Furthermore, five plausible values (PV) randomly extracted from the distribution of results (Wu, 2009) were used as explanatory variables to assess the degree of development of financial literacy, the statistics of which appear in Tables I and II.

In respect to the explanatory variables related to students' individual characteristics, given that the number of studies on this competence is still very small, it was decided to include variables such as the socio-economic level of families, the condition of immigrant and sex, which have proven to have significant influence on educational performance in other competences, in order to verify if such influence is also applicable to FE.

In respect to the variables of the educational centre, these are divided into two groups. The first one considers that this competence entails a different character in respect to the others studied in PISA (reading, mathematics and sciences), given that its presence in the educational

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system is very limited and the treatment it is given in different schools and regions, even within the same country, is very heterogeneous, ranging from simply omitting the subject, to including it as a specific course or seeking the collaboration of external social agents, to considering it from a transversal point of view.

Moreover, the questionnaire filled out by the directors of the educational centres to report the aforementioned situations contain in some cases significant lack of responses, which could affect possible biases in the estimations (OECD, 2014a: 141). The second group comprises types of schools that depend on ownership and a measure of the peer effect (Cordero, Crespo and Pedraja, 2013, and Marcenaro, 2013).

The explanatory variables used are described below (the codes of the original PISA variables used to build the study's variables are shown in parentheses); the statistics are shown in Table III:

- Level 1. Students:
  - SEX. Dichotomous: 1 if the student is female (ST04Q01).
  - ESCS. Index of Economic, Social and Cultural Status (ESCS) provided by PISA.
  - INMI. Dichotomous: 1 for first and second generation immigrants (IMMIG).
  - REPI. Dichotomous: 1 if the student has repeated at least one school year (REPEAT).

- Level 2. Educational centres: treatment of FE.
  - EFAC. Dichotomous: 1 if students have access to some type of FE (SC47Q01).
  - EFOB. Dichotomous: 1 if students receive obligatory FE (SC47Q01).
  - EFTR. Dichotomous: 1 if students receive 20 hours or more of FE a year with a transversal focus (SC46Q02).
  - EFAS. Dichotomous: 1 if students receive 20 hours of more of FE per year in a separate course (SC46Q01).
  - EFEC. Dichotomous: 1 if students receive FE in an economics course (SC46Q03).

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- EFCS. Dichotomous: 1 if students receive FE in a Social Science course (SC46Q04).
- EFMA. Dichotomous: 1 if students receive FE in a maths course (SC46Q05).
- EFCE. Dichotomous: 1 if students receive FE as a supplementary or extracurricular activity (SC46Q06).
- EFRI. Dichotomous: 1 if students receive FE as part of a private sector company initiative (SC46Q07).
- EFSP. Dichotomous: 1 if students receive FE as part of an initiative of a public sector institution other than secondary school (SC46Q08).
- EFNG. Dichotomous: 1 if students receive FE as part of the initiative of an NGO (SC52Q02).

■ Level 2. Educational centres: other characteristics.
- PEER. This is the average of the ESCS index in the school where the student is enrolled. It aims to determine the extent to which the socio-economic characteristics of the school¡¯s other students have an influence on individual performance (peer effect).
- TIPOC. Dichotomous: 1 if the educational centre is public, 0 if it is private or privately managed with public funding (SCHLTYPE).

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TABLE I. Descriptive statistics of the PV and means of financial literacy in OECD countries with better than average performance (500)

COUNTRY	N	PV	Average	Stand. dev.
Australia, AUS	3293	PV1EF PV2EF PV3EF PV4EF PV5EF PVEF	526,46 526,06 526,23 526,39 525,10 526,05	101,34 101,79 100,97 101,03 100,98 101,22
Belgium (Flemish Community), BEL	1093	PV1EF PV2EF PV3EF PV4EF PV5EF PVEF	540,54 541,11 540,72 540,67 542,47 541,10	97,49 97,62 97,90 96,68 97,38 97,41
Czech Rep., CZE	1207	PV1EF PV2EF PV3EF PV4EF PV5EF PVEF	513,14 512,36 513,27 513,33 513,84 513,19	88,24 89,23 86,21 88,57 89,19 88,29
Estonia, EST	1088	PV1EF PV2EF PV3EF PV4EF PV5EF PVEF	529,98 529,83 528,38 528,29 528,82 529,06	79,45 79,32 79,44 78,30 78,36 78,97
New Zealand, NZL	957	PV1EF PV2EF PV3EF PV4EF PV5EF PVEF	520,82 520,47 519,86 519,40 519,38 519,98	116,69 118,01 117,62 118,45 119,11 117,97
Poland, POL	1054	PV1EF PV2EF PV3EF PV4EF PV5EF PVEF	510,74 510,50 509,95 509,01 510,42 510,13	81,60 81,56 82,31 82,40 81,51 81,88

Source: Compiled by the authors with data from PISA2012 (OECD, 2014).

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TABLE II. Descriptive statistics of the PV and means of financial literacy in OECD countries with lower than average performance (500)

COUNTRY	N	PV	Media	Desv. est.
Spain ESP	1108	PV1EF	484,5	85,7
		PV2EF	485,7	84,8
		PV3EF	483,5	84,8
		PV4EF	483,3	85,2
		PV5EF	484,3	85,1
		PVEF	484,3	85,1
France, FRA	1068	PV1EF	485,4	104,5
		PV2EF	486,8	106,5
		PV3EF	487,0	105,5
		PV4EF	486,7	104,7
		PV5EF	485,4	106,3
		PVEF	486,3	105,5
Israel, ISR	1006	PV1EF	476,4	114,1
		PV2EF	477,4	115,5
		PV3EF	476,4	115,2
		PV4EF	475,8	115,7
		PV5EF	476,3	116,2
		PVEF	476,5	115,4
Italy, ITA	7068	PV1EF	466,9	86,4
		PV2EF	466,3	87,3
		PV3EF	466,1	87,2
		PV4EF	466,4	87,6
		PV5EF	465,9	87,4
		PVEF	466,3	87,2
Slovak Republic, SVK	1055	PV1EF	470,9	105,3
		PV2EF	470,8	103,4
		PV3EF	469,9	105,2
		PV4EF	470,4	104,9
		PV5EF	470,3	105,9
		PVEF	470,5	104,9
Slovenia, SVN	1312	PV1EF	484,8	88,5
		PV2EF	483,4	89,7
		PV3EF	484,6	88,5
		PV4EF	483,3	89,4
		PV5EF	484,5	89,4
		PVEF	484,1	89,1
United States of America, USA	1133	PV1EF	492,1	98,4
		PV2EF	492,1	100,6
		PV3EF	490,5	98,9
		PV4EF	492,3	99,7
		PV5EF	490,9	98,9
		PVEF	491,6	99,3

Source: Compiled by the authors with data from PISA 2012 (OECD, 2014).

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TABLE III. Descriptive statistics of the explanatory variables: means (and standard deviations)

Variable	AUS	BEL	CZE	SPA	EST	FRA	ISR	ITA	NZL	POL	SVK	SVN	USA
SEX	0,5 (0,5)	0,51 (0,5)	0,47 (0,499)	0,47 (0,499)	0,48 (0,5)	0,50 (0,5)	0,46 (0,499)	0,49 (0,5)	0,5 (0,5)	0,51 (0,5)	0,49 (0,5)	0,49 (0,5)	0,51 (0,5)
ESCS	0,246 (0,803)	0,194 (0,867)	-0,047 (0,721)	-0,202 (1,011)	0,080 (0,832)	-0,032 (0,811)	0,201 (0,856)	-0,033 (0,966)	0,0827 (0,789)	-0,204 (0,922)	-0,159 (0,932)	0,079 (0,883)	0,155 (0,979)
INMI	0,21 (0,410)	0,11 (0,311)	0,02 (0,156)	0,11 (0,317)	0,10 (0,295)	0,14 (0,347)	0,18 (0,385)	0,08 (0,264)	0,27 (0,446)	0 (0,035)	0,01 (0,099)	0,09 (0,293)	0,23 (0,421)
REPI	0,07 (0,256)	0,25 (0,431)	0,06 (0,238)	0,32 (0,467)	0,04 (0,194)	0,28 (0,448)	0,20 (0,153)	0,18 (0,383)	0,05 (0,222)	0,06 (0,229)	0,06 (0,245)	0,02 (0,139)	0,15 (0,355)
EFAC	0,72 (0,447)	0,81 (0,396)	0,83 (0,375)	0,16 (0,365)	0,22 (0,413)	0,39 (0,488)	0,26 (0,438)	0,35 (0,476)	0,70 (0,458)	0,46 (0,499)	0,85 (0,359)	0,33 (0,471)	0,66 (0,472)
EFOB	0,25 (0,434)	0,51 (0,5)	0,69 (0,464)	0,03 (0,179)	0,10 (0,306)	0,26 (0,441)	0,13 (0,334)	0,26 (0,439)	0,08 (0,278)	0,24 (0,426)	0,54 (0,498)	0,22 (0,417)	0,42 (0,494)
EFAS	0,10 (0,402)	0,15 (0,355)	0,11 (0,313)	0,05 (0,227)	0,04 (0,186)	0,21 (0,404)	0,09 (0,282)	0,13 (0,331)	0,35 (0,477)	0,01 (0,08)	0,10 (0,295)	0,12 (0,326)	0,49 (0,500)
EFTR	0,06 (0,242)	0,04 (0,207)	0,12 (0,327)	0,06 (0,236)	0,07 (0,250)	0,09 (0,289)	0,07 (0,256)	0,05 (0,221)	0,02 (0,148)	0,01 (0,089)	0,19 (0,395)	0,04 (0,186)	0,16 (0,362)
EFEC	0,83 (0,375)	0,79 (0,410)	0,37 (0,484)	0,22 (0,414)	0,43 (0,495)	0,65 (0,478)	0,36 (0,479)	0,49 (0,5)	0,92 (0,271)	0,18 (0,385)	0,45 (0,497)	0,36 (0,481)	0,78 (0,413)
EFMA	0,59 (0,492)	0,66 (0,472)	0,90 (0,306)	0,61 (0,487)	0,85 (0,361)	0,35 (0,476)	0,33 (0,471)	0,29 (0,455)	0,45 (0,497)	0,71 (0,454)	0,95 (0,223)	0,37 (0,482)	0,57 (0,495)
EFCS	0,87 (0,341)	0,81 (0,391)	0,90 (0,302)	0,55 (0,498)	0,83 (0,376)	0,40 (0,489)	0,41 (0,491)	0,44 (0,496)	0,52 (0,500)	0,78 (0,418)	0,80 (0,399)	0,60 (0,490)	0,57 (0,495)
EFCE	0,1 (0,293)	0,18 (0,383)	0,08 (0,278)	0,02 (0,155)	0,22 (0,416)	0,08 (0,277)	0,25 (0,432)	0,13 (0,334)	0,17 (0,374)	0,28 (0,451)	0,31 (0,461)	0,09 (0,281)	0,15 (0,355)
EFPR	0,26 (0,440)	0,27 (0,446)	0,2 (0,399)	0,03 (0,167)	0,10 (0,301)	0,01 (0,116)	0,07 (0,259)	0 (0)	0,38 (0,486)	0,11 (0,318)	0,24 (0,425)	0,10 (0,301)	0,43 (0,495)
EFSP	0,07 (0,250)	0,07 (0,257)	0,05 (0,210)	0,03 (0,172)	0,07 (0,255)	0,01 (0,116)	0,02 (0,140)	0 (0)	0,23 (0,418)	0,07 (0,263)	0,05 (0,213)	0,06 (0,239)	0,24 (0,427)
EFNG	0,12 (0,330)	0,18 (0,384)	0,08 (0,270)	0,02 (0,154)	0,16 (0,369)	0,01 (0,116)	0,08 (0,264)	0,16 (0,369)	0,33 (0,472)	0,03 (0,174)	0,19 (0,391)	0,09 (0,288)	0,25 (0,435)
PEER	0,243 (0,531)	0,190 (0,526)	-0,049 (0,453)	-0,203 (0,621)	0,084 (0,543)	-0,040 (0,530)	0,203 (0,517)	-0,033 (0,607)	0,073 (0,480)	-0,204 (0,583)	-0,159 (0,659)	0,078 (0,607)	0,153 (0,600)
TIPOC	0,60 (0,489)	0,25 (0,434)	0,92 (0,275)	0,68 (0,467)	0,98 (0,143)	0,83 (0,376)	1 (0)	0,95 (0,213)	0,95 (0,228)	0,97 (0,170)	0,91 (0,285)	0,98 (0,154)	0,95 (0,218)

Source: Compiled by the authors with data from PISA 2012 (OECD, 2014)

Estimated models and analysis of the results

HLM 6.0 (Raudenbush, Bryk, Cheong and Congdon, 2004), which calculates the parameters of the previous equations by means of iterative methods that maximise a function of maximum likelihood, was used to obtain the multilevel estimates. In all the models the observations are weighted with the weight variable *w_fstuwt* provided by PISA. The programme provides the final mean result of the population estimators with the requirements described above. To avoid possible problems in the significance tests, the parameters of the equations and their standard errors robust to heteroscedasticity are calculated.

An additive estimation strategy was used: first the variables referred to student characteristics were dealt with, followed by variables related to the type of FE treatment reported by school directors, and lastly, the remaining school characteristics. Tables IV, V, VI and VII provide three models for each country: model one includes the null model and the individual variables; model two incorporates the variables related to the FE; and model three adds the other variables related to the school. All present significance in the estimated parameters of at least 10% and global significance. The tables include a row that assesses the differences between the ICC of the null model and model 1 (student variables), of model 1 and 2 (including only FE variables) and lastly model 1 and 3 (all of the school's variables).

The models obtained show much greater variations between centres than what was established for the other competences, which oscillate between 45% French and 85.4% Spanish, probably as a result of the aforementioned disparity regarding the range and depth of the treatment of FE in the educational systems. In respect to student variables, the models highlight that the degree of development of the competence entails a strong component linked to the equity of educational systems. We thus note that in nearly all countries the students that obtain the worse results are those from poorer families with lower professional and academic status and fewer cultural assets (measured by means of ESCS), the repeaters and the immigrants (with the exception of Australia, where other studies have already described that the latter obtain the best results;

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Thomson, 2014). Furthermore, in eight of the thirteen countries analysed there are significant differences of gender, to the detriment of female students. Therefore, in general girls obtain worse results in countries with below average degrees of development, and the gender variable is not significant in three of the six countries where the average values of the degree of development of financial literacy are above the OECD average. In respect to the characteristics of the schools, the peer effect also highlights that the higher the average socio-economic level of school students, the better the result in FE is in eleven of the thirteen countries studied. The type of school is only partially relevant (three of the countries studied), although public schools always show worse results than private schools or private schools with public funding.

The recent increase of awareness by managers of educational systems regarding the importance of FE and of international mandates (OECD, 2012) has led to a first phase of implementation of FE based on different methods. In order to identify the best national results in fomenting the degree of development of financial literacy in the educational systems analysed, we used Table VIII, which contains the mean plausible values obtained in each country and the differences in the ICC derived from the different models corresponding to the groups of variables analysed.

The estimates highlight that the impact of the policies to implement FE in educational systems is still very limited and is less than 7%. The most relevant cases, which combine achieving levels of performance above the OECD average and greater impact in connection with their measures, are the Flemish community in Belgium (the variables of their model 2 account for 6.1% of their performance) and the Czech Republic (3%, model 2). In Belgium, which achieves the highest degree of development of the competence in the OECD, the estimated model highlights that the most important variable is EFEC, which comprises the schools that teach FE as part of a Economics course (option present in 79% of the schools) and which accounts for an increase of 47 points in the performance obtained; the fact that financial education is obligatory (51% of schools) and implementing programmes in collaboration with NGOs (18% of schools) is also relevant. In the Czech Republic, which ranks fifth in performance of the thirteen countries studied, the fact that

it is obligatory to study FE in 69% of the schools increases performance by 19 points, whereas collaboration with private entities increases performance by 25 points.

The other countries where performance is above average present contributions to their FE programmes which have less than 3% influence on the final results. Thus, for Estonia, which ranks second in performance level, the variables that describe a transversal model, dealing with FE in social science courses and programmes in collaboration with public sector institutions other than schools are positive and significant measures, although the influence of test actions only represents 1% of the final result. In Australia, in 83% of the schools the relevant variable is to include FE in a course in Economics (this explains 0.5% of total performance). In New Zealand 92% of the schools teach FE in courses in Economics: the variable EFAC, with a frequency of 17%, is the only one statistically significant to explain the variance between centres, and it only explains 1.7% of the level variance. For Poland, model 2 does not contribute to explain the differences between centres arising from the FE programmes.

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TABLE IV. Multilevel estimators of financial literacy in 13 countries OECD (continued)

	AUS1	AUS2	AUS3	BEL1	BEL2	BEL3	CZE1	CZE2	CZE3
Null Model, γ_{00}	525,2[a] (2,82)	--	--	534,0[a] (6,29)	–	--	499,5[a] (6,06)	--	--
Level 1: STUDENTS									
γ_{00}	520,6[a] (2,610)	508,2[a] (5,87)	512,5[a] (6,62)	567,1 [a] (5,55)	552,4[a] (11,15)	546,3[a] (10,83)	524,2[a] (5,52)	511,3[a] (10,10)	530,3[a] (5,71)
SEX	--	--	--	-16,17 [a] (4,97)	-18,78[a] (4,98)	-19,95[a] (4,86)	-19,83[a] (5,59)	-20,34[a] (5,55)	-20,96[a] (5,44)
INMI	20,44[a] (5,34)	18,97[a] (5,29)	18,94[a] (5,29)	-38,13 [a] (11,43)	-43,03[a] (11,53)	-36,80[a] (11,02)	-32,02[a] (12,03)	-33,03[a] (11,91)	-33,96[a] (11,43)
REPI	-63,66[a] (8,75)	-63,60[a] (8,73)	-64,39[a] (8,74)	-70,86 [a] (6,10)	-70,28[a] (6,08)	-65,92[a] (6,24)	-119,92[a] (12,76)	-119,15[a] (12,54)	-116,86[a] (12,64)
ESCS	39,02[a] (2,49)	38,84[a] (2,50)	30,94[a] (3,02)	13,72[a] (2,83)	13,28[a] (2,79)	8,68[a] (3,14)	24,54[a] (4,15)	24,78[a] (4,15)	14,76[a] (4,40)
Level 2: CENTRES, FINANCIAL EDUCATION									
EFAC	--	--	--	–	-23,80[b] (9,73)	-20,04[b] (9,08)	--	--	--
EFOB	--	--	--	–	–	16,87[b] (7,79)	--	18,96[c] (10,52)	--
EFTR	--	--	--	–	–	--	--	--	--
EFAS	--	--	--	–	–	--	--	-31,00[a] (11,83)	-29,06[b] (12,92)
EFEC	--	18,32[a] (6,47)	17,29[a] (6,21)	–	46,82[a] (10,23)	39,45[a] (9,47)	--	--	--
EFMA	--	--	--	–	–	--	--	--	--
EFCS	--	--	--	–	–	--	--	--	--
EFCE	--	--	--	–	-25,67[c] (13,10)	--	--	--	--
EFPR	--	-10,08[c] (5,21)	-9,62[c] (5,05)	–	–	--	--	24,67[a]	21,99[a]
EFSP	--	--	--	–	–	--	--	--	--
EFNG	--	--	--	–	21,57[c] (11,17)	20,07[b] (9,95)	--	--	--
Level 2: CENTRES, OTHER CHARACTERISTICS									
PEER	--	--	21,82[a] (6,30)	–	–	36,81[a] (9,15)	--	--	60,26[a]
TIPOC	--	--	-11,41[b] (5,41)	–	–	-35,68[a] (9,49)	--	--	--
Null Variance (τ^2)	7710 (2635)	--	--	5361 (3856)	–	--	4523,5 (4211)	--	--
CCI null	0,745	--	--	0,582	–	--	0,503	--	--
Variance (τ^2)	6728 (1359)	6728 (1359)	6696 (1189)	4197 (2002)	4203 (1490)	4159 (1095)	3645 (2279)	3663 (2010)	3638 (1510)
CCI	0,168	0,163	0,151	0,323	0,262	0,208	0,385	0,354	0,293

[a] significant p<0.01; [b] significant p<0.05; [c] significant p<0.10. Standard errors in parenthesis.

Source: Compiled by the authors with data from PISA 2012 (OECD, 2014).

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TABLE V. Multilevel estimators of financial literacy in 13 OECD countries (continued)

	ESP1	ESP2	ESP3	EST1	EST2	EST3	FRA1	FRA2	FRA3	ISR1
Null Model, γ_{00}	487,1[a] (4,09)	--	--	527,8[a] (4,05)	--	–	481,2[a] (6,84)	--	--	472,7[a] (9,40)
Level 1: STUDENTS										
γ_{00}	527,7[a] (4,34)	529,1[a] (4,21)	530,5[a] (4,07)	535,2[a] (3,97)	520,3[a] (9,89)	536,9[a] (4,42)	525,5[a] (6,23)	495,7[a] (9,89)	498,8[a] (9,80)	474,9[a] (7,56)
SEX	-14,91[a] (4,99)	-14,86[a] (4,96)	-15,31[a] (4,94)	–	--	–	-11,87[b] (5,70)	-12,37[b] (5,33)	12,06[b] (5,31)	–
INMI	-33,06[a] (8,21)	-30,67[a] (8,10)	-30,63[a] (8,11)	-32,27[a] (8,71)	-31,61[a] (8,68)	-32,68[a] (8,60)	-45,11[a] (8,19)	-44,15[a] (8,30)	-42,35[a] (8,28)	–
REPI	-80,26[a] (5,54)	-81,51[a] (5,38)	-80,54[a] (5,38)	-72,41[a] (10,32)	-72,89[a] (10,23)	-71,84[a] (10,14)	-85,15[a] (8,70)	-65,78[a] (9,92)	-60,46[a] (10,02)	-35,70[b] (15,06)
ESCS	15,43[a] (2,61)	15,03[a] (2,54)	12,31[a] (2,93)	17,51[a] (3,68)	17,11[a] (3,65)	17,10[a] (3,65)	22,83[a] (4,14)	22,31[a] (3,62)	18,11[a] (3,88)	26,42[a] (4,17)
Level 2: CENTRES, FINANCIAL EDUCATION										
EFAC	–	--	--	–	--	–	–	--	--	–
EFOB	–	--	--	–	--	–	–	--	--	–
EFTR	–	--	--	–	16,19[c] (8,66)	22,52[a] (8,28)	–	32,30[b] (15,05)	27,72[c] (14,83)	–
EFAS	–	--	--	–	--	-22,83[c] (11,80)	–	--	--	–
EFEC	–	--	--	–	--	–	–	32,95[a] (10,61)	27,97[a] (10,56)	–
EFMA	–	--	--	–	--	–	–	--	--	–
EFCS	–	--	--	–	20,56[c] (10,72)	–	–	--	--	–
EFCE	–	--	--	–	-23,25[a] (8,73)	-18,71[b] (8,52)	–	--	--	–
EFPR	–	--	--	–	--	–	–	123,1[b] (50,11)	129,7[b] (49,14)	–
EFSP	–	--	--	–	27,00[b] (13,46)	28,94[b] (13,19)	–	--	--	–
EFNG	–	-54,61[a] (13,65)	-49,68[a] (13,26)	–	--	–	–	--	--	–
Level 2: CENTRES, OTHER CHARACTERISTICS										
PEER	–	--	11,41[b] (5,76)	–	--	–	–	--	28,29[a] (9,50)	–
TIPOC	–	--	--	–	--	–	–	--	--	–
Null Variance (τ^2)	6143 (1052)	--	--	4951 (1189)	--	–	5026 (6148)	--	--	7070 (7385)
CCI nulo	0,854	--	--	0,806	--	–	0,450	--	--	0,489
Variance (τ^2)	4098 (493)	4102 (421)	4098 (393)	4542 (837)	4505 (771)	4544 (739)	4521 (2128)	4486 (1756)	4468 (1658)	6621,8 (4525)
CCI	0,107	0,093	0,088	0,156	0,146	0,140	0,320	0,281	0,271	0,406

[a] significant p<0.01; [b] significant p<0.05; [c] significant p<0.10. Standard errors in parenthesis.

Source: Compiled by the authors with data from PISA 2012 (OECD, 2014).

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TABLE VI. Multilevel estimators of financial literacy in 13 OECD countries (continued)

	ISR2	ISR3	ITA1	ITA2	ITA3	NZL1	NZL2	NZL3	POL1	POL2	POL3
Null Model, γ_{00}	–	--	462,6[a] (3,26)	--	–	524,1[a] (6,75)	--	–	511,4[a] (4,22)	--	–
Level 1: STUDENTS											
γ_{00}	471,8[a] (7,98)	475,6[a] (7,85)	480,9[a] (3,69)	483,1[a] (5,16)	483,8[a] (4,45)	528,2[a] (5,35)	523,4[a] (5,65)	548,5[a] (15,37)	526,8[a] (4,86)	526,8[a] (4,86)	529,1[a] (4,92)
SEXO	–	--	-13,11[a] (3,11)	-13,28[a] (3,11)	-14,23[a] (3,19)	--	--	–	-10,42[b] (5,03)	-10,42[b] (5,03)	-10,75[b] (4,98)
INMI	–	--	-19,15[a] (6,32)	-19,67[a] (6,29)	-17,94[a] (6,47)	--	--	–	-119,6[a] (9,05)	-119,6[a] (9,05)	-120,2[a] (9,00)
REPI	-35,75[b] (14,99)	-26,43[c] (15,45)	-42,23[a] (4,72)	-42,68[a] (4,72)	-39,05[a] (4,62)	-84,14[a] (17,68)	-84,46[a] (17,75)	-78,81[a] (17,14)	-77,40[a] (10,96)	-77,40[a] (10,96)	-76,68[a] (10,79)
ESCS	26,55[a] (4,19)	18,43[a] (4,03)	6,36[a] (1,48)	6,26[a] (1,50)	–	51,12[a] (5,36)	50,41[a] (5,35)	33,76[a] (6,11)	23,28[a] (3,09)	23,28[a] (3,09)	19,39[a] (3,42)
Level 2: CENTRES, FINANCIAL EDUCATION											
EFAC	–	--	--	--	–	--	--	–	--	--	–
EFOB	–	--	--	-15,41[b] (7,42)	-18,13[a] (6,73)	--	--	–	--	--	–
EFTR	–	--	--	-24,76[a] (8,24)	-19,16[b] (8,30)	--	--	–	--	--	42,34[a] (4,24)
EFAS	35,53[c] (19,59)	34,72[b] (13,44)	--	32,46[a] (8,12)	33,39[a] (7,30)	--	--	–	--	--	–
EFEC	–	--	--	-16,84[b] (6,87)	–	--	--	–	--	--	–
EFMA	–	--	--	--	–	--	--	–	--	--	–
EFCS	–	--	--	11,44[c] (6,41)	–	--	--	–	--	--	–
EFCE	–	--	--	--	–	--	28,37[b] (12,44)	–	--	--	–
EFPR	–	--	--	--	–	--	--	–	--	--	–
EFSP	–	-33,47[c] (18,66)	--	--	–	--	--	–	--	--	–
EFNG	–	--	--	17,89[b] (7,14)	14,55[b] (6,82)	--	--	–	--	--	–
Level 2: CENTRES, OTHER CHARACTERISTICS											
PEER	–	82,32[a] (15,61)	--	--	40,45[a] (5,87)	--	--	63,28[a] (13,95)	--	--	17,01[a] (6,31)
TIPOC	–	--	--	--	–	--	--	-27,37[c] (14,76)	--	--	–
Null Variance (τ^2)	–	--	4084 (3630)	--	–	10221 3360			5019 1547		
CCI null	–	--	0,529	--	–	0,753			0,764		
Variance (τ^2)	6624 (4418)	6653 (2662)	3823 (2870)	3843 (2138)	3828 (2629)	9146 (1388)	9167,5 (1238)	9026 (731)	4275 (1128)	4275 (1128)	4271 (1041)
CCI	0,400	0,286	0,429	0,407	0,407	0,132	0,119	0,075	0,209	0,209	0,196

[a] significant p<0.01; [b] significant p<0.05; [c] significant p<0.10. Standard errors in parenthesis.

Source: Compiled by the authors with data from PISA 2012 (OECD, 2014).

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TABLA VII. Multilevel estimators of financial literacy in 13 OECD countries (final)

	SVK1	SVK2	SVK3	SVN1	SVN2	SVN3	USA1	USA2	USA3
Null Model, γ_{00}	460,9[a] (6,09)	--	--	473,6[a] (7,97)	–	--	496,7[a] (5,48)	--	--
Level 1: STUDENTS									
γ_{00}	476,1[a] (5,08)	473,0[a] (15,73)	479,7[a] (14,02)	490,8[a] (7,18)	510,1[a] (10,23)	507,4[a] (6,48)	503,44[a] (4,29)	493,88[a] (4,90)	485,7[a] (5,59)
SEXO	--	--	--	-16,80[a] (5,23)	-16,08[a] (5,32)	-16,16[a] (4,59)	--	--	--
INMI	-76,90[b] (38,77)	-81,58[b] (37,47)	-81,58[b] (37,47)	-34,67[a] (8,04)	-35,47[a] (8,72)	-28,86[a] (6,69)	--	--	--
REPI	-93,65[a] (14,11)	-85,00[a] (14,46)	-85,00[a] (14,46)	-76,20[a] (17,76)	-85,60[a] (17,41)	-67,32[a] (17,68)	-74,61[a] (8,04)	-73,20[a] (7,89)	-71,37[a] (7,82)
ESCS	21,72[a] (3,18)	14,04[a] (3,77)	14,04[a] (3,78)	12,58[a] (4,15)	14,05[a] (4,55)	--	31,63[a] (3,27)	30,76[a] (3,31)	25,78[a] (3,67)
Level 2: CENTRES, FINANCIAL EDUCATION									
EFAC	--	33,82[b] (16,08)	29,18[b] (14,58)	–	–	--	--	--	--
EFOB	--	--	--	–	-36,65[a] (12,44)	-31,91[a] (11,87)	--	--	17,13[b] (7,64)
EFTR	--	--	--	–	–	--	--	27,06[a] (9,55)	--
EFAS	--	-43,44[a] (14,28)	-39,43[a] (13,85)	–	38,10[b] (14,56)	24,87[c] (13,62)	--	--	--
EFEC	--	--	--	–	-40,12[a] (11,68)	-29,05[a] (9,61)	--	--	--
EFMA	--	--	--	–	–	--	--	--	--
EFCS	--	-31,77[b] (12,59)	-24,53[b] (10,91)	–	–	--	--	--	--
EFCE	--	--	--	–	–	--	--	--	--
EFPR	--	--	21,28[b] (9,72)	–	–	-20,66[b] (10,15)	--	–	14,43[b] (7,17)
EFSP	--	--	--	–	–	--	--	--	--
EFNG	--	31,72[b] (12,35)	--	–	–	--	--	19,95[b] (8,86)	--
Level 2: CENTRES, OTHER CHARACTERISTICS									
PEER	--	--	40,01[a] (5,41)	–	–	76,12[a] (7,99)	--	--	26,68[a] (7,28)
TIPOC	--	--	--	–	–	--	--	--	--
Null Variance (τ^2)	4661 (5440)	--	--	3416 (5296)	–	--	7393 (2472)	--	--
CCI null	0,461	--	--	0,392	–	--	0,749	--	--
Variance (τ^2)	4232 3439	4230 3010	4217 2503	3324 (4021)	3391 (3133)	3205 (1744)	6345 (1021)	6353 838	6346 708
CCI	0,448	0,416	0,372	0,547	0,480	0,352	0,139	0,116	0,100

[a] significant p<0.01; [b] significant p<0.05; [c] significant p<0.10. Standard errors in parenthesis.

Source: Compiled by the authors with data from PISA 2012 (OECD, 2014).

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TABLE VIII. Differences of the ICC of the estimated models

COUNTRY	Mean PV	CCI				Differences		
		CCI Null Model (1)	CCI Model 1 (2)	CCI Model 2 (3)	CCI Model 3 (4)	Variance explained: Students (1)-(2)	Variance explained: FE Centres (2)-(3)	Variance explained Total Centres (2)-(4)
BEL	541	0,582	0,323	0,262	0,208	0,259	0,061	0,115
CZE	513	0,503	0,385	0,354	0,293	0,118	0,030	0,091
NZL	520	0,753	0,132	0,119	0,075	0,621	0,013	0,057
EST	529	0,806	0,156	0,146	0,140	0,651	0,010	0,016
AUS	526	0,745	0,168	0,163	0,151	0,577	0,005	0,017
POL	510	0,764	0,209	0,209	0,196	0,556	0,000	0,013
OCDE-13	500							
SVN	485	0,392	0,547	0,480	0,352	-0,155	0,067	0,195
FRA	486	0,450	0,320	0,281	0,271	0,130	0,039	0,049
SVK	470	0,461	0,448	0,416	0,372	0,013	0,033	0,076
USA	492	0,749	0,139	0,116	0,100	0,611	0,022	0,038
ITA	466	0,529	0,429	0,407	0,407	0,101	0,022	0,022
ESP	484	0,854	0,107	0,093	0,088	0,746	0,014	0,020
ISR	476	0,489	0,406	0,400	0,286	0,083	0,006	0,120

Source: Compiled by the authors with data from PISA 2012 (OECD, 2014).

In respect to countries with below-average performance, the best results correspond to France, whose FE model explains 4% of the variance between schools. The most relevant variable is having FE in the context of an Economics course (this is done in 65% of schools), which increases performance by 33 points in model 2; transversal approaches also provide positive contributions (present in only 9% of schools) and collaboration with private entities, which occurs in 1% of schools. In Slovakia (where model 2 explains 3.3% of variance of the results between centres), having FE available in 85% of the schools has a positive impact. However, organization of a specific subject or teaching FE in a social science course has a negative impact on the results; collaborating with NGOs and private entities is positive. The North American model explains 2.2% of the variance between centres; FE is obligatory in two third of the schools,

which contributes 17 points to improving the final results; in 78% of the schools FE is taught in Economics courses; the transversal model, present in only 16% of the schools, is also statistically significant in model 2, together with collaboration with non-governmental or private entities, depending on whether we consider models 2 or 3. In Slovenia, the positive contribution stems from establishing a specific subject, but the results of the parameters suggest that the presence of FE in Economics courses must be reviewed, together with the manner in which it is taught when it is obligatory. The remaining countries reveal impacts of their FE programme that explain less than 2% of the variance of the results of model 2.

In the Spanish case, the impact on the competence of the FE programmes introduced in the educational system is irrelevant. The lag is particularly serious despite recent efforts made. Spain is the OECD country in which there is the least amount of FE available for students: 84.20% do not have any at all (OECD, 2014). In the pilot programmes promoted by the Bank of Spain (BE), the percentage of participants in connection with the total student population is very small (43,000 students, out of 8,081,972 enrolled and 452 schools of the 27,650 that exist in the general pre-university education level for 2013-14), whose authors stress the need to include this subject matter in school curriculums (BE, 2013: 18). Economics is a subject not taught at the age levels assessed by PISA, or at earlier ages, by teachers specialised in Economics or in courses taken by all students. Although teachers responsible for FE lack training in a scientific field as complex and specific as Economics or Finances, recent modifications of curricula have opted for a transversal model, indicating that FE should be dealt with by primary education teachers in the different areas of knowledge they cover, whereas in obligatory secondary education, for the age groups assessed by PISA, FE is to be taught transversally by the Maths or Geography and History teachers (MEC, 2014a: 12-15).

Conclusions

The results of PISA 2012 indicate that financial literacy presents differential traits requiring concrete actions that are soundly based and sufficiently ample and profound to have an influence on the general

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student population and not just on special groups participating in specific programmes. In addition, the research carried out highlights that the impact achieved by the actions of educational systems in this field is still very limited and presents great potential for improvement.

The results in connection with the most appropriate models to implement FE must be analysed with care, given that in many of the participating countries the data provided are very limited and the influence of the initiatives adopted on final performance is very scarce. However, it is possible to identify educational systems that have achieved a relevant impact on the degree of development of the competence in their contexts. Most of them share having applied the principle of specialisation in implementing FE, a complex subject with its own complex epistemological and scientific sphere, by establishing different obligatory subjects or including FE in school curriculum courses dealing with economics. Furthermore, collaboration programmes with private institutions and NGOs have also proven to be relevant. Neither teaching FE during maths or social science classes, nor transversal models, have proven to produce positive results in the majority of countries with the best performance and with FE programmes that have greater impact on school students. In any case, it is essential to analyse in greater depth different methodologies and additional data to establish definite criteria to guide national educational policies in this area.

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