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Regional Analysis on an International Scale Casts a New Light on PISA Findings about the
Skills of 15-year-old Students

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1. Comparison of students of Northern Italy with other European regions

How do Italian schools perform? How much do Italian students learn? The most frequent answers to these two questions have long been “poorly” and “little”.

In the past few years, many have drawn these general conclusions from a very authoritative source: the OECD PISA survey. Based on rigorous criteria and an objective approach, both in 2000 and in 2003 the most prominent international survey on 15-year-old students attributed Italy a very low position in the score ranking of standardized tests on key skills like reading, mathematics and sciences.

Unfortunately, like other studies which are quoted as often as PISA, the latter is rarely known more in depth than what is allowed by reading the quotations themselves. With reference to the 2003 survey, for example, it is well-known that the Italian score in mathematics was 466 versus an average of 500 in 41 participating countries. It was later specified, however, that this poor result conceals wide variations in different areas of the country, to a much greater extent than in most other nations. In Southern Italy and in the Islands scores are definitely lower than the national average, and fully comparable to those of countries ranking last in the international comparisons, like Turkey or Mexico. The results of Central Italy are substantially in line with the national average, with figures similar to Portugal and Greece. The students of the two macro-areas of the Northeast and Northwest of Italy, instead, are much more favourably positioned in the skill ranking system of PISA, both with respect to the other Italian regions and to the international average: their scores are entirely similar to those of neighbouring countries like France, Switzerland and Austria, and higher than Germany and the United States.

If we insist on using PISA as a benchmark, then we should at least answer the two questions raised at the beginning including the above-mentioned territorial differences into our consideration. Despite the lack of any substantial institutional and organizational difference in their educational systems, the results of international tests point to very diverse levels of learning in the different Italian territorial areas considered.

It was against this background that, some years ago, Piedmont proposed to add a regional perspective to the PISA OECD survey in Italy, something that had already been done in other countries since 2000. Hence the decision of a limited group of Italian regions and provinces to support and implement an extension of PISA 2003 samples, with a view to gaining a regional insight into the report.

The cultural value of the approach and the scientific rigour acknowledged to the OECD methodology were two strong incentives to the initiative, along with the specific comparative method applied in that survey on an international scale. With PISA, each country can thus draw on reliable data on the level and distribution of rigorously defined skills and it becomes possible to compare the performances of students of various countries, regardless of differences in curricula and educational systems.

Now, if this is clearly an opportunity for each individual country, it can also be useful to different regions belonging to the same country. For the regions of Northern Italy, for example, it may only be partly relieving to know that the performance of their students is better than that of other Italian regions, when it is well known that the scores of the latter are exceptionally low. But even a direct comparison with the average performance of other countries would be inappropriate, since every country has diversified situations within its national boundaries. Nor can it be a satisfactory solution to make reference to abstract values like the “OECD average”.

Comparisons between inconsistent areas may be even more inadequate if the goal is understanding the reasons and implications of positive or negative differences: given the variety and heterogeneity of factors related to skills, a direct comparison between very diverse areas - not only from a geographical, but also from a demographic, economic, social and cultural viewpoint - would make it difficult to attribute specific weight to each factor, controlling for the others. In particular, other differences could overshadow those depending on specific educational systems or their peculiar organization, management and functioning at a regional or local level.

On the other hand, nowadays the real benchmarks for teen-agers who are preparing themselves for adult life and for work are bound to be international. The globalization of economic systems and the increasing interconnections on a global scale require a re-definition at an international level of the key skills necessary to each individual to participate and be active in these changes.

Hence the idea of developing comparative analyses on PISA data about skills in both a regional and international format. This way, more accurate information can be gathered on actual skill levels and the way they are distributed among adolescents, by comparing each region with regions in other countries similar from a demographic, sociologic and economic viewpoint.

Furthermore, even a direct comparison between individual regions belonging to the same national macro-areas might offer more information than can be elicited from aggregate data: should there turn out to be consistent differences in quality or level of skills within the same macro-areas – i.e. between the different regions of Northern Italy –, then it might be necessary to

reassess previous explanations (which might be biased by aggregation) to the benefit of other possible descriptions that would otherwise be blurred by average data.

PISA 2003: Average Score in Maths, Reading and Sciences among 15 year-old Students in some Italian and European Regions

GEOGRAPHICAL AREA	MATHS		READING		SCIENCES	
	AVER.	E.S.	AVER.	E.S.	AVER.	E.S.
Piedmont	494	4,9	501	4,0	522	5,2
Lombardy	519	7,3	515	6,9	540	7,5
Veneto	511	5,5	514	6,3	533	6,0
Tuscany	492	4,6	492	6,7	513	5,7
Switzerland (Ger)	527	3,7	500	3,1	513	3,9
Switzerland (Fr)	525	6,2	496	8,0	512	7,1
Switzerland (Ita)	520	5,9	493	8,2	502	7,2
Basque Country	502	2,8	497	2,9	484	3,1
Cataluña	494	4,7	483	4,5	502	4,0
Scotland	524	2,3	516	2,5	514	2,7
OECD Average	500	0,6	494	0,6	500	0,6
ITALY	466	3,1	476	3,0	486	3,1

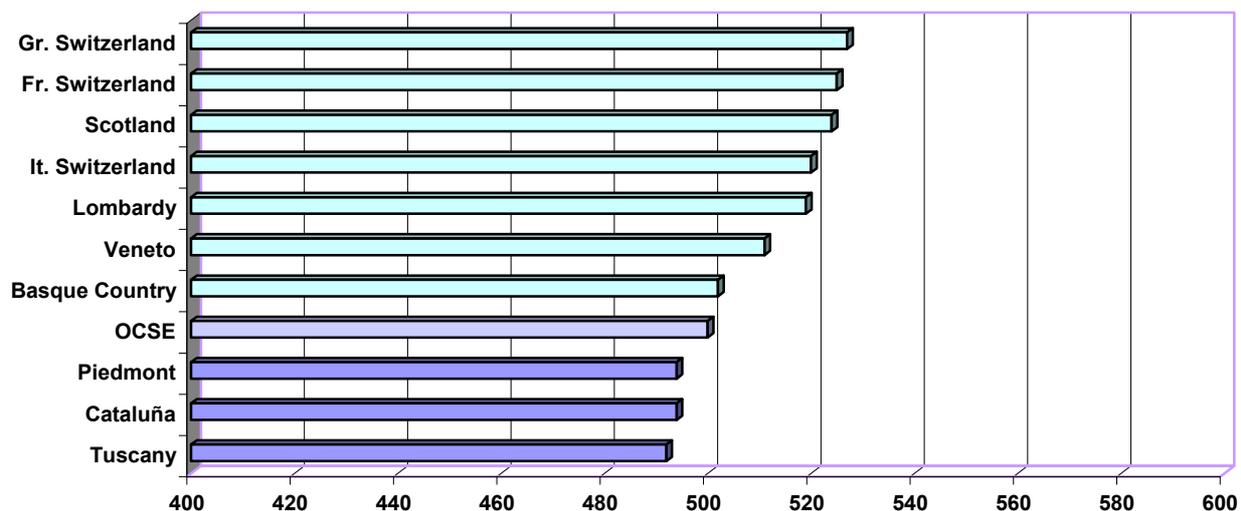
Source : PISA/OECD database in OECD website –Processed by IRES Piemonte, 2005

Some early and general findings of a comparative analysis based on previous assumptions are reported in the following pages.

In short, the study highlights that, based on the international PISA survey test results, it is impossible to provide a clear-cut answer to the questions raised at the beginning of this contribution on the performance of the Italian educational system. The skills of teen-agers in prominent regions of Northern Italy are not just higher than the national average, and therefore very different from those of Southern and even Central Italy. As a matter of fact, in the regions of the North skills are similar to those of comparable regions of other European countries, the average scores of which were much higher than that in Italy: for example, the neighbouring Switzerland, which obtained a score of 527 in maths, versus 466 of Italy. On the contrary, according to the interregional and international comparisons performed for the purpose of this study, the regions of Northern Italy emerge from the evaluation as relatively “specialized” in

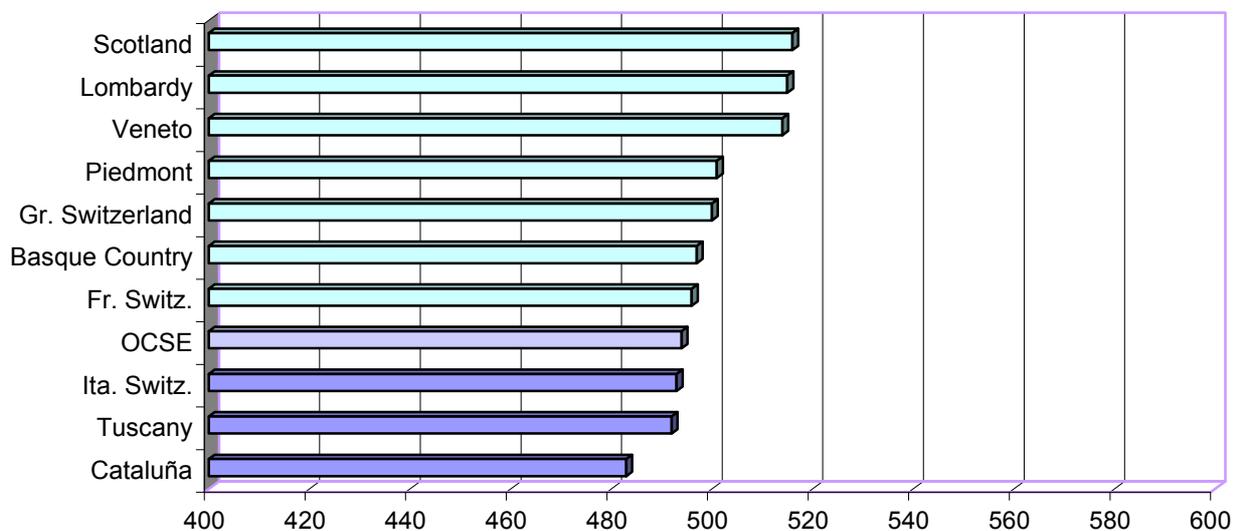
some key areas like reading and sciences, with scores exceeding those of the other European regions directly compared to them (from countries like Switzerland, Spain and the United Kingdom).

PISA 2003: Average Score in Maths among 15 year-old Students in some Italian and European Regions



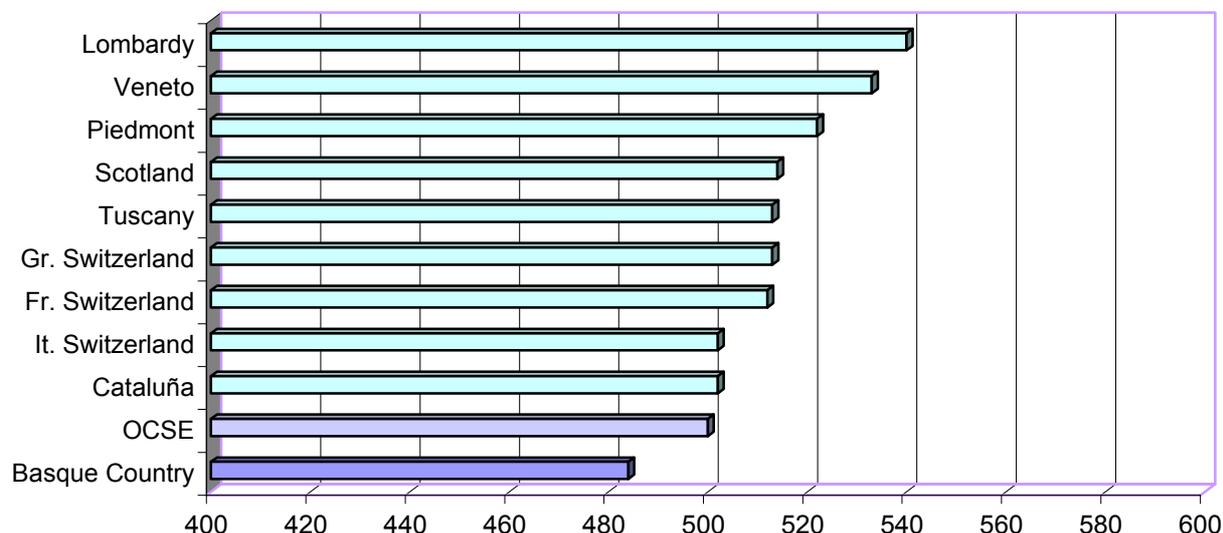
Source : PISA/OECD database – processed by IRES Piemonte, 2005

PISA 2003: Average Score in Reading among 15 year-old Students in some Italian and European Regions



Source : PISA/OECD database – processed by IRES Piemonte, 2005

PISA 2003: Average Score in Sciences among 15 year-old Students in some Italian and European Regions



Source : PISA/OECD database – processed by IRES Piemonte, 2005

It is also important to point out that the same score levels are obtained in Northern Italy not only by the students of the most valued secondary schools like Lyceums, but also by students attending Technical Schools, who are the majority in Italian secondary education institutions². Quite interestingly, unlike Italy as a whole, in Northern Italian regions even the students of Technical Schools exhibited average skills in line with the general average of OECD, with scores equal to or even higher than the average scores of Lyceums at a national level, and not very far from the average scores of Lyceum students in the same Northern regions, with wide overlappings in their distribution.

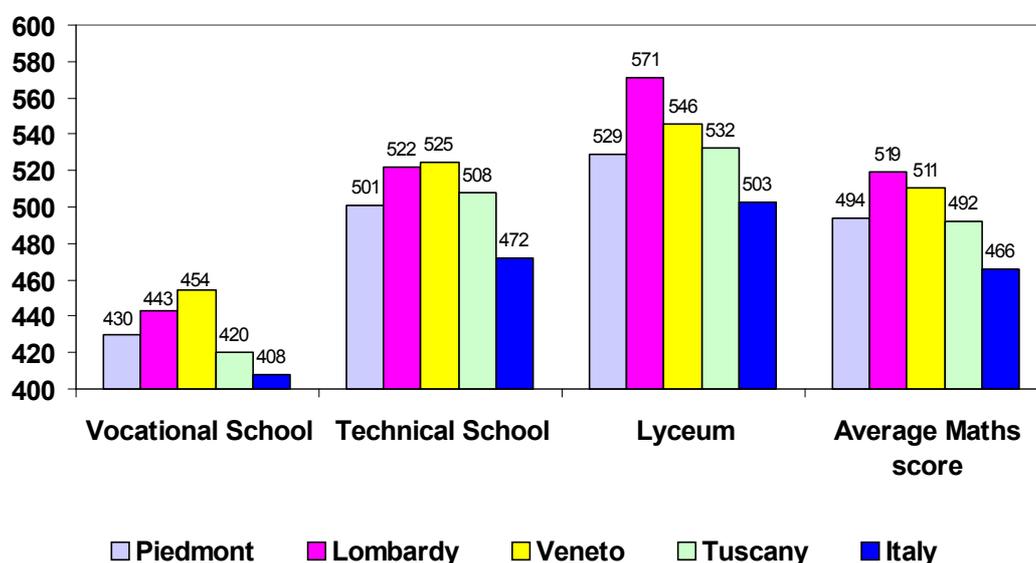
However, in the regions of Northern Italy as well as at national level, the situation of Vocational Schools, which account for 20% of all the students, is considerably different. PISA scores show that the poor preparation of these boys and girls when they leave compulsory education, not only remains definitely lower than that of their peers after about two years of secondary study, but it turns out to be objectively inadequate in a comparative international perspective. With a negative gap of 60-70 points versus the OECD average (against the -100 at the national level), even in the regions of Northern Italy the students of Vocational Schools are at a serious

² Technical education has been the object of considerable reform attempts in the past decades, but it is in these schools that not only many supervisors and technicians were educated, but also many managers and entrepreneurs who played key roles in the Italian economy.

disadvantage: a proportion of about 35% of them scored below the minimum standards deemed by OECD necessary not only to successfully continue education, but also to effectively start working and have good carrier prospects.

A serious rethinking of this specific chunk of education is certainly the most acute and urgent critical measure to be taken for Italy as a whole, and even more so in the regions of Northern Italy, perhaps, because students of other types of schools are much better performers there than elsewhere.

PISA 2003: Comparison Between Average Maths Scores in Different Types of Secondary Schools in 4 Italian Regions

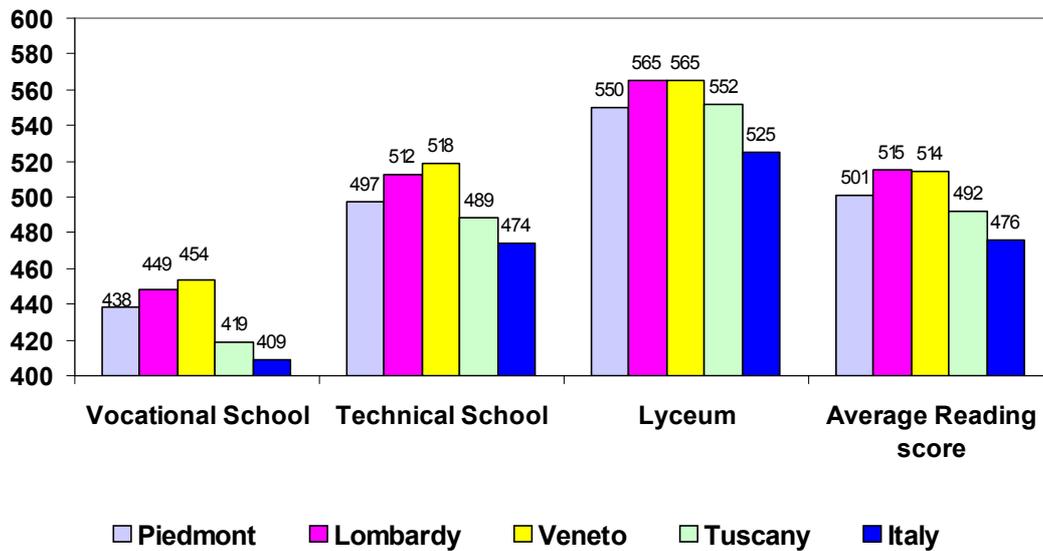


Source : PISA/OECD database – processed by IRES Piemonte, 2005

2. Individual differences between the regions of Northern Italy

The above-mentioned interregional comparisons highlight another element hidden by other more comprehensive data representations: even between the regions of Northern Italy differences are not negligible, both in terms of levels and distribution of PISA tests results. Despite the morphological similarity and physical proximity of regions like Piedmont, Lombardy, Veneto and Tuscany, PISA tests results are sistematically different, even when the same types of schools are compared. The constancy and regularity of these differences may at least partly compensate for the limitations in terms of statistical significance of some individual comparisons.

PISA 2003: Comparison between Average Reading Scores in Different Types of Secondary Schools in 4 Italian Regions



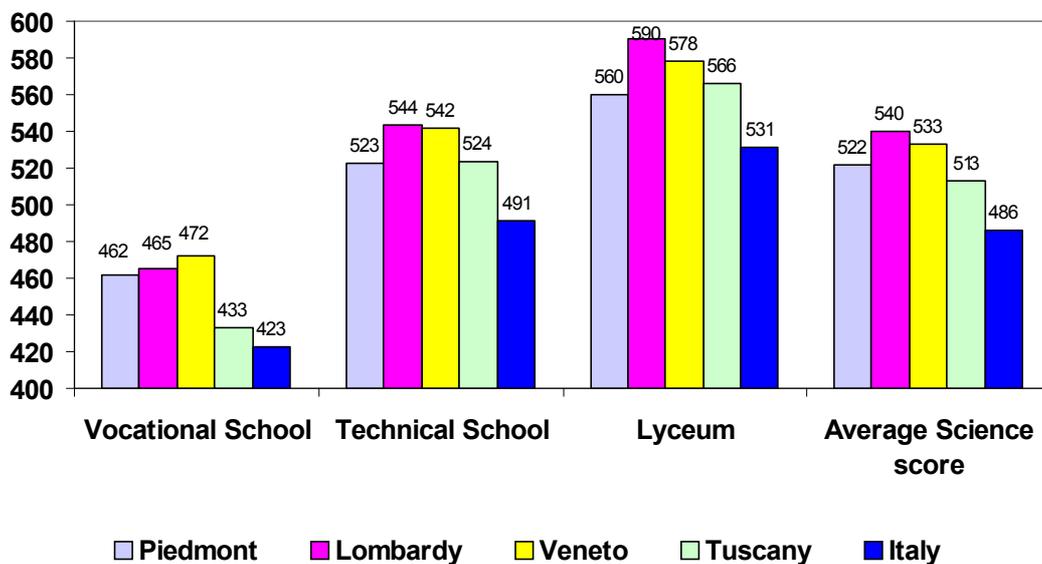
Source : PISA/OECD database – processed by IRES Piemonte, 2005

All along the analysis some peculiar regional trends of the educational systems have first appeared and then taken a clearer shape, at least inasmuch as they could be reflected by PISA results. A case in point is the driving role played by Lyceums in pushing the average score of Lombardy very high, with peaks in mathematics and sciences. Veneto, instead, reveals an unusual trend with a very low percentage of poor results both in technical and vocational schools, with a very positive impact on average scores both in maths and reading. And this favourable aspect has no negative impact on Lyceums, the scores of which are almost as high as those of Lombardy. The situation of Tuscany is very polarized instead: Lyceums are substantially in line with those of the Northern regions, while Vocational Schools are closer to the Italian average, with very striking gaps in reading and sciences. Piedmont, finally, highlights another specific pattern, with Vocational Schools almost as problematic as those of Tuscany and a ranking of Technical Schools and Lyceums not as good as that of Lombardy and Veneto: the biggest gaps are in maths, where Technical Schools in Piedmont score 25 points less than in Veneto, and Lyceums are 40 points below those in Lombardy. Still in maths, Vocational Schools in Piedmont obtain 25 points less than in Veneto.

Consequently, the general trend shows that space for local variability within the same educational and institutional system exists, even when comparing regions which are much more similar to each other than the different countries compared at an international level.

This prompts analysts to continue the study in the direction of a better understanding of the reasons and the local mechanisms of this variability. At the same time, the empirical evidence of better performances even within the same kind of schools, shows that it is certainly possible to improve the performance of any individual region, even within the same educational framework. This inevitably shifts more responsibility to local and regional authorities, both in education and in other relevant policy fields.

PISA 2003: Comparison between Average Scores in Sciences in Different types of Secondary Schools in 4 Italian Regions



Source : PISA/OECD database – processed by IRES Piemonte, 2005

3. Social, economic and cultural background of students and skills measured in the PISA survey: differences between Italian and European regions

Persisting differences have emerged out of PISA test results in various regions, even between schools of the same type. For the purpose of a comparative assessment, the background of students - i.e. the social, economic and cultural features of their environment - should also be taken into account. Several published reports on PISA international data explored the links between the characteristics of the social, economic and cultural environment of students and their likelihood to positively respond to PISA tests.

Based on the PISA questionnaire filled in by the students and the matching of diverse information concerning their family context, a summary index of the social, economic and cultural status of students was developed³. For the purpose of our comparative analysis between different geographical areas, two main contributions can be gathered from this set of indicators : 1) the mean values of status indices in the various areas can be directly compared, to find out whether significant differences emerge and check if their distribution is consistently related to PISA results differences; 2) moreover, it is possible to compare the relative impact of socio-economic and cultural status on learning in different territorial contexts, as illustrated by PISA. According to the OECD survey, not only context data are diverse in the different countries considered but, even when the contexts are similar, the influence of socio-economic and cultural factors on PISA results may vary according to different countries (and regions).

These two analytical steps could allow us a sort of preliminary “check”, to see if reported differences or similarities in background conditions may or may not play a relevant role in explaining the performance differences highlighted in PISA tests at a regional level.

In Italy, the average value of the ESCS index (Economic, Social and Cultural Status) is equal to -0,1: it is therefore lower than the OECD average, which is conventionally set at 0, with a standard deviation of 1. At a regional level the same index varies from -0.1 in Veneto to +0.1 in Lombardy, with Piedmont and Tuscany positioned exactly on the OECD average.

³ This index, called ESCS (Economic, Social and Cultural Status), arises from the combination of three relevant indicators: 1) parent’s job, based on the higher occupation according to the ISEI classification (International Socio Economic Index of Occupational Status); 2) their level of education, corresponding to the higher qualification reached by the parents according to the ISCED classification (International Standard Classification of Education); 3) the “cultural goods” owned by the family, based on the HOMEPOSS (Home Possession) index which includes specific equipment such as a desk, a room of his/her own, a quiet place to study, a computer for studying with the relevant software, internet connection, a personal calculator, books of classical literature, poetry books, works of art, reference books which can be a support for studying, a dictionary, etc

To have some international reference term, one can consider that the index value for both Cataluña and the Basque Country is the same as Veneto (-0.1): well above the Spanish average (-0.3), but lower than the OECD average. Even the combined value for Switzerland is the same as the OECD average, with the three linguistic areas ranging from -0.1 in the German speaking part of Switzerland to +0.1 in the French speaking part. The latter value (+0.1) is also recorded both in Scotland and in Lombardy.

There are therefore clear differences between the European regions considered, but they are not so far-reaching (consistently with the selection and comparison criteria followed in the study). What is even more important, however, is that socio-economic status differences do not seem to be consistently associated to performance differences: in particular, Veneto and the German-speaking part of Switzerland rank on the status index clearly lower than on PISA results.

Interestingly enough, in Northern Italian regions – and particularly in Veneto again – the performance gap between students positioned at the two extremes of the social scale seems particularly narrow: differences in tests results of 25% of students with a lower ESCS and 25% of students with higher status range from 52 points in Veneto to 74 in Lombardy. If we consider the Italian average, the same difference between the lower and upper quartile reaches 90 points.

Generally speaking, in the European regions compared in the study, differences between the extremes are higher than in the 4 regions of Northern Italy (with the only exception of the Basque Country), and this is even more evident in the German and French speaking parts of Switzerland (with a difference of 103 and 97 points).

The conclusion might be that for the regions of Northern Italy and, in particular, for some of them, levels of socio-economic status comparable to other European regions are matched by smaller discrepancies in performances registered by the students positioned at the two extremes of the social ladder.

With respect to the impact of socio-economic status on PISA results, another measure adopted in OECD reports is the percentage of results variance “explained”, in statistical terms, by differences in the ECSC index⁴. In Italy, for example, the index “explains” slightly less than 14% of the score variance in maths: this figure is similar to Spain, lower than the 18% of Switzerland and the 20% of OECD as a whole. For Northern Italian regions the influence of status on performance drops further, moving from the lowest value in Veneto (where the differences in

⁴ Basically, it is the value of the R-squared of the regression between status index and test scores. It measures the share of performance variations that can be traced back to differences in the socio-economic status index. The remaining part must be traced back to other factors.

socio-economic and cultural status of families explain only 5.6% of the students' score scattering), up to a maximum of 11% in Tuscany. The corresponding figure is 10% in Piedmont and Lombardy, the same as in the Basque Country. In all the other European regions the explanatory capacity of status gaps is higher: it ranges from 13.8% in Cataluña to 18.8 in the German-speaking cantons of Switzerland.

PISA 2003: Socio-economic and Cultural Conditions of Students compared to Maths Scores by Region⁵

ESCS INDEX	Geographic area	ESCS Index average	Average maths score in the lower quartile	Average maths score in the upper quartile	Inter-Quartile differ.	Score increase for 1 index unit	Variance explained by ESCS %
Family socio-economic and cultural status index (ESCS)	Piedmont	0,0	459	528	69	30	10,6
	Lombardy	0,1	485	559	74	31	10,1
	Veneto	-0,1	485	537	52	21	5,6
	Tuscany	0,0	451	524	73	30	11
	Ger. Switz.	-0,1	470	573	103	50	18,8
	Fr. Switz.	0,1	477	574	97	45	18,5
	Ita. Switz.	0,0	479	560	81	39	15,5
	Cataluña	-0,1	452	535	83	33	13,8
	Basque C.	-0,1	471	538	67	29	10,7
	Scotland	0,1	482	573	91	39	18,1

Source : PISA/OECD 2003 database – processed by IRES Piemonte, 2005

The positive meaning of a lower influence of socio-economic status on PISA results could be weakened, for Italy as a whole, by the fact that the distribution of Italian results is shifted towards the bottom. Rather than a lower degree of inequality, one might call it a higher degree of flattening. However, in the regions of Northern Italy – where performances are definitely higher than the national average and in line with international standards – data show that the impact of socio-economic status is lower than the Italian average, and much lower as against the other European regions compared in the study. At least in the regions of Northern Italy

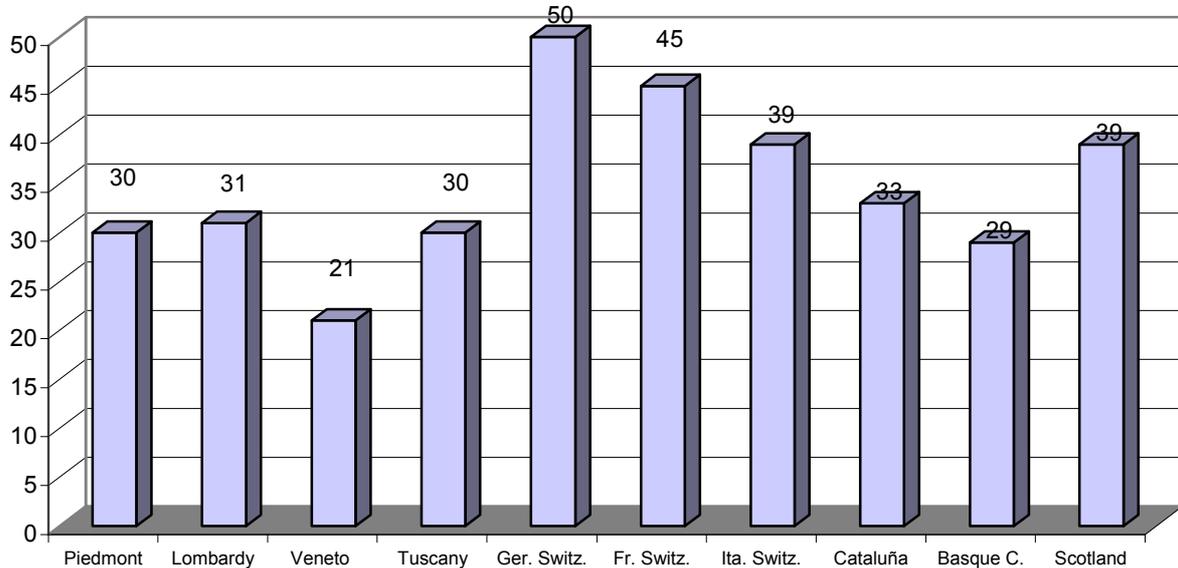
⁵ All the table figures, partly already published in OECD reports and partly in individual national reports, have been recalculated for the occasion, following the same methodology and using PISA database on the OECD website, to make them fully comparable.

therefore, social inequalities seem to have a lower impact on performance and this does not seem to undermine the quality of average performance values. This is once again a significant insight that would have been impossible to gather from aggregate national data.

A confirmation of these somehow astonishing findings may come from another way of looking at the strength of the relation between socio-economic and cultural status and PISA test results. Following the example of OECD reports, one might measure the extent to which students' performance is likely to change with an increase of one unit in the ESCS summary index⁶. In general, in the average of OECD countries, this variation equals 45 points in the maths scale, and it may be considered a measure of the average sensitivity of PISA results to status variations.

The subsequent Graph offers a visual representation of the extent to which maths performance might be affected by socio-economic and cultural background changes in some European regions. It clearly shows how much this influence may vary between different regions, even within the same country.

PISA 2003: Variation of Maths Scores Correlated to a One-unit Increase in Family Socio-economic and Cultural Status on a Regional Basis



Source : PISA/OECD database – processed by IRES Piemonte, 2005

⁶ In this case, we focussed on regression coefficients to describe the direction and the magnitude of variations induced in the dependent variable (PISA results) by an increase of one unit in the value of the independent variable (the socio-economic and cultural status index).

Again, Veneto is the region where family background shows the lowest impact on maths scores. In this region a one-unit increment in the socio-economic status index is matched by an increase of only 21 points in the PISA scale. In Piedmont, Lombardy and Tuscany the same increase corresponds to 30 points, which is only slightly less than the national average of 34, and pretty similar to the values of the Basque Country and Cataluña.

Conversely, the performance of German and French-speaking students in Switzerland seems to be more sensitive to changes in the socio-economic and cultural status, with respectively 50 and 45 point increases matching each unit increment in the status index: a sensitivity higher than in Scotland and in the Italian-speaking area of Switzerland (39).

In summary, in Northern Italian regions, unlike other Italian areas, the skills of 15-year old students are not inferior to the ones measured in other comparable European regions. Furthermore, a closer look highlights that the influence on PISA performance commonly attributed to social background seems to be definitely less powerful in these regions or, at least, be adequately counterbalanced by other influences capable of reducing social differences without lowering average performance. As an additional challenge to deeply rooted views, attention should be devoted to the emblematic case of Veneto, a region where the level of skills was among the highest in absolute terms and spread out rather evenly regardless of the different types of school specialization considered and of differences in the socio-economic and cultural status of students.

Clearly, this observation is intended to be a further incentive to deepen the scope of studies and go beyond a merely descriptive approach, rather than being an exhaustive explanation of the results obtained so far. However, at the end of this exploration, at least one provocative question may be raised: after all, taking a closer look at PISA data from the Italian perspective, couldn't we find a sort of "Finland" of our own in the apparently poor landscape of Italian average performance? If so, such a model would be felt closer to our reality than the one celebrated in PISA reports: it could therefore be more easily emulated by other Italian regions.

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