



**SCHOOL SECTOR VARIATION ON NON-COGNITIVE  
DIMENSIONS: ARE DENOMINATIONAL SCHOOLS  
DIFFERENT?**

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## SCHOOL SECTOR VARIATION ON NON-COGNITIVE DIMENSIONS: ARE DENOMINATIONAL SCHOOLS DIFFERENT?

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### ABSTRACT

Denominational schooling makes up an important part of European educational systems. Given its specificity, denominational schooling can be expected to place a greater weight on values teaching and moral education. As such, it may be more effective in bringing about certain attitudes and opinions. It also may be more successful in creating a warm and caring atmosphere, thus helping students to better emotionally connect to the school community. This paper set out to empirically test some of these hypotheses by making use of three waves of data collected in the framework of the Program for International Student Assessment study. We compare public and publicly supported private (as a proxy to denominational) schools on two dimensions, namely the emotional integration with the rest of the school community, and the concern and feelings of responsibility towards the environment. But for Austria, Belgium and Spain, no evidence could be found that the type of the school has any impact on the reported psychological adaptation to the school. In these three countries, publicly supported private schools tend to be more successful in integrating their students. Also students in public and private dependent schools were equally environment oriented, taking into account several student and school characteristics. The lack of schooling sector differences in attaining non-cognitive aims may have at least three causes. First, ecological issues could be salient enough not to necessitate any special religious or moral reinforcement in order to gain traction. Second, public schools may use religious education or ethics just as fruitfully and consequently, they are just as successful in values and norms transmission. Third, it is possible that schools play a minor role in introducing students to environmental dilemmas and concerns, this role being taken over by the family or the media.

### INTRODUCTION

Imparting knowledge and skills to be later used in real life situations is usually construed as the primary purpose of schooling. Yet, the educational process certainly cannot be reduced to its cognitive aspect. In addition to facts and ways of thinking about issues, education is foremost concerned with ensuring an overall balanced development. This includes, in addition to cognitive progress, concerns relating to emotional well-being and affection, and perhaps, most importantly, socialization into the prevailing norms, transmission of values etc.

Despite its multi-sided nature, the bulk of educational research has focused on sorting out the factors that condition and influence cognitive development, as measured by academic achievement. In comparison, relatively little attention has been paid to non-cognitive aspects of learning and the underlying processes that shape them. On the one hand, matters such as motivation, self-esteem, aspirations etc. have only been addressed insofar as they were seen as intervening variables in raising academic attainment. On the other hand, internalization of prevailing norms, and the attachment to of civic and ethical values as paramount objectives of the educational systems have been amply discussed at the macro theoretical level (Bourdieu 1976; Bourdieu and Passeron 1977; Hopper 1977; Archer 1979; Davie 2000), but empirically under-researched.

Schools vary considerably in how successful they are in achieving their cognitive educational goals. They also might vary in their capacity to attain non-cognitive objectives. Whereas, school level variations in academic achievement have been extensively delved into, relatively little is known about what school characteristics facilitate the accomplishment of non-cognitive objectives. Several schools traits (such as size, educational philosophy, student intake, material resources, location, ideological orientation of the staff etc.), can plausibly play a role. Among them, the denominational character of a school is potentially one of the most salient, given the direct relevance of religious schooling to moral and values education.

## DENOMINATIONAL SCHOOLS IN EUROPE

Denominational schools have a long history in Europe. Indeed, the Catholic, and later the Protestant Church have been the first to organize and run educational establishments. As such, the first schools have their roots almost invariably in organizations and orders associated with churches. It is only much later that the public school systems have emerged. In the process of mass education development, the dominant (national) Churches have been relatively successful in preserving some autonomy for their for their educational establishments (Archer 1979; Wolf and Macedo 2004). Concomitantly, over time and as a result of often protracted political struggles, they have experienced various degrees of success in securing state support for running their educational network (Schneider, Marschall et al. 1998; Sturm, Groenendijk et al. 1998; Wolf and Macedo 2004; Herbst 2006). As a result, denominational or confessional schools have kept functioning, albeit in a modified form, in a majority of European countries. Although denominational schools are a presence in most West and Central European countries, the regulations under which they function, as well as their outlook and their position in the wider educational system vary substantially across countries (De Groof 2004; Harris 2004; Meuret 2004; Vermeulen 2004).

The fact that denominational schools have continued their existence successfully, especially in a climate of increasing secularization<sup>1</sup> (Davie 2000; Bruce 2002; Halman and Riis 2003; Knippenberg 2005), has been somewhat of a puzzle. Indeed, it has sometimes been suggested that as the salience of religion and of the established Churches in everyday life decreases, confessional schools in Europe might disappear as a result of parental preferences leaning towards public non-denominational educational establishments<sup>2</sup> (Sturm, Groenendijk et al. 1998; Dijkstra, Dronkers et al. 2004; Dronkers 2004). Yet, such a phenomenon has yet to happen.

The continued persistence of denominational schools suggests that there might be characteristics specific to this type of schools that parents value when it comes to the education of their children. Two lines of argument have been advanced on this front. Firstly, since academic achievement is the most important product of a school, some authors have argued that denominational schools are better than their public counterparts at raising student cognitive outcomes, and consequently are preferred by parents interested in maximizing their children's attainment<sup>3</sup>. The pre-eminence of denominational schools has been linked on the one hand to their private administration (Chubb and Moe 1990; Hoxby 2002), and on the other hand to their denominational character (Greeley 1982; Coleman and Hoffer 1987; Bryk, Lee et al. 1993; Dronkers and Robert 2008). According to the latter argument, the confessional nature of Church affiliated schools enables them to build a different kind of school atmosphere and to foster a different type of interpersonal relationships, based on mutual respect and trust. In turn, these contribute to raising motivation, having higher expectations, embracing hard work, being disciplined, and so on. Such qualities constitute advantages that allow for high academic achievement to flourish.

The second argument that has been put forward to explain the persistence of denominational schools is also linked to their confessional character. From a legal point of view, their existence, and the availability of school choice in general, was premised on the freedom of parents to have their children educated according to their philosophical and religious values. Such reasoning was especially strong in countries where religious cleavages (secularism included) were particularly salient in the political process and in everyday life<sup>4</sup> (Campbell 2004; Dijkstra, Dronkers et al. 2004; Meuret 2004; Reuter 2004; Vermeulen 2004). Nevertheless, parental desires to transmit their own world views cannot account for the steady success of denominational schools in increasingly secularized societies. But denominational schools might cater for other parental demands. By emphasizing religious and moral education, denominational schools may

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<sup>1</sup> The term 'secularization' can be taken to have several meanings; here secularization is understood as the declining significance of the role of Church over the social sphere and the weakening of 'institutionalized' religious practice;

<sup>2</sup> The role of the Church used to be very strong in the provision of health and welfare services, as well; although it continues to maintain a presence in these areas, its authority and involvement have declined and been replaced by state institutions;

<sup>3</sup> This argument has been strongly made especially in American educational research, where neo-liberal ideas have been debated much more, but can also be found in the British context;

<sup>4</sup> Both Belgium and Netherlands have experienced bitter cultural and school wars centered around the issue of control over educational establishments; similar situations could be found in France, Italy and parts of Germany;

be better character builders, ensuring a more ‘complete’ personality development (Barber 1984) compared to the public sector. If denominational schools were able to provide an environment that stimulated a healthier emotional development, stronger moral fiber, enhanced resilience and discipline, a more robust internalization of adhered to norms and values, this could prompt parents to opt for them over the public alternative.

To sum up, whether as an intermediary step in raising academic outcomes or as character building, denominational schools are posited to be better able to deliver positive non-cognitive results, such as better school integration, stronger ethics, better interpersonal relationships, a caring environment etc.<sup>5</sup>

Most of the research on private schools has focused on sector differences in academic achievement, as measured through test scores. Despite a substantial amount of research in the area (Coleman, Hoffer et al. 1982; Noell 1982; Alexander and Pallas 1983; Willms 1985; McPherson and Willms 1986; Coleman and Hoffer 1987; Chubb and Moe 1990; Bryk, Lee et al. 1993; Gamoran 1996; Neal 1997; McEwan 2001; Dronkers, Baumert et al. 2002; Van Dunk 2003; Dronkers and Avram 2009), the issue remains controversial and findings inconclusive. Rather than denominational schools always surpassing public establishments, results are often context specific, depending on both space and time. Our own research (Dronkers and Avram 2009; Dronkers and Avram 2010) confirms the spatial variation of the denominational school sector performance (relative to public schools) in Europe.

Hitherto, especially in the European context, the legitimacy of denominational schools is often related not to academic superiority, but an edge in bringing about positive non-cognitive outcomes. The body of evidence concerning this matter remains underdeveloped.

This chapter aims at contributing to filling this gap. Using the Program for International Student Assessment (PISA)<sup>6</sup> dataset, we examine sector differences in two related areas, namely student psychological well-being and integration in the school and attitudes toward the environment and environmental problems. Both can be subsumed to the broader non-cognitive outcome area.

Unfortunately, PISA does not allow a clear distinguishing of denominational schools. To remedy this problem, we have decided to use a proxy available in the dataset, i.e. a combination of ownership status and public financing. Using this set of two criteria, we can distinguish between public schools, private but largely publicly financed ones (private, government dependent), and schools that are both privately owned and secure the majority of their budget from private funding sources (private, government independent). Albeit the exact details vary, most countries allow faith schools to be run autonomously from the public system and make

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<sup>5</sup> A reverse argument has been formulated as well: given that denominational schools tend to cater to their own group primarily, they become sectarian and thus hinder integration into the larger society and foster intolerance towards those not from the same religious group;

<sup>6</sup> The Program for International Student Assessment is Carried out once every three years by the OECD; see [http://www.pisa.oecd.org/pages/0,2987,en\\_32252351\\_32235731\\_1\\_1\\_1\\_1\\_1\\_1,00.html](http://www.pisa.oecd.org/pages/0,2987,en_32252351_32235731_1_1_1_1_1_1,00.html).

available substantial public funds for them<sup>7</sup>, often on a par with public establishments<sup>8</sup>. Consequently, we have opted to use the private, government dependent category as an indicator for denominational schools. Although reasonable, it has to be kept in mind that the overlap between the two categories is not perfect<sup>9</sup>. Notably, some private, government supported schools are not affiliated with religious organizations, as freedom of establishment is a right enshrined in the constitution in countries such as Netherlands and Belgium, permitting a wider range of organizations to establish their own school networks. Moreover, the degree of overlap is likely to differ across countries.

These caveats notwithstanding, a comparison between public and private government dependent schools should yield some interesting insights into any potential advantages of denominational schooling in non-cognitive areas, such as student psychological integration and environmental concerns and attitudes.

## RESEARCH DESIGN AND METHODS

Overall, 34 European countries have been surveyed in at least one of the three waves that have been carried out so far in the framework of the PISA study. However, a private, government dependent sector does not exist in all of them<sup>10</sup>. In addition, in a few countries, although publicly supported private schools do exist, the sector is much too small for a comparison with the public schools to be meaningful. Consequently, these countries have been excluded from the analysis. Due to technical reasons, we have set a threshold of a minimum ten schools per sector, (for each non-cognitive dimension) for a country to be included in the analysis. This has left us with 16 countries with suitable data for the public-private comparison along student psychological integration and 12 countries for the environmental attitudes comparison, respectively.<sup>11</sup>

PISA is designed to primarily measure competencies and skills in reading, math and science. However, in addition to pupil test scores in these areas, it also collects information on student backgrounds and characteristics, as well as information about the schools included in the

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<sup>7</sup> Detailed descriptions of the national educational systems (rules governing the private sector included) can be found in the Eurybase database- Executive Agency-Education, A. a. C. (2005-2008). Eurybase - Education systems in Europe Executive Agency-Education, Audiovisual and Culture, [http://eacea.ec.europa.eu/education/eurydice/eurybase\\_en.php](http://eacea.ec.europa.eu/education/eurydice/eurybase_en.php).

<sup>8</sup> An important exception to this general system is the UK (England and Scotland) where denominational schools are more thoroughly integrated with the public system, albeit the Church (especially the Catholic Church) retains important attributes in running the school; in the PISA dataset, these schools are labeled public, therefore neither England, nor Scotland could be included in the analysis.

<sup>9</sup> In Ireland, almost 100% of grant aided schools are denominational, in the Netherlands, around 80% of grant aided schools are denominational, while in Luxembourg, the figure is 83% for the secondary level; Euridyce (2000). Private education in the European Union. Brussels, Euridyce.

<sup>10</sup> In particular, in many European countries the overwhelming majority of schools are public; moreover, public financing is restricted to the public sector; countries where the Orthodox Church has been dominant have also lacked a tradition of Church established schooling, separate from the public network.

<sup>11</sup> While basic information on students and schools is available in all three waves of PISA, particular issues such as attitudes toward the environment or psychological well-being in the school have been probed only in particular waves. Questions on student psychological integration have been asked during 2000 and (in a slightly restricted form) in 2003, whereas items containing information on environmental attitudes can be found only in the 2006 wave.

study. The student questionnaire collects detailed information about a student's family background as well as about some non-cognitive areas of interest. One such area is the student's emotional well-being within the school she is attending. A battery of six questions on how well students have been able to psychologically adjust to their school has been asked in 2000 and 2003. The six items have been used to construct one comprehensive scale.<sup>12</sup> Concern and feelings of personal responsibility toward the environment constitute another non-cognitive dimension of interest. The 2006 wave of PISA taps into it. Thirteen questions related both to concern about environmental issues and support for various actions to preserve the environment have been used to construct one scale of environmental attitudes. Detailed information on the exact wording of the items, as well as alpha values for scale and for each country can be found in Appendix 1.

Because public and publicly financed public schools may differ on a range of characteristics regarding their student intake and organizational characteristics that are potentially linked to either of the two outcomes of interest, a simple comparison of the two sectors would be deceptive. To compensate for bias related to sector heterogeneity, three strategies have been used. All of them use a series of individual and school characteristics, as follows:

- a) Individual: gender, immigration status, foreign language used at home, education of both the mother and the father, occupation of both the mother and the father, wealth, and cultural possessions;
- b) School: school composition (as measured by the percentage of students with at least one parent having university degree), school size, 2 admission policies (whether the school considers parental endorsement of the school's values and the enrollment in one of the school's special programs when admitting students), the student-teacher ratio, a composite index of educational resources, the computer-student ratio, as well as whether the school charges tuition fees or not.

First, to take advantage of the clustering of the data and to look deeper into cross-national and cross-school discrepancies, several two and three-level models have been fitted. This approach allows us to gauge the distribution of variance across levels, as well as to assess divergence due to compositional effects. On the other hand, a hierarchical model containing a large number of variables with unconstrained coefficients would require the estimation of numerous random effects. Therefore, a second strategy has been used, i.e. standard ordinary least squares (OLS) regressions (weighted by student and adjusting for student clustering in the data) have been carried out.

As OLS is sensitive to non-linearities in the predictor variables, a third method has been used to confirm results, namely propensity score matching (PSM). PSM attempts to replicate an

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<sup>12</sup> Scale values have been constructed by averaging all non-missing items belonging to the scale; if all constituent items are missing, the value of the composite scale is set to missing as well; this approach allows for a minimization of missing values in the data.

experimental design, while relying on observational data<sup>13</sup>. In order to do so, it takes an indirect, two-step approach. In a first stage, the probability (called propensity score) that a student will attend a private, government dependent school rather than a public one has been computed based on student and school characteristics (individual and school characteristics are the same as in the OLS analysis). Propensity scores have been calculated using a pooled three-wave dataset (consisting of the waves carried out in 2000, 2003 and 2006), in order to increase both the student and the school N. In a second step, students in the private, government supported sector are matched with pupils with similar propensity scores, but that are nonetheless attending public schools. The aim is to create two groups that are similar in all respects, but the school sector they attend<sup>14</sup>. Subsequently, the average scores on the two scales (psychological well-being and environmental attitudes) are compared in the two groups. Because the matching procedure can influence the findings, several matching techniques have been tried out, and results reported. Unlike the OLS approach which relies on the entire dataset to estimate effects, PSM only compares individuals that could be adequately matched on the set of predictors used to calculate the propensity score. The result is that while ensuring comparability and addressing heterogeneity of treatment effects<sup>15</sup> concerns, all the individuals in the sample that could not be matched are discarded, and thus, information is lost. In addition, in case the treatment condition is likely to generate different effects for the treated and the untreated (i.e. heterogeneity of treatment effects), only the average treatment effect for the treated can be calculated<sup>16</sup>.

## SELECTIVITY OF THE PRIVATE, GOVERNMENT SUPPORTED SECTOR ACROSS EUROPE

Regulation and private support for denominational schools varies significantly across countries in Europe<sup>17</sup>. Nonetheless, all private schools share one feature, namely students self-select into them, i.e. they make a conscious decision about attending the respective school. Therefore, the characteristics of the intake of private and public schools are likely to diverge in notable ways. Previous research finds considerable evidence of class-driven selection processes (Ball 1993; Ball,

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<sup>13</sup> For an in-depth account of how PSM techniques operate see Rosenbaum, P. R. and D. B. Rubin (1983). "The central role of the propensity score in observational studies for causal effects." *Biometrika* 70(1): 41-55, D'agostino, R. B. (1998). "Propensity Score Methods for Bias Reduction in the Comparison of a Treatment to a Nonrandomized Control Group." *Statistics in Medicine* 17(19): 2265-2281, Dehejia, R. H. and S. Wahba (2002). "Propensity Score-Matching for Nonexperimental Causal Studies." *The Review of Economics and Statistics* 84(1): 151-161, Morgan, S. L. and D. J. Harding (2006). "Matching Estimators of Causal Effects: Prospects and Pitfalls in Theory and Practice." *Sociological Methods and Research* 35(1): 3-60.

<sup>14</sup> Calculating the propensity scores means that students are matched on one dimension instead of all the dimensions which are used to calculate the propensity score;

<sup>15</sup> Such heterogeneity is especially relevant when subjects self-select into the treatment as in this case; students that attend private school have actually made a conscious choice to attend this type of educational establishment.

<sup>16</sup> The average treatment effect for the untreated and the average treatment effect remain unknown;

<sup>17</sup> For an overview of regulations governing private schooling in Europe, see Executive Agency-Education, A. a. C. (2005-2008). Eurybase - Education systems in Europe Executive Agency-Education, Audiovisual and Culture, [http://eacea.ec.europa.eu/education/eurydice/eurybase\\_en.php](http://eacea.ec.europa.eu/education/eurydice/eurybase_en.php).

Bowe et al. 1995; Ball, Bowe et al. 1996; Ball 1997; Van Dunk 2003), although the choice process is not usually modeled as a private/denominational vs. public schooling option.

Our own data allows us to consider, and, to a certain extent<sup>18</sup>, to correct for bias resulting from school selection. In an attempt to explicitly model the school selection process, attendance of a private, publicly supported school is regressed on 13 individual and school characteristics (see the previous section for details). Differences in the intake of students between the two sectors can be seen in Appendix 2. Students in public and private dependent schools do differ in a number of countries, at least on one dimension. Especially, in Germany, Ireland, the Slovak Republic and Sweden, students in private, publicly funded schools tend to be girls, to come from families with more prestigious occupations, and sometimes to have better educated parents, or more cultural possessions. They also attend schools that are smaller in size and often have fewer resources than public schools. Also, the parental endorsement of school values plays a more prominent role in the selection process than in other countries.

However, the most important thing to note is that the selectivity of the private, government supported sector is nation specific. Moreover, the relative size of the private dependent sector is very uneven, ranging from around 1% of students in Switzerland to approximately 70% in Netherlands and Belgium (details of sector size and funding are available in Appendix 3)<sup>19</sup>. This is to be expected, since the conditions under which private schools in general, and denominational schools in particular, have to operate vary widely across Europe. Reflecting the unequal extensiveness of the private sector across countries, the number of students attending a private dependent school is quite small in a number of national samples. As a result, statistical procedures will have lower power in some countries than in others and therefore statistical significance is not directly comparable between countries<sup>20</sup>.

## SECTOR DIFFERENCES IN PSYCHOLOGICAL WELL-BEING/INTEGRATION

One important assertion that has been made about denominational schools relates to the climate they create for their students. More specifically, by emphasizing Christian values such as caring for one another, being tolerant and altruist, they are said to be successful in fostering vibrant interpersonal relationships and a feeling of group belonging, which in turn creates a milieu fostering academic achievement (Coleman and Hoffer 1987; Bryk, Lee et al. 1993; Dronkers and Robert 2008). A caring and nurturing environment is however important per se, not just as a trigger of superior educational attainment. By promoting emotional well-being and a healthy psychological development, it can ensure appropriate mental development, the gaining of social skills and prevent problems of social isolation and alienation.

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<sup>18</sup> Not all variables that form a theoretical point potentially could influence selection processes are present in our dataset; nevertheless, we do control for a large number of individual and school characteristics;

<sup>19</sup> Admittedly, the freedom of establishment means that all private schools receive government support as long as they comply with the rules set forward by the relevant authority; as a result, many Waldorf, Montessori etc. schools receive financial help alongside more traditional denominational schools.

<sup>20</sup> However, the magnitude of the effect is directly comparable.

The PISA study has asked several questions related to psychological integration and emotional attachment to the school both in 2000 and 2003<sup>21</sup> (details of the exact wording of the items and the reliability of the scale for each country can be found in Appendix 1). Because the wording of the questions has been identical in the two waves, we have decided to use a pooled two-wave data-set, in order to maximize the number of private, government supported schools available for analysis. This strategy gives us sixteen European countries that have suitable data<sup>22</sup>. Separate analyses have been carried out for each of them. Results are presented in Tables 1, 2 and 3.

Average sector emotional integration scores for each country, as well as the raw difference are given in Table 1. In both sectors, average psychological adjustment to the school is slightly above the midpoint of the scale, varying between 0.5 and 0.9. In seven countries, a statistically significant difference between publicly supported private schools and public establishments can be found. In all of them, students in private schools report, on average, higher psychological integration and a stronger emotional link with the school. The strength of the effect is nevertheless not very large, between 0.04 and 0.07 points (roughly between 0.09 and 0.17 standard deviations).

[Table 1 about here]

Using a multi-level model, we have tested for school and country level variation in the students' emotional adaptation (see Table 2). Models 1 and 2 contain only random second and third level effects. Psychological well-being differs significantly both among countries and among schools (about 2.5% of the total variation is at the school level and about 2% at the country level). The third model introduces school sector. On average, students in private, state supported schools are likely to report higher psychological integration in their schools. The school sector variable however fails to account for any variation at the country level<sup>23</sup>.

[Table 2 about here]

Since students in private schools are self-selected, they are likely to differ in important respects from students attending public schools, a fact potentially biasing the results. Consequently, in order to control for student heterogeneity between the two school sectors, as well as some school characteristics that could potentially be associated with denominational schools, but that are not directly caused by the denominational character, the next two models introduce individual and school level controls (Models 4 and 5 in Table 2). A list of both individual and school level control variables is given in the RESEARCH DESIGN &

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<sup>21</sup> No similar questions were asked in PISA 2006.

<sup>22</sup> At least 10 schools per sector.

<sup>23</sup> Put differently, countries do not differ between themselves due to the different balance between the public and the private dependent sector.

METHODS section. Adding student and school variables hardly affects the effect of the school sector. It continues to remain statistically different from zero (at around 0.03). To check whether the impact of the school sector diverges among countries, Models 6 and 7 include both a random intercept and a random slope<sup>24</sup>. Both are statistically significant, confirming that school sector effect do indeed differ cross-nationally<sup>25</sup>. The average school sector effect is slightly reduced to 0.023 but remains well above the statistical significant threshold.

The advantage of using a multilevel model resides in its clearly exposing and modeling higher order variation and effects. However, its elegance comes at the price of constraining most coefficients in the estimation to be equal in all countries, a fairly restricting assumption. In order to bypass it, we have used country-level OLS and PSM. Results are shown in Table 3.

[Table 3 about here]

The first column of Table 3 displays the average effect (OLS regression coefficient) of attending a private, government supported school rather than a public school on the psychological integration score, while controlling for relevant individual and school characteristics. Statistically significant differences are found in Austria, Belgium, Spain and Sweden. Introducing the control variables marginally reduces the impact of attending a private school in a majority of countries, but substantially, coefficients are not far from zero.

The remaining columns in Table 3 show the results of PSM analyses, based on different types of matching strategies, along with the number of matched cases on which the school sector comparison is made. Generally speaking, PSM results are based on much smaller samples than the OLS. As a result, the power of the tests is much weaker<sup>26</sup>. Conversely, they are based on real comparisons rather than interpolations and extrapolations, as in the case of OLS, so they should minimize bias. Using nearest neighbor (with replacement) without caliper matching, significant sector differences in psychological integration emerge only in Luxembourg. Private government schools have students that on average have an almost 0.5 higher (0.82 standard deviations) score on the psychological integration scale. However, this result is not stable when using other matching strategies. The second type of matching, nearest neighbor (with replacement) with caliper ensures that only good matches are retained in the analysis, but as a result, greatly reduces the number of cases on which the comparison is based (column 5, Table 3). When using this type of matching, two countries show significant sector difference, i.e. Belgium and Switzerland. Nonetheless, from a substantive point of view, the size of the effect is small. Finally, using Mahalanobis distance matching in conjunction with the propensity score, yields significant sector differences only in Belgium. Again, the magnitude of the effect is small.

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<sup>24</sup> Variances and co-variances were unconstrained; the covariance between the intercept and the slope however is statistically indistinguishable from zero.

<sup>25</sup> Due to technical reasons, a model having both school and country level variation, together with a random slope could not be estimated; therefore the school level random effect has been dropped.

<sup>26</sup> This lead to the paradox that coefficients can actually increase compared to the baseline model and lose statistical significant simultaneously.

Comparing the multilevel, OLS and PSM findings, some inconsistencies emerge. In particular, using propensity score matching, we are much more likely to find statistically insignificant school sector differences. To a certain extent, this can be explained by the lower power of PSM. The multilevel school type coefficient constantly points to a higher emotional adaptation to the school in private, government supported schools. The random slope on the other hand indicates that the size of the effect varies across countries. Austria, Belgium, and Spain are countries where possibly the private, publicly financed schools fare better in providing an environment where their students can psychologically adjust. In the remaining countries, any evidence for a school sector differentiation is very weak.

After controlling for a host of individual and school characteristics, no noteworthy differences appear between the two sectors in most European countries. Furthermore, even when statistically significant results do emerge, they are usually disconfirmed when using a different statistical framework. Austria, Belgium and Spain are somewhat of an exception. Additionally, although the magnitude of the effects that have been found to be statistically different from zero, in substantive terms it is moderate to small.

## SCHOOL SECTOR DIFFERENCES IN ENVIRONMENTAL ATTITUDES

In the past decade, environmental issues have become increasingly salient both in everyday life and on national and international political stages. Framed from various perspectives -economic, scientific, political, and social- environmental concerns can ultimately be construed as belonging to the realm of ethics. Damaging the environment harms not only other species, but has the potential to seriously damage living conditions for others and threatens the life circumstances of future generations. Although traditionally not associated with religious beliefs and convictions, the environment started to figure more prominently in Church (especially the Roman Catholic Church) teachings<sup>27</sup>. If denominational schools focus more intensely on moral education, they should emphasize moral and ethical aspects of environment preservation. Accordingly, it can be expected that students attending these schools place a greater weight and are more sensitive to environmental issues.

The 2006 wave of PISA contains several questions that probe on the one hand into the awareness and concern regarding various environmental problems, and on the other hand, the willingness to act and support potential solutions addressing some of these problems<sup>28</sup>. Thirteen questions have been summarized by constructing one scale to tap into the broader issue of environmental attitudes (information on used items and the reliability of the scale can be found in Appendix 1). Twelve European countries have suitable data (at least ten schools per sector) to

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<sup>27</sup> The increased salience of environmental issues for Catholic Church teachings is illustrated by the new list of modern sins, released in 2008, 1500 years after the original one; polluting the environment is listed as a mortal sin.

<sup>28</sup> For a more detailed description of categories of environment related questions in PISA 2006, see Bybee, R. W. (2008). "Scientific Literacy, Environmental Issues, and PISA 2006: The 2008 Paul F-Brandwein Lecture." *Journal of Science Education and Technology* 17(5): 566-585.

carry out public-private dependent comparisons. Separate analyses have been carried out for each of them. Tables 4, 5 and 6 display the findings.

Simple, raw differences between the two sectors show statistically significant results in five countries, out of the twelve included in the analysis. Students enrolled in private dependent schools in Austria, Germany, Hungary, Ireland, and Portugal have, on average, higher scores on the environmental scale than students enrolled in public schools. The reverse is true in Italy, where students attending the public sector have a more environment friendly attitude.

[Table 4 about here]

Similarly to the previous analysis, we have conducted a multilevel model to assess the variation existing at the country and at the school levels (Models 1 and 2 in Table 5). About 13.6% of the total variance is found at the country level and about 3.6% at the school level. Next, the third model introduced the school sector variable. It fails both to account for any higher level variance and to reach statistical significance.

[Table 5 about here]

However, environmental attitudes may be influenced by factors that are not under the immediate control of the school, such as student personal characteristics and family background. To account for this, several individual controls have been introduced, as well as the school's social composition, size and a few proxies for school resources have been added to isolate some school characteristics that are not related to the denominational character (see the complete list in the RESEARCH DESIGN AND METHODS section). Adding the control variables (Models 4 and 5) does not change either the magnitude of the school sector impact. It continues to be statistically indistinguishable from zero. Finally, the last three models introduce a second country level random effect, namely a random slope for the school sector effect. In Models 6 and 7, where the school level variance parameter is omitted, the fixed effect of the school sector remains nil. On the contrary, the random slope coefficient does surpass the statistical significance threshold pointing towards cross-national differentiation in the effect of the school sector. Subsequently, the final model adds the school level variance on top. The random slope of the school type continues to be significant, but only at the 0.05 level.

The multilevel model constrains all coefficients to be equal across countries<sup>29</sup>. As the selectivity of the private sector differs among countries (see Appendix 3), this constraint is potentially a serious shortcoming. To circumvent it, we have carried out OLS and PSM estimation procedures, separately for each country. The results of the OLS regressions incorporating control variables are displayed in Table 6. Coefficients are significant in two

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<sup>29</sup> Technically, this problem can be solved by introducing random slopes for all the variables in the model; however, this greatly complicates the model and makes its estimation much more difficult.

countries, i.e. Ireland and Spain. In the former, students in private, publicly supported schools are stronger environmentalists than their peers attending public schools, whereas in the latter, public school goes place more weight on environment related matters. Note, however, that, substantively, the coefficients are small in both cases. In the remaining ten countries, no difference in environmental attitudes between private and public school pupils emerges.

[Table 6 about here]

Using standard OLS regression has the disadvantage of lower flexibility in modeling heterogeneity of treatment effects, non linear relationships between outcome and control variables and reliance of interpolation and extrapolation techniques when the two groups being compared are largely different. To compensate for these shortcomings, we have resorted to propensity score matching. Albeit addressing some of the weaknesses of OLS, propensity score matching has limitations of its own. In particular, when subjects in the treatment and control groups (in this case students attending publicly financed, private schools and those attending public schools) have diverging characteristics, it is quite difficult to find good matches, making the drawing of conclusions tenuous. To check the sensitivity of results to the quality of matches, three matching techniques have been used, i.e. nearest neighbor matching (with replacement) without caliper, nearest neighbor matching (with replacement) with caliper and Mahalanobis distance matching<sup>30</sup> based on the propensity score and five additional variables (higher parental education, highest parental occupation, immigrant status, cultural possessions and family wealth). Results are reported in Table 6.

Results are generally consistent with the OLS regression findings, in confirming that no difference in environmental attitudes is to be found between students in the two school sectors in the majority of countries. There are only two exceptions to this general pattern. In particular, students in private government dependent schools in Portugal have, on average, higher score on the environment attitudes scale compared to their peers in public schools. This result is confirmed by all three PSM analyses. A similar advantage of private schooling emerges in the Slovak Republic when using nearest neighbor without caliper. Nevertheless, this result cannot be replicated using the other two matching techniques. Furthermore, from a substantive point of view, the magnitude of the difference is very small in all cases, under 0.01, representing below 0.03 standard deviations<sup>31</sup>.

To sum up, both standard OLS regression analysis and various types of propensity score matching indicate that generally, there are no differences in attitudes toward the environments

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<sup>30</sup> The matching techniques usually trade accuracy for efficiency; the most accurate is the nearest neighbor with caliper, as this ensures that the best match and only cases with a good match are kept in the analysis; however, this greatly reduced the number of cases, since all subjects that cannot be matched are discarded; S.E. increase accordingly; Mahalanobis distance matching places greater weight on the variables which are included in computing the distance; however, it is the method most prone to bias in this case, since tolerance bands have been set relatively high.

<sup>31</sup> The scale runs from 0 to 4 and the country standard deviations range from 0.36 to 0.5.

between students attending public schools and students attending publicly funded private schools. The various multilevel models that have been fitted also yield statistically insignificant differences between the environmental attitudes of students in the public and in the private sectors. Even in the few cases where a statistically significant difference can be found, the magnitude of the effect is too small to warrant a confirmation of private schooling advantage. Consequently, the hypothesis of private government dependent schools providing an education that brings about a more environment friendly attitude is disproved.

## SUMMARY AND CONCLUSIONS

Ordinary educational processes presuppose more than just the attainment of cognitive objectives. Non-cognitive goals, such as a healthy emotional balance and psychological development, the transmission of values and societal norms are just as paramount as reaching proficiency in reading or math. Yet, relatively little is known about how these processes occur in the context of the school, and about the school characteristics that influence them.

Denominational schooling, with its deep historical roots, makes up an important part of European educational systems (especially in the Western and Central parts of the continent). Given its specificity, denominational schooling can be expected to place a greater weight on values teaching and moral education<sup>32</sup>. As such, it may be more effective in bringing about certain attitudes and opinions. It also may be more successful in creating a warm and caring atmosphere, thus helping students to better emotionally connect to the school community. This paper set out to empirically test some of these hypotheses by making use of three waves of data collected in the framework of the Program for International Student Assessment study.

More specifically, public and publicly supported private (proxying denominational) schools have been compared on two dimensions, namely the emotional integration with the rest of the school community, as reported by students, and the concern and feelings of responsibility towards the environment. In the first case, but for Austria, Belgium and Spain, no evidence could be found that the type of the school has any impact on the reported psychological adaptation to the school. In these three countries, publicly supported private schools tend to be more successful in integrating their students. In the latter case, students in public and private dependent schools were equally environment oriented, taking into account several student and school characteristics. Notably, average scores on the environmental attitudes scale were high in both sectors in all twelve countries.

Thus, whereas our first hypothesis is partially supported (for three countries), the second one is rejected. The strong support for environment preservation, found in both types of schools suggests that environmental issues and concerns have a robust foothold throughout Europe<sup>33</sup>.

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<sup>32</sup> The Church itself played an overwhelmingly important role in norms and tradition preservation and transmission in the pre-modern era; although diminished, it still retains this function nowadays;

<sup>33</sup> The other interpretation would be that there are strong social desirability issues when asking these question; however, there is no reason to expect that these should affect one school sector more;

The lack of schooling sector differences in attaining non-cognitive aims (psychological well-being/integration; environment preservation) may have at least three causes. First, ecological issues could be salient enough not to necessitate any special religious or moral reinforcement in order to gain traction. They are, in fact, among the few examples where a strong public consensus exists on the desirable course of action. Second, public schools may use religious education or ethics just as fruitfully and consequently, they are just as successful in values and norms transmission. In fact, a variant of moral, civic or ethics education is always present in the official curricula for public secondary education in all countries<sup>34</sup>. As such, public education is certainly not amoral. As a matter of fact, environmental problems may be better represented in public schools' curricula and teaching practice, given the fact that climate change and environmental protection were first put on the agenda by leftist groups and that, the Church is a relative late-comer to the debate. Third, it is possible that schools play a minor role in introducing students to environmental dilemmas and concerns, this role being taken over by the family or the media. Further research is needed to probe into these hypotheses.

At this point, it should be kept in mind that we only analyze one normative dimension, namely concern and willingness to protect the environment. This debate a fairly recent one in which the Church has only just began to take part. Denominational and public schools may foster much more contrasting attitudes in more traditional areas such as gender roles, abortion, euthanasia, tolerance and respect for diversity and one's fellows etc.

Yet, it is also possible that confessional education is no longer keen on or successful in forcefully moulding the attitudes and beliefs of the students attending it. If such were the case, the lack of school sector differences on non-cognitive dimensions could shed light on the mechanisms behind the success of denominational schools in secularized societies<sup>35</sup>. If denominational schools are not able or willing to substantively alter (in comparison with public schools) the attitudes and values of their pupils, their confessional character could be irrelevant for irreligious parents. If parents are interested in both cognitive skill development and religious socialization, they would be able to select a denominational school based on superior effectiveness in delivering academic prowess, and not be concerned by a potential religious, moral or values conversion of their children. On the one hand, evidence exists that 'academic achievement' constitutes the primary element guiding parental choice (Echols and Willms 1995; Denessen, Driessena et al. 2005; Goldring and Phillips 2008), especially for middle class and more educated parents. On the other hand, denominational schools have been shown to bring about higher cognitive attainment (controlling for the intake), at least in some countries (Coleman, Hoffer et al. 1982; Greeley 1982; McPherson and Willms 1986; Gamoran 1996; Dronkers, Baumert et al. 2002; Dronkers and Robert 2008; Dronkers and Avram 2010). For the

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<sup>34</sup> Executive Agency-Education, A. a. C. (2005-2008). Eurybase - Education systems in Europe Executive Agency-Education, Audiovisual and Culture, [http://eacea.ec.europa.eu/education/eurydice/eurybase\\_en.php](http://eacea.ec.europa.eu/education/eurydice/eurybase_en.php);

<sup>35</sup> Netherlands is probably the best example of a country with a large section of its population declaring no denominational affiliation but with a very strong and vibrant denominational school sector;

moment, such a mechanism remains a hypothesis. Further research is needed to probe into the ways denominational school characteristics are intertwined with parental school preferences.

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Table 1: Average psychological well-being in public and private, state dependent schools in 16 European countries

| Country     | Average score in the private dependent sector-I | Average score in the public sector-II | Average sector difference (I-II) |
|-------------|---|---------------------------------------|----------------------------------|
| Austria     | 0,885   | 0,807                                 | 0,078**                          |
| Belgium     | 0,598   | 0,560                                 | 0,039***                         |
| Czech R.    | 0,595   | 0,592                                 | 0,002                            |
| Denmark     | 0,736   | 0,715                                 | 0,020                            |
| Finland     | 0,715   | 0,714                                 | 0,0003                           |
| France      | 0,618   | 0,639                                 | -0,020                           |
| Germany     | 0,828   | 0,771                                 | 0,057*                           |
| Hungary     | 0,744   | 0,767                                 | -0,022                           |
| Ireland     | 0,705   | 0,686                                 | 0,019                            |
| Luxembourg  | 0,771   | 0,731                                 | 0,040*                           |
| Netherlands | 0,698   | 0,675                                 | 0,022                            |
| Portugal    | 0,756   | 0,726                                 | 0,030                            |
| Slovak R.   | 0,628   | 0,585                                 | 0,043*                           |
| Spain       | 0,773   | 0,728                                 | 0,045***                         |
| Sweden      | 0,856   | 0,823                                 | 0,033                            |
| Switzerland | 0,840   | 0,770                                 | 0,073*                           |

Note: the scale runs from -4 to 4; \* significant at the 0.05 level; \*\* significant at the 0.01 level; \*\*\*significant at the 0.001 level.

Source: Authors' calculations based on the pooled 2000&2003 PISA dataset.

Table 2: Multi-level modeling of student psychological well-being in 16 European countries

|                               | Model1     | Model 2    | Model 3    | Model 4   | Model 5    | Model 6    | Model 7    |
|-------------------------------|------------|------------|------------|-----------|------------|------------|------------|
| <b>Fixed Effects</b>          |            |            |            |           |            |            |            |
| Private dependent sector      |            |            | 0.03***    | 0.023**   | 0.021**    | 0.029***   | 0.023***   |
| <b>Individual</b>             |            |            |            |           |            |            |            |
| Gender (Male)                 |            |            | -          | 0.005     | 0.006      | -          | 0.002      |
| Immigrant                     |            |            | -          | -0.018**  | -0.019**   | -          | -0.023***  |
| Foreign language used at home |            |            | -          | -0.023**  | -0.022**   | -          | -0.028**   |
| Mother's education            |            |            | -          | 0.003     | 0.002      | -          | 0.002      |
| Father's education            |            |            | -          | 0.002     | 0.001      | -          | 0.002      |
| Mother's occupation           |            |            | -          | -0.000    | -0.000     | -          | -0.000     |
| Father's occupation           |            |            | -          | -0.000    | -0.000     | -          | -0.000     |
| Cultural possessions          |            |            | -          | 0.011**   | 0.011***   | -          | 0.012***   |
| Wealth                        |            |            | -          | 0.013**   | 0.012***   | -          | 0.013***   |
| <b>School</b>                 |            |            |            |           |            |            |            |
| Composition                   |            |            | -          |           | 0.089***   | -          | 0.085***   |
| Size                          |            |            | -          |           | 0.0000     | -          | 0.0000     |
| Student-teacher ratio         |            |            | -          |           | -0.0005    | -          | -0.0003    |
| Computer-student ratio        |            |            | -          |           | -0.000     | -          | -0.002     |
| Educational resources         |            |            | -          |           | 0.003      | -          | 0.003      |
| Admission 1                   |            |            | -          |           | 0.005      | -          | 0.004      |
| Admission 2                   |            |            | -          |           | 0.0000     | -          | -0.003     |
| Tuition                       |            |            | -          |           | -0.002     | -          | -0.004     |
| <b>Random effects</b>         |            |            |            |           |            |            |            |
| School (SD)                   | 0.116***   | 0.085**    | 0.085**    | 0.080**   | 0.079**    | 0.078**    | 0.076**    |
| Country (SD)                  | -          | 0.075**    | 0.078**    | 0.077**   | 0.078**    | -          | -          |
| School sector (SD)            | -          | -          | -          | -         | -          | 0.014**    | 0.011**    |
|                               |            |            |            |           |            |            |            |
| Log likelihood                | -117132.16 | -116446.37 | -116436.51 | -78377.92 | -68911.611 | -116890.04 | -69090.492 |

Note: \* significant at the 0.05 level; \*\*significant at the 0.01 level; \*\*\*significant at the 0.001 level;

Source: Authors' calculations based on PISA 2000&2003.

Table 3: Differences in student psychological integration between public and publicly financed private schools (Average Private dependent –Average public); results of OLS & PSM

| Country     | Uncorrected Difference | OLS Regression Coefficient | N    | PSM Difference-Matched Sample NN | N    | PSM Difference-Matched Sample-NN with caliper (0.001) | N    | PSM Difference-Matched sample on Mahalanobis distance-5 controls | N    |
|-------------|------------------------|----------------------------|------|----------------------------------|------|---|------|--|------|
| Austria     | 0,082*                 | 0,093*                     | 4604 | 0,135                            | 571  | 0,085   | 476  | 0,036  | 586  |
| Belgium     | 0,040**                | 0,043*                     | 8416 | 0,044                            | 7632 | 0,045*  | 7544 | 0,053*   | 7713 |
| Czech R.    | 0,014                  | 0,000                      | 8973 | -0,024                           | 820  | -0,026  | 705  | 0,020  | 821  |
| Denmark     | 0,017                  | -0,055                     | 5131 | -0,078                           | 1391 | -0,040  | 924  | -0,030   | 1423 |
| Finland     | 0,003                  | -0,003                     | 8234 | 0,051                            | 769  | 0,056   | 668  | 0,024  | 784  |
| France      | -0,039                 | -0,044                     | 1955 | -0,062                           | 476  | -0,061  | 463  | -0,037   | 477  |
| Germany     | 0,060                  | 0,041                      | 4961 | 0,036                            | 550  | 0,023   | 409  | 0,026  | 550  |
| Hungary     | -0,007                 | 0,009                      | 2953 | 0,060                            | 547  | 0,053   | 515  | -0,008   | 547  |
| Ireland     | 0,009                  | -0,046                     | 4552 | -0,010                           | 3072 | -0,025  | 2812 | -0,029   | 3152 |
| Luxembourg  | 0,040                  | -0,012                     | 3357 | 0,494*                           | 475  | 0,176   | 202  | -0,007   | 506  |
| Netherlands | 0,017                  | -0,003                     | 3357 | 0,005                            | 3227 | 0,007   | 3099 | 0,029  | 3241 |
| Portugal    | 0,023                  | 0,036                      | 5682 | 0,056                            | 533  | 0,041   | 494  | 0,004  | 535  |
| Slovak R.   | 0,051                  | 0,045                      | 4686 | 0,002                            | 735  | 0,011   | 685  | 0,035  | 745  |
| Spain       | 0,043**                | 0,058*                     | 7493 | 0,010                            | 1143 | 0,024   | 832  | -0,003   | 1167 |
| Sweden      | 0,059                  | 0,078*                     | 6045 | 0,046                            | 360  | 0,093   | 300  | 0,095  | 361  |
| Switzerland | 0,133**                | 0,110                      | 8227 | 0,138                            | 198  | 0,155*  | 193  | 0,017  | 203  |

Note: \* significant at the 0.05 level; \*\* significant at the 0.01 level;

Source: Authors' calculations based on the pooled 2000&2003 PISA dataset; propensity scores computed on the pooled 2000/2003/2006 PISA dataset.

Table 4: Average environmental attitudes in public and private, state dependent schools in 12 European countries

| Country     | Average score in the private dependent sector-I | Average score in the public sector-II | Average sector difference (I-II) |
|-------------|---|---------------------------------------|----------------------------------|
| Austria     | 3,321   | 3,255                                 | 0,066**                          |
| Belgium     | 3,249   | 3,238                                 | 0,011                            |
| Denmark     | 3,095   | 3,097                                 | -0,002                           |
| Germany     | 3,321   | 3,260                                 | 0,060*                           |
| Hungary     | 3,456   | 3,415                                 | 0,041**                          |
| Ireland     | 3,207   | 3,164                                 | 0,042**                          |
| Italy       | 3,236   | 3,334                                 | -0,097***                        |
| Netherlands | 3,127   | 3,118                                 | 0,009                            |
| Portugal    | 3,607   | 3,553                                 | 0,053***                         |
| Slovak R.   | 3,231   | 3,259                                 | -0,027                           |
| Spain       | 3,486   | 3,488                                 | -0,001                           |
| Sweden      | 3,053   | 3,033                                 | 0,020                            |

Note: the scale runs from 1 to 4; \* significant at the 0.05 level; \*\* significant at the 0.01 level; \*\*\*significant at the 0.001 level.

Source: Authors' calculations based on the 2006 PISA dataset.

Table 5: Multi-level modeling of environmental attitudes in 12 countries

|                               | Model1     | Model 2   | Model 3  | Model 4    | Model 5    | Model 6    | Model 7    | Model8    |
|-------------------------------|------------|-----------|----------|------------|------------|------------|------------|-----------|
| <b>Fixed Effects</b>          |            |           |          |            |            |            |            |           |
| Private dependent sector      |            |           | 0.005    | -0.004     | -0.01      | 0.013      | -0.003     | -0.004    |
| <b>Individual</b>             |            |           |          |            |            |            |            |           |
| Gender (Male)                 |            |           |          | -0.063***  | -0.063***  |            | -0.064***  | -0.063*** |
| Immigrant                     |            |           |          | -0.005     | -0.001     |            | 0.000      | -0.001    |
| Foreign language used at home |            |           |          | -0.058***  | -0.066***  |            | -0.070***  | -0.066*** |
| Mother's education            |            |           |          | 0.001      | 0.001      |            | 0.001      | 0.001     |
| Father's education            |            |           |          | 0.001      | 0.001      |            | 0.001      | 0.001     |
| Mother's occupation           |            |           |          | 0.0003***  | 0.0002*    |            | 0.0002**   | 0.0002    |
| Father's occupation           |            |           |          | 0.0004***  | 0.0003**   |            | 0.0003**   | 0.0003**  |
| Cultural possessions          |            |           |          | 0.060***   | 0.060***   |            | 0.061***   | 0.060***  |
| Wealth                        |            |           |          | -0.027***  | -0.027***  |            | -0.027***  | -0.027*** |
| <b>School</b>                 |            |           |          |            |            |            |            |           |
| Composition                   |            |           |          |            | 0.002      |            | -0.004     | 0.002     |
| Size                          |            |           |          |            | 0.0000     |            | 0.0000     | 0.0000    |
| Student-teacher ratio         |            |           |          |            | 0.0004     |            | 0.001      | 0.001     |
| Computer-student ratio        |            |           |          |            | -0.059**   |            | -0.056***  | -0.055**  |
| Educational resources         |            |           |          |            | -0.001     |            | -0.001     | -0.001    |
| Admission 1                   |            |           |          |            | 0.009      |            | 0.009*     | 0.009*    |
| Admission 2                   |            |           |          |            | 0.001      |            | 0.003      | 0.001     |
| Tuition                       |            |           |          |            | -0.012*    |            | -0.010*    | -0.011*   |
| <b>Random effects</b>         |            |           |          |            |            |            |            |           |
| School (SD)                   | 0.164***   | 0.080***  | 0.080*** | 0.062***   | 0.061***   | -0.158***  | 0.147***   | 0.147***  |
| Country (SD)                  |            | 0.155***  | 0.156*** | 0.144***   | 0.144***   | -          |            | 0.061***  |
| School sector (SD)            |            |           |          |            |            | 0.042**    | 0.023**    | 0.019*    |
| <b>Log likelihood</b>         |            |           |          |            |            |            |            |           |
| Log likelihood                | -42716.943 | -41238.48 | -41242.3 | -25318.935 | -23241.688 | -41815.994 | -23368.974 | -23239.29 |

Note: \* significant at the 0.05 level; \*\*significant at the 0.01 level; \*\*\*significant at the 0.001 level.

Source: Authors' calculations based on PISA 2006.

Table 6: Differences in student attitudes towards the environment between public and publicly financed private schools (Average Private dependent – Average public); results of OLS & PSM;

| Country     | Uncorrected Difference | OLS Regression Coefficient | N     | PSM Difference-Matched Sample NN | N    | PSM Difference-Matched Sample-NN with caliper (0.001) | N    | PSM Difference-Matched sample on Mahalanobis distance-5 controls | N    |
|-------------|------------------------|----------------------------|-------|----------------------------------|------|---|------|--|------|
| Austria     | 0,087**                | 0,029                      | 3207  | 0,061                            | 426  | 0,088   | 273  | 0,022  | 441  |
| Belgium     | 0,002                  | -0,013                     | 5041  | -0,002                           | 4293 | 0,007   | 4179 | 0,016  | 4388 |
| Denmark     | -0,021                 | -0,007                     | 2173  | 0,058                            | 623  | -0,046  | 273  | -0,069   | 634  |
| Germany     | 0,035                  | -0,007                     | 2811  | -0,018                           | 286  | -0,002  | 214  | -0,01  | 295  |
| Hungary     | 0,040*                 | 0,032                      | 2806  | 0,035                            | 689  | 0,022   | 598  | 0,003  | 696  |
| Ireland     | 0,03                   | 0,049*                     | 2964  | -0,005                           | 1726 | 0,018   | 1239 | 0,019  | 1786 |
| Italy       | -0,086**               | -0,031                     | 10586 | -0,061                           | 542  | 0,007   | 393  | -0,063   | 556  |
| Netherlands | 0,006                  | 0,011                      | 3399  | -0,001                           | 2811 | 0,005   | 2502 | 0,012  | 2871 |
| Portugal    | 0,048**                | 0,028                      | 3147  | 0,137**                          | 470  | 0,094**   | 359  | 0,085*   | 477  |
| Slovak R    | -0,043                 | -0,046                     | 3358  | 0,169*                           | 207  | -0,062  | 154  | -0,006   | 223  |
| Spain       | -0,011                 | -0,069***                  | 11049 | -0,008                           | 2653 | -0,007  | 960  | -0,063   | 2700 |
| Sweden      | 0,036                  | 0,002                      | 3098  | -0,065                           | 403  | -0,018  | 259  | 0,061  | 412  |

Note: \* Significant at the 0.05 level; \*\* significant at the 0.001 level.

Source: Authors' calculations based on PISA 2006; propensity scores estimated using the pooled 2000, 2003 & 2006 PISA dataset;

## APPENDIX 1: Non-cognitive outcome scales

Items going into the student psychological integration scale:

My school is a place where:

- 1) I feel like an outsider (or left out of things)
- 2) I make friends easily
- 3) I feel like I belong
- 4) I feel awkward and out of place
- 5) Other students seem to like me
- 6) I feel lonely

Answers are given on a four point scale. The overall scale is adjusted so that higher values on the scale indicate higher levels of integration.

Items going into the environmental attitudes scale:

Do you see the environmental issued below as a serious concern for yourself and/or others?

- 1) Air pollution
- 2) Energy shortages
- 3) Extinction of plants and animals
- 4) Clearing of forests for other land use
- 5) Water shortages
- 6) Nuclear waste

How much do you agree with the statements below:

- 1) It is important to carry out regular checks on the emission from cars as a condition of their use
- 2) It disturbs me when energy is wasted through the unnecessary use of electrical appliances
- 3) I am in favour of having laws regulating factory emissions even if this would increase the price of products
- 4) To reduce waste, the use of plastic packaging should be kept to a minimum
- 5) Industries should be required to prove that they safely dispose of dangerous waste materials
- 6) I am in favour of having laws that protect the habitat of endangered species
- 7) Electricity should be produced from renewable sources as much as possible, even when this increases the cost.

Answers are given on a four point scale. The overall indicator is adjusted so that higher values reflect more concern for the environment and more willingness to make sacrifices in order to protect it.

Table1: Values of Cronbach Alpha for the student psychological integration scale

| Country  | Alpha-PISA<br>2000 | Alpha-PISA<br>2003 | Country     | Alpha-PISA<br>2000 | Alpha-PISA<br>2003 |
|----------|--------------------|--------------------|-------------|--------------------|--------------------|
| Austria  | 0,8                | 0,8                | Ireland     | 0,83               | 0,82               |
| Belgium  | 0,74               | 0,76               | Luxembourg  | 0,76               | 0,78               |
| Czech R. | 0,7                | 0,73               | Netherlands | 0,75               | 0,76               |
| Denmark  | 0,75               | 0,78               | Portugal    | 0,69               | 0,77               |
| Finland  | 0,83               | 0,85               | Slovakia    | -                  | 0,76               |
| France   | 0,74               | -                  | Spain       | 0,71               | 0,77               |
| Germany  | 0,79               | 0,8                | Sweden      | 0,8                | 0,82               |

|         |      |      |             |      |      |
|---------|------|------|-------------|------|------|
| Hungary | 0,75 | 0,79 | Switzerland | 0,75 | 0,76 |
|---------|------|------|-------------|------|------|

Note: data is unavailable for Finland in 2000 and France in 2003.

Source: Authors' calculations based on PISA 2000 and PISA 2003.

Table 2: Values of Cronbach Alpha for the environmental attitudes scale

| Country | Alpha | Country     | Alpha |
|---------|-------|-------------|-------|
| Austria | 0,78  | Italy       | 0,73  |
| Belgium | 0,78  | Netherlands | 0,76  |
| Denmark | 0,81  | Portugal    | 0,77  |
| Germany | 0,8   | Slovak R.   | 0,73  |
| Hungary | 0,78  | Spain       | 0,79  |
| Ireland | 0,79  | Sweden      | 0,83  |

Source: Authors' calculations based on PISA 2006.

APPENDIX 2: Determinants of private dependent school attendance in Europe

| Country     | Father's education | Mother's education | Father's occup. score | Mother's occup. score | Wealth   | Sex (male) | Immigrant | Foreign language | Cultural possessions | School composition | School size | Student-teacher ratio | Computer-student ratio | Educational resources | Admission-parental endorsement | Admission-special program | Tuition   |
|-------------|--------------------|--------------------|-----------------------|-----------------------|----------|------------|-----------|------------------|----------------------|--------------------|-------------|-----------------------|------------------------|-----------------------|--------------------------------|---------------------------|-----------|
| Austria     | -0.020             | -0.018             | 0.006*                | 0.008                 | -0.048   | -0.940***  | 0.351     | 0.383            | 0.026                | 1.544              | -0.001      | -0.160                | -4.253                 | 0.145                 | 2.323***                       | -0.477                    | 3.671***  |
| Belgium     | 0.015              | 0.017              | 0.001                 | 0.001                 | 0.080    | -0.147     | -0.570*** | 0.488            | 0.032                | 1.077              | 0.001***    | 0.010                 | 0.782                  | 0.300**               | 1.245***                       | -0.098                    | 0.950***  |
| Czech Rep   | -0.077             | -0.069             | 0.012***              | 0.005                 | 0.034    | -0.371     | 0.307     | 0.064            | 0.081                | -0.276             | -0.006***   | -0.073                | -2.072                 | 0.498                 | 1.049*                         | 0.094                     | 2.691***  |
| Denmark     | -0.017             | -0.098             | -0.005                | 0.010***              | 0.007    | -0.166*    | 0.292     | -0.518           | 0.184***             | 0.427              | -0.001      | 0.019                 | 2.529                  | 0.216                 | 2.548***                       | -0.915                    | 5.319     |
| Finland     | 0.017              | -0.083             | 0.003                 | 0.007*                | -0.015   | -0.092     | 0.269     | 1.505***         | 0.013                | 2.74               | 0.002       | -0.204                | -10.18***              | 0.349                 | -1.326**                       | 2.775***                  | 3.892***  |
| France      | -0.006             | -0.038             | -0.002                | -0.0004               | -0.017   | 0.100      | -0.030    | 0.924**          | 0.122                | 0.329              | -0.000      | -0.324                | 1.083                  | 0.120                 | Dropped ‡                      | Dropped ‡                 | -0.409    |
| Germany     | -0.071             | -0.093*            | 0.012***              | 0.004                 | 0.317**  | -0.731***  | 0.057     | -0.416           | 0.225**              | 2.408*             | -0.0004     | 0.061                 | 5.841*                 | 0.137                 | 3.892***                       | -1.090*                   | 2.215***  |
| Hungary     | 0.076              | 0.090*             | -0.001                | -0.002                | -0.104   | -0.162     | 0.091     | -1.378           | 0.069                | 1.690**            | -0.002***   | 0.088*                | -1.012                 | 0.206                 | 1.650***                       | -0.317                    | -0.312    |
| Ireland     | 0.018              | -0.106***          | 0.006**               | 0.012***              | 0.099    | -0.566***  | -0.007    | -0.225           | 0.061                | 3.315***           | -0.004***   | 0.089***              | -20.66***              | -0.304**              | 1.479***                       | -2.067***                 | 1.795***  |
| Italy       | -0.171*            | 0.035              | 0.0002                | 0.008                 | -0.219   | -0.059     | -0.047    | -0.123           | 0.038                | -3.74              | -0.003      | -0.032                | 1.279                  | -0.075                | 0.582                          | 0.648                     | -3.085*** |
| Luxembourg  | -0.086**           | -0.013             | 0.016***              | 0.005                 | -0.150   | 1.794***   | 0.612*    | -0.311*          | -0.019               | 2.908              | -0.010***   | -0.0005               | -23.42**               | -0.914                | 7.541***                       | -8.049***                 | 5.662***  |
| Netherlands | -0.009             | 0.0002             | -0.002                | -0.004*               | 0.065    | -0.111     | -0.460*** | -0.124           | 0.023                | -0.145             | 0.0001      | 0.001                 | 0.300                  | 0.137                 | 1.357***                       | -0.134                    | 0.161     |
| Portugal    | -0.038             | -0.109**           | -0.007                | -0.0001               | 0.208**  | 0.214**    | -0.048    | 0.169            | 0.026                | -2.895             | 0.001***    | 0.143***              | 0.543                  | 0.366                 | 2.640**                        | -2.723***                 | -1.797*** |
| Slovakia    | -0.096             | -0.010             | 0.001                 | -0.002                | 0.434*** | 0.001      | -0.088    | -0.173           | -0.016               | 2.963***           | -0.004***   | -0.027                | -6.634                 | 0.550*                | 1.681***                       | -0.328                    | -0.086    |
| Spain       | -0.072***          | 0.051              | -0.005                | 0.007**               | 0.239*   | 0.084      | -0.106    | 0.586            | -0.149**             | 1.477              | -0.003***   | 1.303***              | 8.624***               | 0.218                 | 2.579                          | -2.946*                   | 3.227***  |
| Sweden      | 0.020              | -0.155***          | 0.014***              | 0.013**               | -0.205** | -0.151     | 0.822***  | 0.297            | 0.252***             | 3.414**            | -0.010***   | 0.199***              | 1.253                  | 0.513*                | -1.678***                      | 0.859                     | -0.003    |
| Switzerland | 0.117**            | -0.268***          | -0.007*               | 0.008                 | -0.181   | -0.331     | -0.223    | 0.164            | 0.358***             | -0.090             | -0.0003     | 0.012                 | 0.083                  | -0.164                | 0.021                          | 1.677                     | 1.859***  |

Note: \* significant at the 0.1 level; \*\*significant at the 0.05 level; \*\*\*significant at the 0.01 level; † dropped due to perfect prediction of the negative selection outcome; ‡ dropped due to collinearity.

Source: Pooled dataset based on PISA 2000, 2003 and 2006.

APPENDIX 3: Private dependent schools in the PISA data-share of students and funding mechanisms

| Country         | Private dependent schools |                  |               |
|-----------------|---------------------------|------------------|---------------|
|                 | % of students             | % public funding | % fee funding |
| Austria         | 7.34                      | 72.25            | 19.13         |
| Belgium         | 69.37                     | 85.16            | 10.16         |
| Czech Republic  | 5.0                       | 74.04            | 18.34         |
| Denmark         | 23.09                     | 74.70            | 23.57         |
| Finland         | 3.88                      | 96.76            | 1.39          |
| France          | 15.45                     | 87.89            | 6.68          |
| Germany         | 5.77                      | 80.64            | 9.10          |
| Hungary         | 9.22                      | 84.40            | 0.64          |
| Ireland         | 58.09                     | 89.57            | 5.78          |
| Italy           | 8.67                      | 91.43            | 6.81          |
| Luxembourg      | 13.64                     | 93.55            | 4.63          |
| Netherlands     | 72.25                     | 95.61            | 3.16          |
| Portugal        | 5.74                      | 92.62            | 7.84          |
| Slovak Republic | 9.87                      | 93.69            | 2.76          |
| Spain           | 29.84                     | 80.05            | 12.76         |
| Sweden          | 5.57                      | 99.04            | 0.25          |
| Switzerland     | 1.01                      | 89.22            | 6.84          |

Source: Authors calculations based on PISA 2000, 2003 and 2006.