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# Deviant Cases from Expected Performance: The Role of Expectations Beyond Socio- Economic and Cultural Status

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# **Deviant Cases from Expected Performance: The Role of Expectations Beyond Socio- Economic and Cultural Status**

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Abstract. Theories of social reproduction describe a general trend in the distribution of educational performances that are grounded in social origins. However, they do not account for those students who fall short of expectations and those who go beyond what is expected. This article aims to understand, net of the socioeconomic and cultural status index, what factors explain the deviation from expected performance. To this end, we conduct quantitative analyses on a sample of 15-year-old Italian students from the OECD PISA 2018 database, with deviation from expected performance as the dependent variable and deviant case analysis as the approach. We first explore sociodemographic and contextual variables at the school level; then, we examine the influence of attitudinal variables like educational and professional expectations. Net of status, familial educational expectations, and individual, firstly professional and secondly educational, expectations are observed to be the most important individual-level factors of the analysis and are able to reshape the known landscape of structural effects on performance inequalities.

Keywords: Performance assessment, reproduction theory, expectations, deviant case analysis

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## On Performance and Status

Well before the introduction of standardized large-scale assessment (LSA), sociological theory interested in education systems tried to answer the question of academic performance distribution, searching for social determinants of educational achievement besides individual cognitive differences attributable to the genetic lottery. Performance distribution is deemed to be primarily a social stratification issue, with theories of social reproduction linking achievement and social origins. These theories argue that academic performances reflect different abilities in the manipulation of cultural symbols and their meanings inherited from the family of origin (Bourdieu & Passeron, 1970) or that they are due to students' differential cognitive development, sustained by the disparity in the availability of economic resources (Boudon, 1974).

Far from being neutral and technical, the knowledge bestowed by educational institutions is the result of socio-cultural selection that mirrors the values and worldviews of the dominant classes. Academic success is considered to depend on progressive recognition of the student as part of the same class culture. This recognition is triggered by the student's inherited cultural capital. Empirical research demonstrates that while its signaling capacity is debated (BreinHolt & Jaeger, 2020), what remains incontrovertible is the contribution of familial environment to academic performances (Sullivan, 2001; Van de Werfhorst et al., 2003; Van de Werfhorst & Hofstede, 2007; BreinHolt & Jaeger, 2020) through the availability of linguistic and cognitive resources to be used as instruments of cultural appropriation (Bourdieu, 1973; Sullivan, 2001). In his description of the primary effect of social origin on educational outcomes, Boudon (1974) hints at the same mechanisms, pointing to the educational opportunities guaranteed by economic resource availability. Through primary effects, economic and social advantages translate into better scholastic performance. When it comes to academic performances, the two lenses are almost of the same shade, and the widespread belief views their integration as having more explicative capacity than the singular approaches (Van de Werfhorst & Hofstede, 2007; Parziale, 2016).

Bowles and Gintis (1973, 1976) attempt to overcome deterministic interpretations, distinguishing within disadvantaged social classes those subjects whose above-average performances disrupt the representation of the association between social origin and achievement. Those same students are qualitatively identified in *Learning to Labour* (Willis, 1977), where, among working-class students, there are *lads*—those who refuse scholastic culture—and *ear'oles*—those who accept it along with the opportunities that come with it, even if it is perceived as imposed by the dominant class.

These attempts suggest that theories of social reproduction are useful in describing a general trend in the distribution of scholastic performances, providing social research with interpretative tools to describe much, but not all, of what happens behind the walls. What has been left out are all those cases for which the association between family origins and performance seems to be weaker than the theories suppose. From other perspectives, the weakness of these association can be mediated by the students' anticipation of their becoming. Students may try to change their trajectories and place themselves better than the expectations drawn from the context where they live (Bourdieu, 1997; Mandich, 2012). In this sense these students beyond expectations practice what Merton (1948) calls «self-fulfilling prophecies» or, in other terms, the bring into play their «capacity to aspire» (Appadurai, 2004; de Leonardis and Deriu, 2012) to claim a better position than the one they started from. This is clear in particular when looking at the educational choice debate, for which the rational processes of choice are only a part of the decision-making, and the reproduction of social differences is not the only outcome of the aggregated choices. In this debate, the motivation, the expectation of parents, teachers, and individuals, in synthesis attitudinal elements, are central for academic performance, and social and educational mobility (Goyette, 2008; Agasisti and Longobardi, 2014; Giancola and Salmieri, 2024). Many empirical studies have addressed the role of parental and individual attitudes on standardized and nonstandardized performance, finding their importance (Khattab, 2015; Pinquart and Ebeling, 2020; Jeynes, 2024).

Dealing specifically with deviation from expected performance, the OECD identifies a similar category of “resilient student,” indicating students in the bottom 25% of the Economic, Social, and Cultural Status index (ESCS) distribution who perform above the median proficiency level (OECD, 2011; Agasisti et al., 2018; Barabanti, 2021). What is missing from the literature is an account of those students who, despite having access to economic, social, and cultural resources, perform significantly below the expected level.

## **1. Research Design Aims and Hypothesis**

The aim of the study is threefold. First, we want to move beyond the logic of the social reproduction of educational inequalities by excluding the explained variance of the ESCS. The study is based on student performances in reading, and we implement the deviant case analysis (DCA) approach in constructing the dependent variable using linear regression. Second, we aim to understand the characteristics of groups of students with different degrees of deviation through bivariate analysis. We estimate the variables' influence on the probability to deviate from expected performance using a multinomial logistic regression model. Finally, we aim to estimate the impact

of attitudinal variables, such as educational and professional expectations (both individual and familial), on the likelihood of deviating from expected performance. Our hypotheses suggest that, in addition to factual variables, attitudinal variables also contribute to differentiating observed performance among students net of socio-economic and cultural conditions.

## **2. Deviant Case Analysis for the Study of Associations**

Deviant case analysis (DCA) stems from empirical sociology, particularly the work of Paul Lazarsfeld and Raymond Boudon (1966). The term “deviancy” in this context refers to a purely statistical fact, without the need for normative assumptions about observed behaviors (Mauceri, 2008). A “deviant case” does not express the expected behavior as would be predicted by other variables (Kendall & Wolf, 1949).

DCA is deemed a tool to consciously advance the theoretical definition of problems and indicators. Indeed, indicator correction has been the most widely accepted result of this kind of approach. DCA has been used to evaluate the associations between different variables designed upon the same underlying properties. Discordance between modes of response that should indicate the same property of a social phenomenon hints at problems in the theoretical definition and operationalization of one of the two variables. In this work, we use DCA as a tool to observe what lies beyond associations between variables that indicate different properties that are already widely understood by sociological theory. The aim is to gain insight into matters that are erroneously deemed to not be in need of further theoretical explanation, such as the distribution of academic (or test) performances.

To corroborate our hypotheses, we define the dependent variable as “relative performance” and use it to observe what lies beyond the association between a student’s performance in literacy tests and his/her ESCS index. DCA runs as follows: *i)* A correlation between two variables—i.e., a case of association that imposes a direction on the causal link between the two variables—enables the explanation of the dependent variable in terms of the variation of the independent variable. *ii)* For each value of the independent variable, a value for the target variable is estimated, which can be considered the behavior that has to be expected. *iii)* The cases falling out from the expected behavior are deemed as deviant cases. *iv)* Multivariate analysis is used to explore possible causes of deviations from expectations.

## **3. Data and Measures**

We use DCA on data on the Italian student population gathered from the OECD PISA 2018 database. The Italian sub-sample (adjusted with the

weights provided by the OECD) consists of 337,898 valid cases. The effects of the independent variables selected from the database are observed; variables are categorized as “factual” or “attitudinal”.

Factual variables refer to both the individual level of analysis and above the individual level:

- The geographic area, which is the recoded division of Italy in three areas: North (including North-East and North-West), Center, and South, which includes the islands of Sicily and Sardinia
- Curricular tracks: general, technical, and vocational curricula, which reflects the horizontal segmentation in Italian upper secondary education (Giancola & Salmieri, 2022; European Commission/EACEA/Eurydice, 2022)
- The average of the ESCS at the single school level as a proxy of the socio-economic and cultural status of the school
- The standard deviation of the ESCS at the single school level as a proxy of the socio-economic and cultural heterogeneity of the school
- Gender
- Migratory background recoded following Rumbaut’s (2004) distinction between first-generation and second-generation immigrants

Attitudinal variables include individual and parental educational expectations, which the OECD PISA assessment gathers as what both 15-year-old students and their parents expect in terms of education completion (tertiary vs. lower degree). Expectations regarding professional status (i.e., what students expect their position in the labor market will be) and attitudes towards school activities (i.e., what level students expect their educational credentials and general usability will reach) are both metric indexes and are dichotomized in the logistic model we implement.<sup>1</sup>

## 4. Analysis

### 4.1 Constructing “Deviation from Expected Performance”

To address our research aims, the dependent variable is obtained using a linear regression relating performance on the reading test with socio-economic and cultural status (ESCS) as an independent variable. ESCS is a reliable predictor of student performances (OECD, 2019b), reproducing 9.5% of variance in scores. Linear regression is used to gauge the direct influence of the ESCS index on PISA students’ scores. Standing as the percentage of reproduced variance, each unitary increase of ESCS corresponds to an increase of 31.643 points in scores (*see Table 1*).

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<sup>1</sup> For the construction of the indexes, see OECD (2019a).

Table 1: Correlation coefficient between ESCS and performance

Model	R	R-squared	Adj. R-squared	Estimated std. error
1	0.3084667	0.095151705	0.095149929	89.42658

Coefficients		B coeff.	Std. error	$\beta$	t	Sign.
Model 1	(Constant)	483.9875891	0.128793992		3757.843	0
	ESCS	31.64342851	0.136692073	0.308467	231.4942	0

Source: Authors' elaboration from OECD PISA (2018)

The difference between predicted score values and the score effectively observed corresponds to the measure of the deviation, i.e., deviation from expected performance based on status as predictor.

$$Y = \hat{y} - y$$

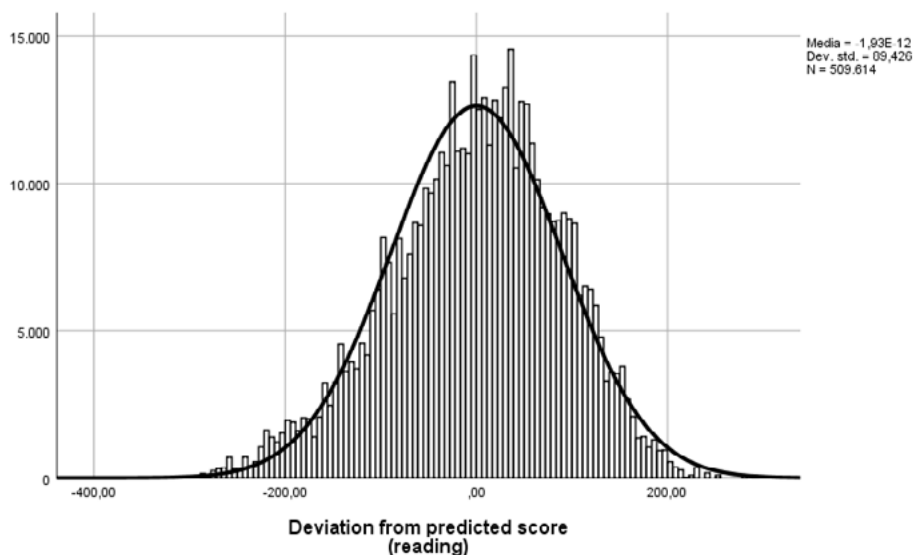
The dependent variable that is the result of this regression and subtraction is then used in both its scalar and categorical forms in the next steps of analysis.

Table 2: Descriptive statistics of deviations from expected performance in PISA reading test

Statistics		
Deviation from predicted score (reading)		
N	Valid	509614
	Missing	11609
Mean		0
Median		5.416
Std. deviation		89.427
Minimum		-315.1
Maximum		293.33
Kurtosis		-0.11
Percentile	I Quintile	-74.843
	II Quintile	-17.917
	III Quintile	28.414
	IV Quintile	77.622

Source: Authors' elaboration from OECD PISA (2018)

Figure 1: Histogram of the distribution of the deviations from expected performance in PISA reading test



Source: Authors' elaboration from OECD PISA (2018)

#### 4.2 Students Deviating above or below the Expected Performance

Before delving into the models and understanding the probabilities of deviating from expected performance, bivariate analysis is used to describe the dependent variable. Cross tabulations are used to describe groups derived from quintiles of relative performance variable distribution in terms of independent categorical variables of interest. In all other cases, correlation tables are used synthetically to describe the association between dependent and independent variables.

Regional differences analysis reveals that over half of the students in Southern and insular regions perform below expectations (50.6%), while most students in the Northern regions perform above (50.7%) (see *Table 1a*<sup>2</sup>). Coupling these observations with regional differences in the association between socio-economic status and PISA scores measured by linear regression coefficients, wider variance among scores is explained by the ESCS index in the southern and insular regions compared to the northern ones, indicating a deep inequality within the Italian educational system (see *Table 2a*).

Regional disparities are intertwined in students' educational inequalities based on Italian upper secondary school track differences. Track choice is

<sup>2</sup> All tables numbered and followed by the letter 'a' are in the appendix



influenced by primary effects to the extent that students' previous learning achievement predicts future academic attainment. Differences in curricular programs inform families' choices, since each track paves the way to a different class reproduction strategy (secondary effects). As such, the distribution of students within tracks evenly mirrors social stratification. In a social context like this the general education track includes the absolute majority of students with positive deviation from expected performance (54.7%).

Conversely, students from the technical track are more likely to perform below and far below the expectation compared to students attending the general track (46.2% vs. 24.6%). Additionally, the overall conditional distribution of deviation within the technical track is the most homogeneous among the three. Students in vocational schools have the highest probability of negatively deviating from expectations (*see Table 3*).

Table 3: Contingency table between deviation in reading score and school track (column percentages)

Deviation	Track			
	General	Technical	Vocational	Total
Far below	8.1	23.2	43.9	19.7
Below	16.6	23.0	24.3	20.0
Expected	20.7	22.1	15.2	20.0
Above	24.5	17.7	12.7	20.1
Far above	30.2	13.9	3.9	20.1
Total	100	100	100	100

Source: Authors' elaboration from OECD PISA (2018)

Remaining on the school level, a strong association is found between deviance from expected performance on the literacy score and the school average value of ESCS as a proxy of school social status: the Pearson coefficient is  $R=0.41$ , meaning that roughly 16% of common variance stands between school social status and student performance net of individual ESCS. Furthermore, the heterogeneity of status within the school does not contribute to denoting significant differences (*see Table 3a*).

If we look at the gender difference, boys are much more likely to perform below expectations while girls tend to perform above expectations (*see Table 4a*).

Migratory background is associated with lower academic performance. Differentiating between first-generation and second-generation students is quite useful in educational research because it hinges on the degree of integration that one has experienced following different individual and familial

migratory trajectories. Conditional distribution of deviation from expected performance within first-generation migrant students is heavily skewed towards the lower tail (63.2% perform below the expectation; see *Table 5a*), probably reflecting difficulties in school integration. Second-generation migrant students fare better, displaying more frequent positive deviations from expected performance. This relates to better abilities in official and formal language due to earlier integration into the school system.

### 4.3 Attitudes towards success

Shifting the attention to the attitudinal variables considered we can observe some preliminary information that introduce us to the next interactions with factual variables.

Overall, educational expectations are symmetrical to the deviation from expected performance (see *Table 4*). Students with low educational expectations demonstrate negative deviation from expected achievement; correspondingly, students expecting to attain a tertiary degree are mostly found in the upper tail of the distribution (50.3%).

Table 4: Contingency table between deviation in reading score and individual educational expectation (column percentages)

Deviation	Individual educational expectations			
	At most upper secondary level	Post-secondary, not tertiary	Tertiary	Total
Far below	31.9	27.1	13.3	20.1
Below	24.2	26.0	17.0	20.0
Expected	19.9	22.7	19.4	19.9
Above	15.5	15.7	22.9	20.0
Far above	8.7	8.6	27.5	20.1
Total	100	100	100	100

*Source: Authors' elaboration from OECD PISA (2018)*

The relation between parental expectations and children's educational achievement follows the same pattern: students whose parents expect their children to stop at secondary or post-secondary education rather than attaining a tertiary degree perform according to these expectations, with slightly more positive deviations for the latter. Students whose parents expect their children to complete tertiary education are in the positive tail of the distribution and do much better than would be statistically expected of them in terms of deviation from expected performance (49.4%) (see *Table 5*).

Table 5: Contingency table between deviation in reading and parental educational expectation (column percentage)

Deviation	Parental educational expectations			
	At most upper secondary level	Post-secondary, not tertiary	Tertiary	Total
Far below	31.5	29.6	11.7	17.9
Below	24.9	23.2	17.4	19.7
Expected	19.1	20.9	21.4	20.8
Above	14.6	16.8	22.6	20.2
Far above	9.9	9.5	26.8	21.3
Total	100	100	100	100

Source: Authors' elaboration from OECD PISA (2018)

The next attitudes examined are individual professional expectations and individual attitudes towards learning activities, both related in their scalar form with the scalar measure of deviation from expected performances. The Pearson correlation coefficient between scalar deviations and the index of professional expectations is  $R=0.304$ , which translates into roughly 9.2% of common variance between the two variables (see Table 6a). Finally, while significant, the Pearson correlation coefficient between the scalar distribution of deviation from expected performance and the attitude towards school learning activities does not denote any relevant associations ( $R=0.07$ ).

Motivational resources represented in the significant attitudinal variables have shown a non-negligible effect on the ability of students to positively deviate from what is expected, at least in bivariate analysis. Indeed, familial and individual educational expectations and individual professional expectations are fueled by familial status and social background (Vergati, 2005). Behind this link lies the risk that, being distributed according to the existing social stratification, expectations become yet another vehicle to further entrench social inequalities in educational outcomes. Thus, the availability of positive attitudes becomes an issue per se, one that is not tackled in this paper. The next steps in the multivariate analysis will be carried out to test if these bivariate relations hold even when all the other factual variables are taken into account.

#### 4.4 Beyond Expectations

To test the effects of the factual and attitudinal variables mentioned above, Ordinary Least Squares regression (OLS) is used to understand the size of the linear effects on deviation from expected performance.

Table 6: OLS regression between deviation from expected performance and factual variables

R	R-squared	Adj. R-squared	Estimated std. error		
0,495	0,245	0,245	73,98553		

	B coeff.	Error standard	$\beta$	t	sign
(Constant)	-70.597	0.932		-75.713	.000
North (vs. South)	45.145	0.311	0.262	144.955	.000
Center (vs. South)	19.406	0.377	0.089	51.471	.000
General track (vs. vocational)	56.247	0.55	0.33	102.318	.000
Technical track (vs. vocational)	35.446	0.432	0.187	81.989	.000
School avg. ESCS	12.276	0.443	0.066	27.683	.000
School ESCS S.D.	-13.914	1.009	-0.022	-13.785	.000
Female vs. male	11.894	0.277	0.07	42.93	.000
2nd generation (mig. background) (vs. native)	-2.3	0.533	-0.007	-4.312	.000
1st generation (mig. background) (vs. native)	-35.04	0.989	-0.055	-35.445	.000
Ed. exp. tertiary (vs. lower level)	8.493	0.361	0.047	23.541	.000
Fam. exp. tertiary (vs. lower level)	17.354	0.356	0.094	48.719	.000
Attitudes toward school learning activities	0.107	0.268	0.001	0.401	.689
Professional expectations	13.384	0.301	0.078	44.393	.000

Source: Authors' elaboration from OECD PISA (2018)

Whether a student is living in the northern, central, or southern region of Italy makes a difference in terms of test scores in reading. Fixing southern regions as a baseline, there is a considerable advantage in terms of scoring above expected performance for students from regions in the North, with an average difference of +45.15 points and a lesser but still significant advantage for students from regions in the Center, with an average difference of +19.41 points.

School track appears to be the most crucial variable affecting deviation from expected performance. Vocational school track is taken as the reference category, and the other two school tracks exhibit the biggest  $\beta$  values in the model (see Table 6). Since vocational schools are filled with students who experienced poor learning outcomes in earlier school grades, the likelihood of performing better than expected is very limited, while deviation from expectation is more common among students attending general schools.

Remaining at the school level, multivariate analysis showed a near-zero positive influence of the school's average ESCS on the dependent variable. However, ESCS heterogeneity within schools showed slightly negative effects on the deviation from test performance. The effects of both these variables can be considered negligible in the overall model due to their sizes.

All else being equal, being a girl has positive effects on deviation from expected performance. This does not come as a surprise because it is a recurring result with multiple associated reasons (Di Castro & Ferri, 2022). Meanwhile, the effects of migratory background are variable. Still on equal terms, first-generation and second-generation immigrant students do not face the same conditions. The latter are only slightly affected by their migrant background, while the same cannot be said for the former. Here, we can observe the major integration of the second generation and the difficulties in the performance of the first generation, probably related to language difficulties (Azzolini et al., 2012).

Lastly, we denote a significant effect of all of the selected attitudinal variables, except for the attitudes toward school learning activities. High educational expectations determine a positive deviation from expected achievement. Despite a standardized  $\beta$  coefficient that seem to denote a small effect size, familial educational expectations have the fourth biggest effect in the model ( $\beta=0.094$ ). Individual educational expectations have an even smaller effect ( $\beta=0.047$ ). Respectively, high familial and individual educational expectations increase test performances by 17.35 and 8.49 points than what is predicted based on the individual status. The ability to deviate from expected performance is also aided by individual professional expectations, the fifth predictor in the model by effect size ( $\beta=0.078$ ).

Attitudes toward school learning activities are the only predictor that loses significance in the multivariate check of the relations. Going back to its construction (OECD, 2019b), the variables used for the attitude index refer to judgments on the value of education for seeking professional or academic opportunities. The ability to over- or under-perform seems independent from judgments on the school's ability to trace academic and vocational paths but seems instead to be systematically dependent on familial and individual expectations in the educational and professional fields. In summary,

what emerges from this model is that, when taken into consideration, attitudinal variables have greater effects than the other individual-level variables.

#### **4.5 Deviating from Statistical Expectations: Factual Variables Examined**

The next step evaluates the effects of the same variables of the OLS of the previous paragraph over the probability of being in one of the quintiles of the “relative performance” variable. Dividing the deviation from expected performance in reading in quintiles equates to the identification of the thresholds beyond which one’s performance can be considered deviant. The central group, between the second and third quintiles, includes students performing around the score predicted via linear regression.

Through multinomial logistic regression, we observed the independent variable weights on the probability of performing above or below the expectation, compared to the probability of fitting to what is expected. The interpretation of the coefficients must consider the position of the category observed in relation to the reference category: for the groups below expectations, positive coefficients mean a positive effect on the probability of underperforming, while negative coefficients mean a protective effect of the considered variable. The reverse occurs for the groups above expectations; in their case, positive coefficients signify a push effect. All the coefficients are to be interpreted as the effect of that variable with all other conditions being equal.

Being from the northern or central regions of Italy has both marked protective and push effects: northern students are 63% less likely to perform far below expectations compared to southern students while having three times the probability of performing far above expectations. In central Italy, the same effects can be observed, though diminished in size: the probability of scoring far below expected is 29% lower than in the South, while the probability of performing far above expectations is 57% higher.

Protective and push effects increase as one departs from expected performance (*see Table 7*).

The upper secondary school-track is the most affecting variable in the model: taking the vocational school track as the baseline, the general school track translates into 4.7 times ( $\text{Exp } \beta$ ) the probability of being among the students performing much better than expected, while reducing the odds of being among the students performing much worse than expected by 84%. Students from technical schools, compared to students from vocational schools, are 67% less likely to be among the ones performing lower than expected and are 2.3 times more likely to be among the ones performing much higher than expected. Therefore, school track shifts from being strongly protective at the top of the table to being strongly pushing at the bottom.

The socio-economic and cultural status of the school has a strong downward protective implication and an upward pushing effect. Attending a school with a high ESCS average value lessens the likelihood of falling into the category of students who perform far below expectations by 37% and increases the likelihood of performing above and far above expectations by 36% and 52%, respectively.

Table 7: 1st multinomial model (factual variables)

	Far below		Below		Above		Far above	
	B	Ex-p( $\beta$ )	B	Ex-p( $\beta$ )	B	Ex-p( $\beta$ )	B	Ex-p( $\beta$ )
Intercept	0.762	0	0.549	0	0.068	0	-2.172	0
North (vs. South)	-0.982	0.374	-0.239	0.787	0.498	1.646	1.101	3.007
Center (vs. South)	-0.312	0.732	0.113	1.12	0.256	1.292	0.48	1.616
General track (vs. vocational)	-1.838	0.159	-0.632	0.531	0.193	1.213	1.559	4.756
Technical track (vs. vocational)	-1.091	0.336	-0.439	0.645	-0.039	0.962	0.833	2.3
School avg. ESCS	-0.426	0.653	-0.15	0.861	0.337	1.401	0.45	1.569
School ESCS S.D.	0.792	2.208			-0.535	0.585	0.381	1.464
Female vs. male	-0.482	0.618	-0.119	0.888	0.078	1.081	0.122	1.13
2nd generation (mig. background) (vs. native)	0.447	1.564			-0.103	0.902		
1st generation (mig. background) (vs. native)	1.278	3.59	0.994	2.701	0.092	1.096	-0.148	0.863
Significant for $\alpha < 0.05$								
R <sup>2</sup> Nagelkerke = 0.255								
Reference category: Within expectation (central quintile)								

Source: Authors' elaboration from OECD PISA (2018)

The interpretation of school social heterogeneity coefficients is slightly more complex. For both the extreme categories, a strong positive effect can be observed, which translates into an increase in both the probability of performing far below (2.2 times) and far above expectations (1.4 times). The effect on the probability of performing just under expectations is not significant, while the probability of being in the group that has higher performance is 46% less likely than just complying with expected performance. Heterogeneity, despite the small effect size observed in the OLS (see Table 6) in the multinomial model, does not show any sign of protective effects;

on the contrary, it seems to pull downward, towards the negative deviation. Regarding the effects on the probability of being in the positive deviation categories, those offer themselves to contradictory interpretation in need of further investigation (*see Table 7*).

Being a girl rather than a boy protects from performing worse than expected and helps in performing above expectations. Girls are 13% less likely than boys to perform below and 39% far below expectations, and they are also 11% more likely than boys to perform far above and 6% above expectations.

The last variable in the factual model is migratory background: being a first-generation or second-generation student compared to being native to Italy. The probability of a first-generation student being a low performer is about 3.5 times higher than that of native students, and it is about 2.7 times higher for the category of lower performance than expected. The effect of first-generation migratory background on the probability of performing above expectations is just slightly positive (0.9%). However, for wider performance deviations, first-generation migratory students have a 21% less probability of performing far above expectations than simply aligning with expectations. Analysis shows that second-generation migrant students are 51% more likely to be far below expectations and are 13% less likely to perform just above expectations. The effect on the probability of performing just below and far above expectations is non-significant.

#### **4.6. Deviating from Statistical Expectations: Attitudinal Variables Examined**

The effects previously described change when taking attitudinal variables into account. Observing the interaction effects between the two blocks of variables in the model allows us to grasp how attitudes and expectations have an effect on the probability and how they mediate (or are mediated by) other variables in the model (*see Table 8*).

The protective and push effects of all factual variables above the individual level of analysis either remain stable or decrease. The change in the coefficients of the territorial variables highlights a reduced distance between the territorial units in the model and the reference category (southern regions) when attitudes are taken into account (e.g., Northern students are a little less protected from negative deviations than students in the South when aspirations and expectations are computed). The same can be observed for what concerns the influence of the track structure. General track and technical track students now see their protection reduced, compared to vocational track students. On the other hand, coefficients for the push effect of the track remain relatively stable. One factual variable whose effects seem to be completely mediated by the attitudinal variables block is the School ESCS



average. While the school context improves its protective influence when attitudes are considered, the push effects provided by the same variable are now close to zero. This result gives us a little proof of the link between expectation and socio-economic status (*see Table 8*).

At an individual level, the coefficients of the migratory background categories are not always significant. When they are, they show that taking expectations into account reduces the positive influence on the probability of performing below expectations, at least for second-generation students. Expectations can change the sign of the coefficients. Second-generation students are now 23% more likely to perform above expectations and 10% more likely to perform far above expectations in comparison with native students (*see Table 9*). For first-generation students, when the *p-value* of the category is less than 0.05, the effect size increases with the introduction of expectations. This translates into a higher probability of scoring below expectations, while the influence on the probability to perform above expectations remains stable. This highlights the relativity of expectations, or the additional difficulties faced by those who aim for the same finish line despite different starting resources. Additionally, the influence of gender on the probability remains stable when expectations are considered (*see Table 8*).

Table 8: Changes in  $\beta$  coefficients of factual variables when accounting for attitudinal variables

	Far below		Below		Above		Far above	
	$\beta_1$	$\beta_2$	$\beta_1$	$\beta_2$	$\beta_1$	$\beta_2$	$\beta_1$	$\beta_2$
Intercept	0.762	0.646	0.549	0.239	0.068	-0.182	-2.172	-2.56
North (vs. South)	-0.982	-0.865	-0.239	-0.146	0.498	0.535	1.101	1.162
Center (vs. South)	-0.312	-0.375	0.113	0.19	0.256	0.29	0.48	0.494
General track (vs. vocational)	-1.838	-1.214	-0.632	-0.268	0.193	0.268	1.559	1.329
Technical track (vs. vocational)	-1.091	-0.934	-0.439	-0.291	-0.039	-0.068	0.833	0.725
School avg. ESCS	-0.426	-0.51	-0.15	-0.232	0.337	0.078	0.45	0.082
School ESCS S.D.	0.792	0.805		0.13	-0.535	-0.716	0.381	0.244
Female vs. male	-0.482	-0.482	-0.119	-0.085	0.078	0.105	0.122	-0.051
2nd generation (mig. background) (vs. native)	0.447	0.346		0.173	-0.103	0.098		0.214
1st generation (mig. background) (vs. native)	1.278	1.535	0.994	1.114	0.092	0.129	-0.148	
Significant for $\alpha < 0.05$								

Source: Authors' elaboration from OECD PISA (2018)

Table 9: 2nd multinomial model (attitudinal variables only)

	Far below		Below		Above		Far above	
	B	Exp( $\beta$ )	B	Exp( $\beta$ )	B	Exp( $\beta$ )	B	Exp( $\beta$ )
Ed. exp. tertiary (vs. lower level)	0.164	1.178	-0.091	0.913	0.187	1.206	0.704	2.023
Fam. exp. tertiary (vs. lower level)	-0.571	0.565	-0.251	0.778	0.094	1.098	0.071	1.073
Attitudes towards education	-0.042	0.959	0.122	1.13	0.056	1.058	-0.089	0.915
Professional expectations	-0.339	0.713	-0.054	0.948	0.079	1.082	0.318	1.375
Significant for $\alpha < 0.01$								

Source: Authors' elaboration from OECD PISA (2018)

The direct influence of attitudinal variables on the probability of deviating from expectations is expressed by the respective  $\beta$  values (see Table 9). Individual educational expectations (the grade level that one expects to complete) seem to have little or no protective effect from the probability to underperform while showing a strong push effect—stronger on the upper tail of score deviation distribution. Analysis shows that aiming to complete tertiary education increases by two times the probability of performing far above expectations and by  $\frac{1}{5}$  the probability of performing above expectations.

What effectively shields from the probability of underperforming is parental educational expectation. Being from a family that expects the student to complete tertiary education cuts in half the student's probability of performing far below expectations and the probability of performing below expectations by  $\frac{1}{4}$ .

This summarizes how individual expectations are more effective than familial pressure in sustaining efforts to overachieve but are also of less use when it comes to avoiding low performances. Parental expectation comes to the rescue in setting the goal of one's educational career, along with the commensurate effort to sustain its reach, even if the demonstrated abilities seem inferior to the need (Gambetta, 1987). Meanwhile, professional expectations have both protective and push effects. These effects are stronger at the tails of the distribution. High professional expectations decrease the probability of performing far below expectations by 38% and increase the probability of performing far above expectations by 37%.

The coefficients for the attitudes towards scholastic institutions are small (only one out of four  $\beta$  values above 0.1) and do not offer themselves to clear interpretation. This suggests that referring to attitudes towards school activ-

ities and the instrumental and general value of education may not be useful in the understanding of performance distribution.

Table 10: 2nd multinomial model (overall)

	Far below		Below		Above		Far above	
	B	Exp( $\beta$ )	B	Exp( $\beta$ )	B	Exp( $\beta$ )	B	Exp( $\beta$ )
Intercept	0.646		0.239		-0.182		-2.56	
North (vs. South)	-0.865	0.421	-0.146	0.864	0.535	1.707	1.162	3.195
Center (vs. South)	-0.375	0.688	0.19	1.209	0.29	1.337	0.494	1.639
General track (vs. vocational)	-1.214	0.297	-0.268	0.765	0.268	1.307	1.329	3.777
Technical track (vs. vocational)	-0.934	0.393	-0.291	0.748	-0.068	0.934	0.725	2.064
School avg. ESCS	-0.51	0.601	-0.232	0.793	0.078	1.081	0.082	1.085
School ESCS S.D.	0.805	2.236	0.13	1.139	-0.716	0.489	0.244	1.277
Female vs. male	-0.482	0.618	-0.085	0.919	0.105	1.11	-0.051	0.95
2nd generation (mig. background) (vs. native)	0.346	1.414	0.173	1.189	0.098	1.103	0.214	1.238
1st generation (mig. background) (vs. native)	1.535	4.643	1.114	3.046	0.129	1.137		
Ed. exp. tertiary (vs. lower level)	0.164	1.178	-0.091	0.913	0.187	1.206	0.704	2.023
Fam. exp. tertiary (vs. lower level)	-0.571	0.565	-0.251	0.778	0.094	1.098	0.071	1.073
Attitudes towards education	-0.042	0.959	0.122	1.13	0.056	1.058	-0.089	0.915
Professional expectations	-0.339	0.713	-0.054	0.948	0.079	1.082	0.318	1.375
significant for $\alpha < 0.05$								
R <sup>2</sup> Nagelkerke = 0.254								

Source: Authors' elaboration from OECD PISA (2018)

## Conclusions

Starting from the DCA approach found in Lazarsfeld and Boudon allowed us to explore the variables that influence the probability of the students deviating from what is expected from their performance based on the ESCS index.

The exclusion of the variance represented by the ESCS highlights the already known effects of structural and sociodemographic elements (factual variables) and the less obvious role of attitudinal elements in determining the distribution of academic performance. We consider this to go beyond the logic of social reproduction. It is already clear that, though the total question of the influence of the ESCS is not solved, the statistical procedure presented is an effort to illuminate other elements that are useful for solving issues related to school inequalities.

The linear and log-linear models were fundamental techniques for understanding the influence of the considered variables on deviation from expected performance and the students' probability of staying in one of the five groups of performers obtained by the division of the relative performance variable into quintiles. The models employed provide some noteworthy results that need to be underlined.

Students who are expected to have similar outcomes, all conditions in the model equal, instead show differentiated performances, in a way that is adherent to their educational and professional expectations (Merton, 1968) (*see Par. 4.3, Par. 4.4 and Par. 4.6*). Further it is shown that the effects of these attitudinal variables seem way more important than every other individual-level factor in the analysis. While surely intertwined (Vergati, 2005), individual and parental educational expectations influence the probability to deviate in different ways (*Par. 4.6*). Students' achievement motivation, i.e., individuals' intense interest in achieving individual success (Giancola & Cannavò, 2018), is critical for overperforming. Meanwhile, parental expectations have almost no effect in that direction; instead, they effectively reduce the probability of underperforming. Combined, these effects suggest that the social distribution of performances is the result of at least two movements influenced by educational expectations. First, high parental educational expectation protects those who are subject to them, pushing their performance at least to the level their ESCS predicts. Second, every step above that is mostly a product of individual expectations.

Net of the statements upon the association between socio-economic status and expectations, the dynamic outlined implies that where family interest is lacking, the student is left without the means to achieve what would be expected of him/her, independently from status. Thus, it is important to emphasize that nurturing students' expectations can provide motivational resources useful for the betterment of one's performance.

It is also critical to remark on how the introduction of attitudinal variables changes the size of effects already in the multinomial model. We refer to the reduction of the protective and push effects of school tracks. The change in migratory background effects is also worth mentioning: at least for second-generation students, the introduction of expectations in the mod-

el reduces the positive effect on the probability of underperforming, and, all conditions and expectations being equal, they are more likely to perform above expectations than native students (*Par 4.6*). These findings are evidence of the non-negligible circular influence of expectations on performance distribution.

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## Appendix

Table 1a: Contingency tables between performance deviation and geographic area

Deviation	Geographic area			Total
	North	Center	South	
Far below	13.2	17.2	28.7	20.0
Below	17.1	22.3	21.9	20.0
Expected	19.0	19.8	21.2	20.0
Above	23.3	21.0	16.0	20.0
Far above	27.4	19.6	12.2	20.0
Total	100.0	100.0	100.0	100.0

*Source: Authors' elaboration from OECD PISA (2018)*

Table 2a: Pearson correlation coefficients of reading test scores by ESCS within Italian regions

	Pearson' R	Common variance (%)	Sign. (two tails)	N
North	0.265	7.0225	0	215150
Center	0.302	9.1204	0	95151
South and islands	0.317	10.0489	0	199313

*Source: Authors' elaboration from OECD PISA (2018)*

Table 3a: Correlation between deviation in reading score, average school ESCS and school ESCS standard deviation

	Pearson's R	Sign. (two tails)	N
Avg. ESCS school	0.41	0	509613.9
S.D. ESCS school	-0.01	0	509613.9
Significant for $\alpha < 0.01$ (two tails)			

*Source: Authors' elaboration from OECD PISA (2018)*



Table 4a: Contingency table between deviation from expected performance and gender (column percentages)

Deviation	Gender		Total
	Female	Male	
Far below	15.2	24.6	20.0
Below	19.4	20.6	20.0
Expected	20.6	19.5	20.0
Above	21.9	18.2	20.0
Far above	23.0	17.1	20.0
Total	100	100	100

Source: Authors' elaboration from OECD PISA (2018)

Table 5a: Contingency table between deviation from expected performance and migratory background (column percentages)

Deviation	Migration background			Total
	Native	2nd Generation	1st Generation	
Far below	18.4	26.6	35.9	19.4
Below	19.9	19.1	27.2	20.0
Expected	20.3	19.0	15.4	20.1
Above	20.7	17.5	13.4	20.2
Far above	20.8	17.8	8.0	20.3
Total	100	100	100	100

Source: Authors' elaboration from OECD PISA (2018)

Table 6a: Correlation between deviation from expected performance in reading score, Student's expected occupational status and Attitude towards school learning activities

	Pearson's R	Sign. (two tails)	N
Student's expected occupational status (SEI)	0.30	0	387484.9
Attitude towards school learning activities (WLE)	0.07	0	487441.7
Significant for $\alpha < 0.01$ (two tails)			

Source: Authors' elaboration from OECD PISA (2018)