The Effect of Organisational Structure on Education Efficiency: public-private provision and decentralisation

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Abstract

This paper investigates the effect of the organisational structure of primary and secondary education systems on their productive efficiency. We use stochastic frontier analysis to estimate efficiency for 18 OECD countries in 2000 and 2003. Organisational structure is explored through two analytical components: the share of public/private providers in the system and the degree of decentralisation of public providers. The share of public providers is found to exert a negative effect on efficiency whereas the degree of decentralisation of public providers is found to exert a positive effect on efficiency.

JEL: I21, I28, H52, C10, C14

KEYWORDS: expenditure and education, expenditure and efficiency, education and efficiency, organisation and education.

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1. Introduction

Public policy can influence economic productivity through two different channels: first, via productivity changes in the public sector itself, and second via the effects of taxation, public spending and regulation on the private sector (European Commission, 2004).

There is a growing body of empirical literature investigating the link between government activity and the performance of economic systems via this second channel[2]. This literature stresses the importance of some "core", "essential", "productive" expenditure for economic growth. This type of expenditure is said to be as important to growth as private capital and labour, acting directly upon the human and physical capital stock and technical progress of the economy, or indirectly through synergies with private activities[3].

The production of human capital is the area of government activity for which the clearest evidence of positive growth effects is available[4]. The economic rationale for government intervention on education hinges on a combination of externalities, economies of scale, other market failures, and redistribution motives (Hanushek, 2002). Empirical studies generally indicate that public spending on education can improve on a pure market outcome.

Several econometric studies suggest that the relationship between government expenditure and economic performance is non-linear, and that a negative correlation between the two is likely to emerge when government expenditure expands beyond a

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[2] Hemming *et. al*, 2002; Romero de Avila and Strauch, 2003; Tanzi and Shuknecht, 2000, 2003; Tanzi and Zee, 2000; and Zagler and Durnecker, 2003.

[3] See Afonso, Ebert, Schuknecht and Thone (2005) for a good review of this literature.

[4] Englander and Gurney, 1994; De Gregorio, 1996; keefer and Knack, 1997; De la Fuente and Domenech, 2000; Bassanini and Scarpetta, 2001; Gemmell and Kneller, 2001; Heitger, 2001; and Buysse, 2002.

certain level (Barro, 1990; Heitger, 2001, Gwartney, Lawson and Holcombe, 1998). An increase in public expenditure is expected to increase the marginal productivity of capital, while an increase in taxes is likely to reduce it[5]. The first positive effect is said to dominate when government is small, being offset by the tax effect when it grows beyond a certain point. The overall result of the interaction between these two effects is mediated by the *efficiency* of public spending.

There are a limited number of studies addressing the efficiency of education systems at the international level (Clements, 1999, 2002; St. Aubyn, 2002; Gupta and Verhoeven, 2001; Afonso and St. Aubyn, 2004, 2005). These studies follow a parallel line of research to the traditional econometric estimation of education production functions using cross-country data (Barro and Lee, 2001; Hanushek and Kimko, 2000; Hanushek and Luque, 2003). In both approaches, socio-economic variables describing students' backgrounds such as parents' education and wealth are the key variables used to explain efficiency[6]. Whilst the importance of these variables cannot be overstated, they are of little help to policymakers attempting to improve the outcomes of education expenditure since, at least in the sort run, they are beyond government control.

More interesting for policymakers is the effect of the organisational structure of education systems on efficiency (something that can be changed by government). In this paper organisational structure is explored in two dimensions: the share of

[5] High levels of taxation tend to damage the general allocation of resources by distorting incentives to work, to invest and/or to save (Cashin, 1995; de la Fuente, 1997; Folster and Henrekson, 1999; Kneller, Bleaney and Gemmell, 1998). Growth is further impaired by high and sustained government deficits and growing debt (Tanzi and Chalk, 2000).

[6] The literature focusing on the econometric estimation of education production functions does not explicitly acknowledge the concept of *efficiency*. Typically, qualitative measures of education outputs (results from international studies assessing students' academic abilities) are regressed on a set of education system resources (financial and/or physical) and other environmental variables thought to affect the performance of the education system. However, since students' socio-economic background (normally proxied by parents' education and wealth) is often presented as a relevant environmental variable for explaining students' performance, it is implicitly assumed that it interferes with the relationship between inputs and outputs, and thus with efficiency.

public providers and the degree of decentralisation of the public share of the system. We estimate efficiency using stochastic frontier analysis and an unbalanced data panel of 18 OECD countries in 2000 and 2003. The results from two OECD (2000, 2003) tests of student's mathematical, reading and scientific abilities are taken as the output variable. The input variable is the cumulative expenditure per student in the course of primary and secondary education. After controlling for the effect of students' socio-economic background, the share of public providers is found to be negatively associated with efficiency whereas the degree of decentralisation of the public share of the system is positively associated with efficiency.

This paper breaks new ground by estimating and explaining education efficiency in a single-stage stochastic frontier model[7], using data from two OECD Programme for International Student Assessment (PISA 2000, 2003) reports. The demonstration that organisational structure affects efficiency is also novel.

[7] Most of the existing literature uses non-parametric methods such as Free Disposable Hull and Data Envelopment Analysis to estimate efficiency. The stochastic specification of the efficiency frontier has the advantage of explicitly acknowledging that some of the deviations from the maximum observed output may occur due to factors unrelated to inefficiency (e.g., inaccuracy in the measurement of output; exogenous shocks outside the control of the production system, etc).

2. Data

The traditional conceptualisation of the education production process is of the following form (Hanushek and Taylor, 1990):

$$A = f(S\ ;F\ ;\varepsilon\ ) \qquad (1)$$

A: a vector of variables measuring individual achievement;

S: a vector of variables measuring school inputs;

F: a vector of variables measuring students' socio-economic background;

ε: a vector of unmeasured factors that contribute to individual achievement (individual ability and random factors).

We expand this model to $A = f(S\ ;F\ ;O;\varepsilon\ )$, where *O* is a vector of variables measuring organisational structure.

We use as a measure of student achievement the results of two OECD surveys conducted in 2000 and 2003 which evaluate the mathematical, reading and scientific ability of 15 year old students[8].

School inputs are measured through the cumulative expenditure per student[9] (CEPS) between the age of 6 and 15 in equivalent US dollars using purchasing power parities[10].

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[8] An arithmetic average of the mathematic, reading and science scores from the 2000 and 2003 *Programme for International Student Assessment (PISA)* surveys was considered. Since the reporting scales for mathematics are not directly comparable between 2000 and 2003, as the PISA 2003 mathematics assessment was more comprehensive than the one that took place in 2000, we drew on the two components of the 2003 mathematical results (*space and shape* and *change and relationships*) common to the 2000 survey.

[9] Let *n(0), n(1)* and *n(2)* be the typical number of years spent by a student from the age of six up to the age of 15 years in primary, lower secondary and upper secondary education. Let *E(0), E(1)* and *E(2)* be

Students´ socio-economic background is proxied by the PISA's index of economic, social and cultural status (IESCS). This indicator captures various aspects of students' family and home background that are thought to be relevant for school achievement[11].

Organisational structure is expressed by two variables: the share of public providers in the system (%PUBPROV), and the degree of decentralisation of public providers (DEC). In the following we provide a brief discussion of the rationale for including these variables.

Primary and secondary education is mainly a public enterprise. On average across OECD countries only 4 per cent of 15-year-olds are enrolled in schools that are

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the annual expenditure per student in US dollars converted using purchasing power parities in primary, lower secondary and upper secondary education, respectively. The cumulative expenditure is then calculated by multiplying current annual expenditure *E* by the typical duration of study *n* for each level of education *i* using the following formula, (OECD, 2004a):

$$CE = \sum_{i=0}^{2} n(i) * E(i)$$

[10] Several different variables have been considered in the education efficiency literature to measure the school inputs contributing to student achievement. These have typically included financial indicators such as expenditure per student and physical indicators such as average class size, ratio of students to teaching staff, and number of instruction hours. Financial inputs were predominant in most of the pioneer studies on education efficiency. Recent studies have favoured the use of multiple physical inputs instead - often being alleged that financial inputs reflect to a large extent differences in costs between countries (mainly teachers' salaries) causing significant distortions to the measurement of efficiency.

We employ a single financial indicator as the input variable for three different reasons. First, differences in costs underlying financial measures of inputs can be mitigated by the use of values converted at PPPs (although they are not totally eliminated as PPPs are calculated taking into account the average level of prices (the one that underlies the gross domestic product) and not the particular prices/costs of specific services like education). Second, some of these differences in cost actually reflect differences in the overall efficiency of the system that should be considered by our calculations. For example, the skill and ability of school managers to contract the best teachers at the best price, to put in place an incentive regime that ensures high labour productivity, or to outsource non-core activities in a cost effective manner, create differences in costs that should be reflected in a proper account of efficiency. Third, despite all the imperfections and flaws of international data on education expenditure, this still arguably remains the best available proxy for the entire set of resources that go into the production of education. Resources such as physical infrastructure (buildings, computers, etc) and policy administration (of schools and the education system as a whole) escape traditional physical input measures, but have a bearing on financial inputs.

[11] IESCS is derived from the following variables (OECD, 2004a, p. 307): *i)* the highest international socio-economic index of occupational status of the father or mother; *ii)* the highest level of education of the father or mother converted into years of schooling; and *iii)* the number of books at home as well as access to home educational and cultural resources, obtained by asking students whether they had at their home: a desk to study at, a room of their own, a quiet place to study, a computer they can use for school work, educational software, a link to the Internet, their own calculator, classic literature, books of poetry, works of art (*e.g.,* paintings), books to help with their school work, and a dictionary.

both privately managed and predominantly privately financed (OECD, 2004a). However, publicly financed schools are not necessarily publicly managed, and in fact, in the search for efficiency gains, governments are increasingly relying on the transfer of public funds to privately managed schools to deliver education services. Accordingly, schools that are privately managed but predominantly publicly financed[12] account for a more expressive average of 13 per cent of school enrolment in OECD countries (OECD, 2004a).

Therefore, in contrast to previous studies that have tested (unsuccessfully) the effect of the ratio of public-to-total expenditure on efficiency[13], we argue that the share of public providers (schools both funded and managed by the public sector) offers a better account of the structural diversity of education systems and that its effect on efficiency is the one that should be investigated.

Apart from the segmentation between public and private providers, a second organizational feature of education systems whose impact on efficiency is worth studying relates to the reforms that have been taking place throughout the last two decades in terms of the way the public sector operates as a service provider. In particular, while seeking to improve efficiency, many governments have opted for devolving decision-making authority to schools and lower levels of governments. This has been accomplished in the expectation it will enable downsizing of central education administration; elimination of superfluous layers of bureaucracy; and

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[12] OECD (2004a) designates these as "government-dependent schools". In PISA, public schools are defined as educational instructional institutions that are controlled and managed directly by a public education authority or agency; or controlled and managed either by a government agency directly or by a governing body (council, committee, etc.), most of whose members were either appointed by a public authority or elected by public franchise. Private schools are defined as educational instructional institutions that are controlled and managed by a nongovernmental organisation (*e.g.,* a church, a trade union or a business enterprise) or if their governing board consisted mostly of members not selected by a public agency.

[13] Afonso and St. Aubyn (2005) did not find a significant relationship between public-to-total education expenditure and efficiency. The authors argued that this was "probably because most spending in this level of education is essentially public and high for most countries" (p. 23).

improvement of chains of command in decision making, delivering a larger proportion of financial and human resources directly to local governments, schools, and students (Behrman, *et al.*, 2002).

We examine the effect of decentralisation on efficiency using an indicator of the distribution of educational decisions by specific levels of government in public lower secondary education (OECD, 2004b)[14].

Our model is estimated for an unbalanced panel of 18 OECD countries in 2000 and 2003[15]. Data for all variables are presented in the statistical annex and descriptive statistics are presented in table 1.

[Insert table I here]

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[14] The percentage of decisions taken at the "local" and "school" levels is taken as the appropriate indicator of decentralisation. Information on four different functional domains is considered:
- *Organisation of instruction*: student admissions; student careers; instruction time; choice of textbooks; grouping students; additional support for students; teaching methods; regular day-to-day student assessment;
- *Personnel management*: hiring and dismissal of teaching and non-teaching staff; duties and service conditions of staff; salary scales of staff; influence over the careers of staff;
- *Planning and structures*: opening or closure of schools; creation or abolition of a grade level; design of programmes of study; selection of programmes of study taught in a particular school; choice of range of subjects taught in a particular school; definition of course content; setting of qualifying examinations for a certificate or diploma; credentialing (examination content, marking and administration);
- *Resources*: allocation and use of resources for teaching staff, non-teaching staff, capital and operating expenditure.

[15] Data on cumulative expenditure refers to 1998 and 2002 (deflated to 1998 prices). Data on decentralisation of public providers also refers to 1998 and 2003.

3. The Stochastic Production Function Model

This paper uses the Battese and Coelli (1995) model for a stochastic frontier production function which is equivalent to the Kumbhakar, Ghosh and McGukin (1991) specification, with the exception that allocative efficiency is imposed, the first-order profit maximising conditions removed, and panel data is permitted. The model may be expressed as:

$$Y_{it} = X_{it}\beta + (V_{it} - U_{it}) \qquad i=1,...,18;\ t=1,2 \tag{2}$$

Y_{it} is the logarithm of the PISA score of country i in period t;

X_{it} is the logarithm of cumulative expenditure per student of country i in period t;

β is a vector of unknown parameters;

t denotes the time period;

V_{it} are random variables assumed to be independent and identically distributed $N(0,\sigma_V^2)$, and independent of U_{it};

U_{it} are non-negative random variables assumed to account for technical inefficiency in production and assumed to be independently distributed as truncations at zero of the $N(m_{it},\sigma_U^2)$ distribution, where:

$$m_{it} = Z_{it}\delta, \tag{3}$$

Z_{it} is a p×1 vector of variables deemed to influence the efficiency of country i in period t; δ is an 1×p vector of parameters to be estimated.

Following Battese and Corra (1977), the likelihood function is parameterised in terms of the variance ratio $\gamma=\sigma_U^2/(\sigma_V^2+\sigma_U^2)$. Hence γ indicates the relative magnitude of technical inefficiency variance to total variance in the model.

Six different specifications of equation (3) are tested:

Model a: $m_{it} = \delta_1 IESCS_{it}$;

Model b: $m_{it} =\delta_0+\delta_1 IESCS_{it}+\delta_2 \ln(\%PUBPROV)$;

Model c: $m_{it} =\delta_1 IESCS_{it}+\delta_2 \ln(DEC)$;

Model d: $m_{it} =\delta_1 IESCS_{it}+\delta_2 \ln(\%PUBPROV)+\delta_3 \ln(DEC)$;

Model e: $m_{it} =\delta_1 IESCS_{it}+\delta_2 \ln(\%PUBPROV)+\delta_3 \ln(\%PUBPROV*DEC)$;

Model f[16]: $m_{it} =\delta_0+\delta_1 IESCS_{it}+\delta_2 \ln(DECINDEX)$

Models "a", "b", and "c" test the isolated effect on efficiency of IESCS, %PUBPROV and DEC, respectively[17]. Models "d", "e" and "f" include simultaneously the three variables and consider different specifications for %PUBPROV and DEC. Model "d" treats the effects of %PUBPROV and DEC on the general efficiency of education systems as being autonomous and independent from each other. Model "e" considers that the effect of decentralisation on efficiency is mediated by the share of public providers in the education system. Finally, model "f" tests the effect on efficiency of an overall index of decentralisation that assumes private schools correspond to a level of decentralisation of one and that public schools are in this respect comparable to private schools, i.e. that ownership of is irrelevant. In

[16] DECINDEX= 1-[%PUBPROV(1-DEC)]. This index assumes that private schools correspond to a level of decentralisation of 100 per cent. The index is equivalent to an average of the level of decentralisation of public and private schools, weighted by the share of public and private providers in the education system, respectively.

[17] In these two later cases controlling for IESCS.

the different specifications an independent term was included when its estimate was significant[18].

4. Results and Concluding Remarks

Maximum likelihood estimates of the parameters in the production function frontier and technical inefficiency effects for the different specifications are presented in table 2. The efficiency ranking associated with model "e"[19] is presented in table 3.

[Insert table II here]

[Insert table III here]

The results are consistent between the different models. Apart from the expected positive effect of students' socio-economic background on efficiency (reflected in the negative estimate of the technical inefficiency coefficient), the share of public providers is found to exert a negative effect on efficiency whereas decentralisation is positively associated with efficiency (the technical inefficiency parameters are positive and negative, respectively).

We tested the robustness of these results by performing a series of generalized likelihood ratio tests. The likelihood ratio statistic is given by $\lambda = 2(\ln L_1 - \ln L_0)$, where ln L_0 and ln L_1 are the maximum log-likelihood values under the null and alternative hypotheses, H_0 and H_1, respectively. Under the null hypothesis this statistic

[18] We performed generalized likelihood ratio tests to determine whether or not an independent term should be included.
[19] The one that generated the highest log likelihood value.

is usually assumed to be asymptotically distributed as a chi-square random variable with degrees of freedom equal to the number of restrictions involved in the test. However, when the null hypothesis involves a restriction of the type $\gamma=0$ this statistic can be shown to have an asymptotic non-standard mixed qui-square distribution with degrees of freedom equal to the number of parameters restricted to zero under the null hypothesis (Coelli *et. al*, 1998)[20]. The results of the likelihood ratio tests are presented in table 4.

[insert table IV here]

The first set of null hypotheses in each model tests the individual and combined significance of the organisational variables DEC and %PUBPROV. The last null hypothesis tests the appropriateness of the stochastic frontier and technical inefficiency effects specification by assessing the possibility of it being equivalent to the average response function, which can be efficiently estimated by ordinary least squares regression. These null hypotheses are clearly rejected[21] and so we conclude that the effects of our organisational variables are significant and that the stochastic specification of the efficiency frontier is appropriate.

Over the last two decades major reforms have been attempted in various public services across a range of jurisdictions. New modes of delivery and new provider structures, mostly drawn from private sector practice, have been tested and adapted to the political and institutional context in which public services operate.

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[20] We extracted the critical value for this statistic from Kodde and Palm (1986).

[21] Except for the individual effect of DEC in model "c". However, since we expect this effect to be influenced by %PUBPROV this lack of individual significance does not appear to be particularly meaningful.

In the field of education one of the most significant changes to the underlying governing structure has been the shift from traditional bureaucratic modes of coordination to decentralized governance mechanisms with increasing private sector participation.

Governments are increasingly relying on private providers as a means of defining institutional environments that induce efficient behaviour. At the same time, the public sector itself is redefining the way it operates as a service provider – from a traditional purely bureaucratic form of organisation to the constitution of effective service agencies, highly decentralised, and operating along privately-inspired management criteria. This paper suggests that both these practices have positive impact on primary and secondary education efficiency.

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Table I: Descriptive statistics

Variable	Mean	Std. Dev.	Min.	Max.
PISA scores	494.000	30.811	393.000	544.000
Cumulative expenditure per std	44148.406	18548.700	10480.545	73328.892
IESCS	-0.020	0.359	-1.130	0.690
%PUBPROV	0.846	0.187	0.233	0.995
Dec	0.603	0.261	0.156	1

Table II: Maximum likelihood estimation results. Absolute t-ratios in parentheses

Model a					
Production function		Technical inefficiency effects		Variance parameters	
Parameter	Estimate	Parameter	Estimate	Parameter	Estimate
Constant	6.100	IESCS	-0.187	σ^2	0.002
	(30.787)		(-4.253)		(2.813)
CEPS	0.012	Log Likelihood	52.274	γ	0.125
	(0.686)				3.410
Model b					
Production function		Technical inefficiency effects		Variance parameters	
Parameter	Estimate	Parameter	Estimate	Parameter	Estimate
Constant	6.205	Constant	0.047	σ^2	0.002
	(3.871)		(1.887)		(4.132)
CEPS	0.004	IESCS	-0.180	γ	0.196
	(0.257)		(-4.538)		(1.183)
		ln(%PUBPROV)	0.117		
			(1.997)		
		Log Likelihood	56.366		
Model c					
Production function		Technical inefficiency effects		Variance parameters	
Parameter	Estimate	Parameter	Estimate	Parameter	Estimate
Constant	6.114	IESCS	-0.143	σ^2	0.002
	(34.016)		(-2.856)		(3.215)
CEPS	0.012	ln(DEC)	-0.031	γ	0.258
	(0.724)		(-1.295)		(0.828)
		Log Likelihood	53.113		
Model d					
Production function		Technical inefficiency effects		Variance parameters	
Parameter	Estimate	Parameter	Estimate	Parameter	Estimate
Constant	6.131	IESCS	-0.140	σ^2	0.002
	(50.426)		(-3.185)		(4.521)
CEPS	0.011	ln(%PUBPROV)	0.135	γ	0.391
	(0.940)		(2.469)		(1.543)
		ln(DEC)	-0.055		
			(-3.150)		

		Log Likelihood	57.667		

Model e

Production function		Technical inefficiency effects		Variance parameters	
Parameter	Estimate	Parameter	Estimate	Parameter	Estimate
Constant	6.128	IESCS	-0.139	σ^2	0.002
	(42.047)		(-3.152)		(2.187)
CEPS	0.011	ln(%PUBPROV)	0.176	γ	0.344
	(0.809)		(4.014)		(0.923)
		ln(%PUBPROV*DEC)	-0.055		
			(-2.816)		
		Log Likelihood	57.780		

Model f

Production function		Technical inefficiency effects		Variance parameters	
Parameter	Estimate	Parameter	Estimate	Parameter	Estimate
Constant	6.109	Constant	-0.083	σ^2	0.002
	(32.700)		(-1.615)		(1.144)
CEPS	0.012	IESCS	-0.166	γ	0.248
	(0.677)		(-3.150)		(0.316)
		ln(DECINDEX)	-0.105		
			(-2.349)		
		Log Likelihood	56.211		

Table III: Efficiency ranking

Country	Output Efficiency	Country	Output Efficiency
2000		2003	
Finland	0.991	Netherlands	0.997
Norway	0.990	Korea	0.995
Denmark	0.990	Finland	0.994
Korea	0.989	Iceland	0.993
Hungary	0.976	Norway	0.991
Austria	0.974	Czech Republic	0.990
Czech Republic	0.973	Denmark	0.989
Germany	0.972	Sweden	0.989
Spain	0.952	Japan	0.989
Italy	0.925	Hungary	0.980
Greece	0.909	Germany	0.978
Portugal	0.872	Slovak Republic	0.971
		Austria	0.971
		Italy	0.948
		Spain	0.942
		Portugal	0.890
		Greece	0.893
Average Efficiency	0.960	Mexico	0.792

Table IV: Likelihood ratio tests (5% level of significance)

Null hypothesis	λ	Critical Value	Decision
Model b			
H_{01}: ln(%PUBPROV)=0	8.367	3.84	Reject
H_{02}: λ=0, Constant=0; IESCS=0; ln(%PUBPROV)=0	26.507	8.761	Reject
Model c			
H_{01}: ln(DEC)=0	1.678	3.84	Not Reject
H_{02}: λ=0; IESCS=0; ln(DEC)=0	20.001	7.045	Reject
Model d			
H_{01}: ln(%PUBPROV)=0	9.107	3.84	Reject
H_{02}: ln(DEC)=0	7.338	3.84	Reject
H_{03}: ln(%PUBPROV)=0; ln(DEC)=0	10.785	5.99	Reject
H_{04}: λ=0; IESCS=0; ln(%PUBPROV)=0; ln(DEC)=0	29.109	8.761	Reject
Model e			
H_{01}: ln(%PUBPROV)=0	10.967	3.84	Reject
H_{02}: ln(%PUBPROV*DEC)=0	7.564	3.84	Reject
H_{03}: ln(%PUBPROV)=0; ln(%PUBPROV*DEC)=0	11.011	5.99	Reject
H_{04}: λ=0; IESCS=0; ln(%PUBPROV)=0; ln(%PUBPROV*DEC)=0	29.335	8.761	Reject
Model f			
H_{01}: ln(INDEXDEC)=0	8.057	3.84	Reject
H_{02}: λ=0, Constant=0; IESCS=0; ln(INDEXDEC)=0	26.197	8.761	Reject

Statistical Annex – Data and Sources

Country	Pisa Average Score (1)	Cumulative expenditure p/std (2)	Index of economic social and cultural status (3)	%Decision-making at school and local levels (4)	%Public providers (5)
Austria (2003)	496	73329	0.06	0.51	0.92
C.Republic (2003)	511	23144	0.16	0.92	0.93
Denmark (2003)	493	67037	0.20	0.81	0.78
Finland (2003)	544	50645	0.25	0.98	0.93
Germany (2003)	499	47660	0.16	0.49	0.92
Greece (2003)	463	28791	-0.15	0.16	0.97
Hungary (2003)	491	18190	-0.07	0.96	0.89
Iceland (2003)	498	54144	0.69	0.75	1.00
Italy (2003)	474	68939	-0.11	0.63	0.96
Japan (2003)	530	63351	-0.08	0.67	0.73
Korea (2003)	541	39017	-0.10	0.56	0.42
Mexico (2003)	393	10480	-1.13	0.22	0.87
Netherlands (2003)	525	48394	0.10	1.00	0.23
Norway (2003)	490	60193	0.61	0.68	0.99
Portugal (2003)	468	42048	-0.63	0.41	0.94
S.Republic (2003)	488	11893	-0.08	0.65	0.87
Spain (2003)	482	40424	-0.30	0.28	0.64
Sweden (2003)	507	56668	0.25	0.83	0.96
Austria (2000)	510	71387	0.01	0.47	0.89
C.Republic (2000)	500	21384	-0.04	0.62	0.94
Denmark (2000)	497	65794	0.20	0.74	0.76
Finland (2000)	538	45363	0.04	1.00	0.97
Germany (2000)	485	41978	0.16	0.53	0.96
Greece (2000)	458	27356	-0.08	0.23	0.96
Hungary (2000)	485	20277	-0.05	1.00	0.95
Italy (2000)	471	60824	-0.17	0.36	0.94
Korea (2000)	537	30844	-0.17	0.32	0.51
Norway (2000)	499	61677	0.49	0.65	0.99
Portugal (2000)	458	36521	-0.58	0.24	0.93
Spain (2000)	485	36699	-0.39	0.41	0.62

(1) Arithmetic average of PISA Mathematics (space and change; change and relationships), Reading and Science scores (OECD, 2004a, Tables 2.1c; 2.1d; 2.2c; 2.2d; 6.2; 6.6; OECD, 2001. Tables 3.3;2.3a;3.6).
(2) Cumulative expenditure per student between 6 and 15 years-old in purchasing power parities (OECD, 2004a, Table 2.6 (values deflated to 1998); OECD, 2001, Table 3.6).
(3) Mean Pisa Index of Economic and Social Status (OECD, 2004a, Tables 2.6;4.3b).
(4) Percentage of decisions relating to public sector, lower secondary education, taken at each level of government (OECD, 2004b, Table D6.6).
(5) Percentage of students enrolled in Public Schools (OECD 2004a, Table 5.19; OECD, 2001, Table 7.13).