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FINANCIAL IMPACTS OF CLASS-SIZE REDUCTION IN PORTUGUESE EDUCATIONAL SYSTEM

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Abstract

This research emerges in the follow up of a research project, funded by the Portuguese Ministry of Education, which had a great impact, and which promoted a new legal regulation regarding the size of classes. The present research aims to promote a reflection toward the benefits derived from the class-size reduction, looking, in this sense, to demonstrate that the costs resulting from this are usually overvalued when they are determined on the basis of a worker's gross cost to the State, and not taking into account the corresponding net costs. For this academic exercise, it was considered the Portuguese case and the costs of a teacher for the public education system in Portugal. Keeping in mind a methodological approach designed to estimate not only gross costs, but, in the same way, the net costs of hiring a teacher at reference prices of 2015/2016, and crossing that cost with the projections of classes to be created in the Portuguese educational system, in the academic year of 2017/2018, starting from a scenario of reduction of the maximum number of students per class, it was estimated that the net costs of that measure will be in the order of 20 million euros, a significantly lower value to those usually assumed by policy makers and considered in the scientific debate on that measure of educational policy. In addition to these net costs, it is necessary to consider other factors that justify the use of a policy of reduction of classes in Portugal. These are the positive pedagogical effects on students' learning - particularly in the most disadvantaged socioeconomic contexts -, the financial savings resulting from the amounts applied in programs to promote school retention, as well as a spillover effect in the medium to long-term resulting from a more educated population. If, to these factors, we still consider a scenario of a strong demographic decline in Portugal, it is demonstrated the opportunity and importance in reinforcing a policy of reducing the number of students per class in Portugal. This work aims to contribute to a better reflection on this subject, in Portugal and in other countries, sensitizing different educational actors for a closer approximation of the relationship between cost and direct and indirect benefits that may result from a policy of class-size reduction.

Keywords: Class-Size Reduction, Educational Policies, Educational Economy.

1 INTRODUCTION

This work aims to promote further reflection on policies related to education funding, particularly on the level of direct and indirect impacts of class-size reductions, using the Portuguese educational system as a case study.

One of the problems that currently confronts educational systems, like all public works, is that of financing. In view of governments' increasing financial difficulties in response to the demands arising from the expansion of education, particularly compulsory education, it is difficult to propose reforms that, at least at first glance, will result in higher costs to the State.

One of the educational measures that has been promoted, or at least suggested, in developed countries, is reducing the number of students per class, on the premise that smaller class sizes contribute to academic success. Nonetheless, this initiative has led to debate, first of all because reducing the number of students per class entails extraordinary expenditures that threaten to strain States' limited budgets.

Obviously at first glance reducing the number of students per class will, in fact, mean more classes and in turn require larger investments in facilities and equipment as well as in teachers, administrators, and staff. However, to dismiss that measure due to the financial burdens it may impose overlooks its positive pedagogical effects. In the short term, these benefits include increased classroom success, reducing the costs of school repetition. In the medium and long term, one cannot ignore the spillover effect of a more educated population. Finally, (although many other positive effects can be identified) there is the assumption that one more teacher or one more employee will constitute an increased expense for the

state as opposed to being perceived as an investment. In other words, that expense is commonly overestimated.

In this article, we intend, first of all and drawing from the literature, to highlight some of the benefits of reducing class sizes, and, second, to demonstrate that the expenses of doing so have been consistently overestimated when they are determined by the gross costs of a public employee and not by the net costs.

2 THEORETICAL FRAMEWORK

The issue of class size, both in terms of costs and in terms of educational methods and school achievement, has been the subject of many studies, with conclusions that sometimes differ significantly. In spite of these disagreements, it is worth noting that the principal international reference studies point to the conclusion that smaller classes tend to produce more favourable pedagogical results, especially among students from socially disadvantaged backgrounds [1-3]. In the Portuguese context, a recent study financed by the Ministry of Education, and in which the authors participated, highlighted similar findings [4].

The results of this research project supported the publication of new legislation, which introduced a reduction in the number of students per class in the initial years of the cycle, expecting to be phased in over the next few years. Table 1 shows the recent evolution up to the present school year [4-5].

Table 1. Legislation with respect to class size in Portugal, 2001 to 2018/2019, by level of instruction

EDUCATIONAL CYCLES	LEGISLATION (2001-2004)	LEGISLATION (2004-2013)	LEGISLATION (2013- 2017)	LEGISLATION (2018/2019)	AVERAGE CLASS SIZES IN 2015/2016
1st cycle of Primary Education	25 (cannot exceed)	24 (cannot exceed)	26 students	24-26 students	20,7 (16.142 classes)
2nd cycle of Primary Education	25-28 students	24-28 students	26-30 students	24-28 students (5th year) 26-30 students (6th year)	22,1 (8.084 classes)
3rd cycle of Primary Education	25-28 students	24-28 students	26-30 students	24-28 students (7th year) 26-30 students (8th and 9th year)	22,4 (11.772 classes)
Secondary Education - General	25 -28 students	24-28 students	26-30 students	26-30 students	24,5 (7.008 classes)
Secondary Education – Prof/Vocational Classes	-	18-23 (minimum of 15 and maximum of 28, when justified)	24-30 students	24-30 students	17,2 (3.583 classes)

In addition to improvements in student learning obtained in smaller classes, several studies also point to positive effects in school climate and teacher satisfaction [6-7]. Two other aspects on which scholars agree when studying policies of class-size reductions are that they can never be viewed in isolation but in conjunction with a range of educational policies, and that their implementation will require an increase in financial outlays, due primarily to the hiring of additional teachers and the construction or rehabilitation of new classrooms.

Despite this, some authors refer to ways in which these associated costs can be lessened, in the medium and long term, by taking into account reductions in school retention and dropout rates, the rising educational level of the population, the consequent increase in economic productivity and purchasing power, and the reinforcement of equity and social justice, among other aspects that, broadly, have the power to generate economic growth and development [8].

In this sense, these indirect benefits should be framed with the Theory of Human Capital [9-10] and of innumerable studies that demonstrate the positive relationship – a spillover effect – between educational levels and rising levels of economic growth and development [11-12], as well as social and economic development resulting from other indirect, non-monetary benefits such as changes in fertility and birth rates, the encouragement of political participation and solidarity, and the reduction of crime. All of these represent incalculable positive externalities of education [13-15].

In spite of these positive externalities that may occur in the medium and long term, the decision to reduce the number of students per class is a measure with immediate financial effects, resulting from the necessity of hiring new teachers and more technical and operational support staff, as well as building, renovating, or re-equipping classrooms. We see here the difficulty, from a financial point of view, of moving ahead with significant reductions in the makeup of classes, taking into account the budgetary demands and constraints that schools face and, often, the priority given to the implementation of alternative educational programs [1-2]. In other words, what more commonly ends up on the table on the part of many political decision makers is precisely the reverse, that is, in the name of budgetary control, raising the average number of students per class, with the goal of saving major sums of money.

On the other hand, it is urgent to bring into the debate the costs inherent in not implementing these types of policies that can promote manageable class sizes. As previously explained, it is certain that implementing money-saving measures resulting in larger class sizes can lead to a significant increase in costs. These costs take into account medium and long-term economic and social impacts that eventually grow in significance. They include, for example, lower graduation rates, lower productivity, lower average earnings, negative impacts on civic participation and general happiness, all of which, taken together, translate into lower fiscal returns for the State.

3 METHODOLOGY

In methodological terms, the study is structured in a statistical and descriptive approach to the phenomenon of the financial impacts of a policy of reducing the number of students per class.

For this academic exercise, it was considered the Portuguese case and the costs of a teacher for the public education system in Portugal. Keeping in mind a methodological approach designed to estimate not only gross costs, but, in the same way, the net costs of hiring a teacher at reference prices of 2015/2016 and crossing that cost with the projections of classes to be created in the Portuguese educational system, in the academic year of 2017/2018.

Taking into account these results inherent to the additional charge of a class reduction policy, it is also sought to estimate the values that can result in savings for the State budget. For the estimates that will be presented, we used the collection and analysis of different databases provided by the Portuguese Ministry of Education, during the research project indicated previously [4].

It was our intention to create a simulation exercise tied to the eventual need to hire new teachers and to build and equip new classrooms, with the idea that these estimated values can help to assess the future financial impact resulting from the reduction of the number of students per class. Our specific focus is on the human resources needed, and thus, we propose the following: If it is explicit and justified, the methodology considered pertinent to use is that of determining the unit cost per teacher in the event their hiring is necessary as part of an overall policy to reduce class sizes.

Our methodology of calculating the financial impacts of reducing the number of students per class is different from the ones normally utilized, especially in Portugal by official entities such as the National Council of Education [16], in taking into consideration the fact that each teacher represents, simultaneously, an expense and a source of income for the State. The expense is the nominal wage that corresponds to each salary level. The source of income corresponds to the part of earnings that the State will claim indirectly by means of taxes and contributions.

4 RESULTS

Considering the research project in which the authors participated, it was estimated that if the reduction in the number of students per class materialized in this school year had taken place in 2017/2018, this would entail the creation of around 1036 new classes and about 1057 teaching hours, teachers that would be hired in the scale 167, equivalent to the beginning of the career [4].

The value corresponding to scale 167 is used, based on the presumption that any new teacher who is hired will be hired at the beginning of the career.

Table 2. Number of Classes and Teaching Hours to be Created, in 2017/2018

STARTING YEARS OF THE CYCLE	CLASSES TO CREATE	TEACHING HOURS TO CREATE (FTE)
1st year	209	217
5th year	174	178
7th year	208	236
10th year – General Education	184	190
1st year – Professional/Vocational	261	236
Totals	1036	1057

Taking these values into account, we now seek to estimate not only the gross (direct) financial impact of the measure but also the net (indirect) financial impacts. Gross Costs, that is, the real cost of an employee for the Ministry of Education (ME), and that results from the addition to the nominal salary of an employee the 23,75% of this salary that the ME sends to Social Security, and along with it, the meal subsidy; we call this amount the “Gross Annual Salary,” that which corresponds to the direct financial burdens borne by the Ministry of Education. On the other hand, Net Costs, obtained assuming that the employee is not only a source of expense but also a source of income, as a result of the direct and indirect revenues drawn from the respective salary; we call this amount the “Net Annual Salary,” that which corresponds, in the final instance, to the financial burdens accruing to the State for an employee. In this sense, Table 3 shows the calculations applied to a teacher at the beginning of the career (scale 167).

Table 3. Annual Financial Obligations of the State / Employment Cost of Scale 167 in 2015/2016 (in euros)

PUBLIC FINANCIAL OBLIGATIONS	
Base salary (Scale 167) (1)	1518,63
Social Security / CGA ¹ (23,75%) (2)	360,67
Total monthly cost to the State (1)+(2)	1879,30
Annual total (14 months ²) (3)	26310,26
Meal subsidy (11 months ³) (4)	1014,4
Total Annual Obligation for a new teacher, hired at Scale 167 (A)=(3)+(4)	27324,66

¹ In the Portuguese context, Social Security refers to the general program, while General Treasury/Caixa Geral de Aposentacões (CGA) corresponds to the social security program for civil servants. Due to recent legal changes, some teachers are covered by CGA and others by Social Security.

² In Portugal, workers receive in addition to their monthly salaries a holiday bonus and a Christmas bonus.

³ In Portugal, the meal subsidy is only paid for 11 months of actual work.

DIRECT PUBLIC FINANCIAL BENEFITS	
Total annual obligation (Scale 167)	27324,66
Base salary (14 months)	21260,82
IRS Withholding (15,8%) (1)	3359,21
Social Security / CGA (11%) (2)	2338,69
ADSE ⁴ (3,5%) (3)	744,13
Total Direct Public Financial Benefits (B)=(1)+(2)+(3)	6442,03
INDIRECT PUBLIC FINANCIAL BENEFITS / ECONOMIC BENEFITS	
Net salary (Scale 167) (1)	14818,79
Meal subsidy (11 months) (2)	1014,4
Income from labour factor (RDP) (3)=(1)+(2)	15833,19
Expected consumer spending (96,1% consumption tax, as a function of RDP-2nd quarter 2016)	15215,70
VAT potential income (12,5% of the average VAT– VAT/Expected consumer spending) (4)	1901,96
Total Indirect Public Financial Benefits / Economic Benefits (C)= (4)	1901,96
Net Annual Teacher Salary Scale 167= (A) – ((B) + (C))	18980,67 euros / teacher
(Gross Annual Teacher Salary Scale 167 – Total Direct Public Benefits – Total Indirect Public Benefits)	(Scale 167)

As shown in Table 3, the State's total annual obligation for a teacher at Scale 167 (the entry-level salary step for a teacher) is approximately 27 thousand euros.

However, this burden soon decreases by about 6.442 euros upon taking into account the direct financial benefits to the State, as we add the corresponding amounts of IRS withholding, contributions to Social Security or CGA, and ADSE.

In addition, if other indirect benefits are taken into account, the annual net salary would be on the order of 18.980,67 euros. According to the projection indicated in Table 2, the increase in 1.057 full-time teacher hours would represent a gross cost to the State on the order of 29 million euros.

Taking into account the amounts in the same Table 2 and, in addition, applying the estimated amounts in the methodological framework shown in Table 3, it was possible to obtain the following amounts, which are financial impacts for the 2017/2018 academic year, but at 2015/2016 prices.

⁴ The ADSE is a public institute of the Ministries of Finance and Health, directed toward Disability Protection and Assistance.

Table 4. Gross Costs and Net Costs arising from teaching hours to be created in 2017/2018, prices from 2015/2016

YEARS OF THE BEGINNING OF EACH CYCLE	GROSS COSTS (SCALE 167), IN EUROS	NET COSTS (SCALE 167), IN EUROS
1st year	5 929 451,22	4 118 805,39
5th year	4 863 789,48	3 378 559,26
7th year	6 448 619,76	4 479 438,12
10th year – Sciences & Humanities Classes (General Education)	5 191 685, 40	3 606 327,30
1st year – Professional/Vocational Classes	6 448 619,76	4 479 438,12
Totals	28 882 165,62	20 062 568,19

From the analysis in Table 4, the evidence shows that assuming the basic cost per teacher at Scale 167 in net terms – that is 18.980,67 euros – instead of the 27.324,66 euros attached to the perspective of gross costs, the total real cost to the State is not almost 29 million euros but rather around 20 million euros, representing a reduction on the order of 30%.

Starting with a complementary estimate, Table 5 is intended to highlight the additional charges of a reduction in the number of students per class in the Portuguese education system, comparing with some values that could unburden the public budget, assuming the benefits verified for the school success of the students, also in the Portuguese educational system, of smaller classes.

For this, we took as reference a unit cost of building a new classroom in the order of 150 thousand euros and its equipment on the order of 4.5 thousand euros. Additionally, it is assumed on the side of possible savings, the charges with programs to prevent school failure and drop out and the financial impacts that would result from an effective drop in student retention by 25%, an objective defined by the ministry of education. In this particular case, was taken as a reference as unit cost for each student retained 3019.47 euros / year [4, 17].

Table 5. Estimates of Additional Charges and Savings resulting from the reduction of classes in 2017/2018 at 2015/2016 prices

ADDITIONAL CHARGES	EUROS	SAVINGS	EUROS
Teachers	20 062 568,19	Programs "failure and school leaving" – TEIP 3	20 418 987,67
Construction of new classrooms	3 300 000 (22 classrooms * 150000 euros)	Target "-25% Retention"	62 083 322,67 (20561 students * 3019,47 euros)
New classroom equipment	99 000 (22 classrooms * 4500 euros)		
Totals	23 461 568,19		82 502 310,34

In this way, the values presented clarify that the real cost to the State is significantly lower than what is generally expected. Independent of the fact that, in the Portuguese case, the reduction in the number of students per class eventually may not involve new hiring by virtue of demographic changes and administrative actions to redistribute students among oversized and undersized classes (which are about two-thirds of the total), what it was really intended to show is the fallacy of public decision-makers when they simply consider gross expenditures. Confined to their reductive viewpoints, these decision-makers frequently neglect the broader perspective of future positive externalities that result from a more educated population, as amply described in the literature.

5 CONCLUSIONS

The aim of this work was to mobilize the literature regarding the educational policy of reducing class sizes, with a focus on its financial impacts, presenting a methodological process that permits the assumption of some reference values for different pay scales of the teaching career and an estimate of more realistic costs for that policy, using the Portuguese educational system as a case study.

This article attempts to demonstrate, by means of the estimates presented, that there are benefits to be gained from reducing class sizes and that the associated costs are typically overestimated as a result of being determined by the gross cost to the State of an additional employee, and not by the corresponding net costs, as we have made clear through the calculations presented.

In reality, these net costs determined today may be, in the medium and long term, significantly less than projected, or may even be null, by virtue of the positive externalities arising from education. Research has shown that a more educated population, besides being a more competent and productive population, is one that shows more engagement and solidarity, is more open to change, with better hygiene and health, and more discerning in terms of culture [13-15]. In this way, education affects a number of elements that are difficult to measure monetarily but that have direct and indirect impacts on the economy, thus justifying the investment that can be made. In fact, if all the monetary and non-monetary effects are taken into account, the cost of investment in education is marginally null.

In this sense, a measure such as the reduction in the number of students per class should be seen as a highly profitable investment in the medium and long term, one that guarantees the development of the people and the country, as a result of the immediate pedagogical impact that it can have on student success. The promotion of a more educated and enlightened population, one that is more skilled and productive, clearly justifies the investment and should be seen as more than a financial burden, as political decision-makers with limited, short-term perspectives have commonly seen it.

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