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## Education x 3

### UNDERSTANDING LOW ACHIEVEMENT

*The Government has set a series of targets for improved educational attainment in England and Wales, across a range of qualifications. To meet these targets, it is trying to achieve a better understanding of why some pupils achieve poor results, and asked Frontier to use the techniques of economic analysis to help policy-makers arrive at more "evidence-based" conclusions. Only then can they begin to judge whether they are attacking the problem in the most effective way.*

As reconfirmed by the Prime Minister this summer, education remains the Government's "number one" priority. Improvements in educational achievement are sought across the board, with specific targets set for results in national assessment tests (SATs) at ages 7, 11 and 14, and in GCSEs. SATs results are reported for each school in league tables published in the national press. The intention is to give recognition to schools that do well and encourage others to do better. →

There are many initiatives to bring about the desired improvement, including a programme to reduce class sizes, the introduction of national strategies for improving literacy and numeracy, and policies targeted at specific areas of the country, such as "Excellence in Cities". These have been focused on the factors generally believed to hold back pupil achievement. But are these really the critical factors? And are they being tackled in the most effective way?

At the end of 2001, Frontier was asked by the Government to carry out an empirical economic analysis of the factors associated with low achievement at age 11 of individual pupils and schools. Although this initial piece of work had to be done in only two weeks, we found that economic techniques enabled us to identify the key variables relatively quickly, laying the foundations for more in-depth analysis.

### ASK ALL THE QUESTIONS

The first step was to construct a robust framework within which all those factors that might be supposed to influence pupil achievement could be assessed. At age 11, for example, it would seem reasonable to assume achievement might be influenced by:

- personal and family characteristics, such as gender, family background and home environment, family income, ethnic origin and prior attainment;
- school and neighbourhood factors, such as pupil-teacher ratios, the quality of teaching, the achievements of friends (peer effects) and the degree of deprivation in the local environment.

Even this list includes only a few of the possible factors. The first step, for policy-makers, is to arrive at an understanding of the relative importance of each of them. If, for example, parental support is found to have a bigger influence than class size, greater emphasis on policies targeted at parental support may give the Government a bigger "bang for its buck".

So the next step was to build an empirical model to explore the association (or empirical regularities) between the factors described and performance as measured by the SATs for 11-year-olds (Key Stage 2 tests). In particular, we considered Key Stage 2 attainment in mathematics and English.

As a result of the priority that has been given to monitoring pupil achievement and school performance in recent years, the Department for Education and Skills now holds records of the achievement for each individual pupil. These records also show the gender of the pupil and, as the records can be merged with the department's school-level data, for each pupil it is possible to identify some of the characteristics of the school he or she attended, including its location. In the year 2000, approximately 600,000 pupils took Key Stage 2 tests. The DfES has comprehensive data that will allow the relationship between pupil achievement and some of the school and location factors to be analysed for all 600,000.

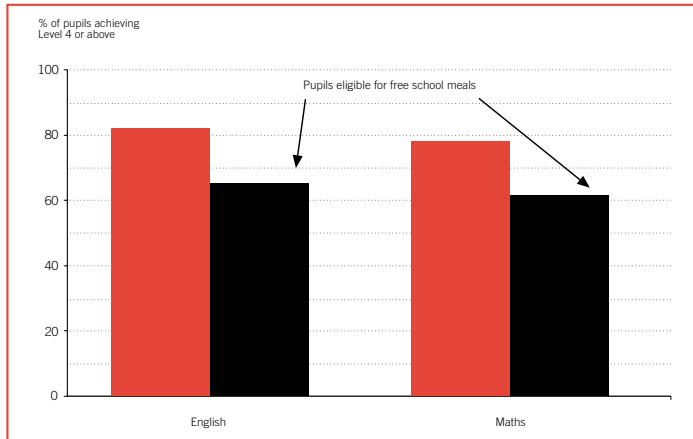
The DfES is conscious that it also needs to know more about the characteristics of individual pupils. In 2001, it collected data for a sample of 56,000 Key Stage 2 pupils, recording – among other things – their age, ethnic origin, eligibility for free school meals (an indicator of family income) and whether they had special educational needs. This data can also be combined with information on the schools they attended and their achievement at Key Stage 2.

These data sets therefore provide information on a number of the factors that might be expected to affect pupil achievement. Moreover, this data is held in a form that enables it to be brought together into a single data set for empirical modelling. A notable exception – at the time – was the data relating to prior attainment. Although this was available from a survey specifically relating to pupil progress, it could not be linked to the pupil level data described above.

### LET THE DATA TELL THE STORY

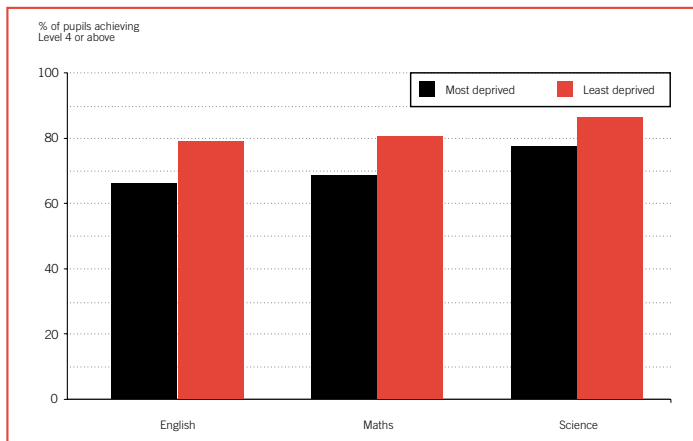
A good starting-point for the analysis of data of any kind is to draw some simple charts; these may quickly reveal some trends in the data and key characteristics.

We found that simply by plotting the data, we could illustrate the extent to which socio-economic factors – associated with both the characteristics of individual pupils and where they went to school – appeared to be important. For example, the chart illustrates the difference in achievement for pupils with and without eligibility for free school meals.



Source: *Pupil level Annual Schools Census (PLASC), DfES, 2001.*

The pattern is stark for both English and mathematics. A lower percentage of pupils who are eligible for free school meals meet the expected level of achievement at Key Stage 2. Looking at locational measures of socio-economic characteristics, the second chart below shows that those local education authorities that are more deprived have lower achievement levels on average.



Source: *Annual Schools Census, DfES, 2000 and DETR's indices of deprivation, 2000.*

This, however, only tells us one side of the story. Many false conclusions have been drawn from such analyses, which ignore all the other factors that might explain such apparent relationships. What we really want to know is the association between these socio-economic characteristics and achievement once all the other factors that could influence achievement have been taken into account – that is, we want to try to isolate the different effects. Regression analysis helps us to achieve this.

In our regression analysis, we examined the relationship between low achievement and pupil characteristics (gender, ethnic origin, free school meals, whether English is the pupil's first language, and whether he or she has special educational needs – that is to say, identified learning difficulties). At the same time we examined a range of school and environmental factors (including the proportion of pupils at school with the above characteristics, and variables such as school size).

Gender was found to be important, to different degrees in the two subjects. At age 11, girls have a significantly higher probability than boys of achieving good results in English. In maths, boys do better, but the difference is slight.

However, this was not as important a factor as the association we observed between achievement and free school meals. In fact, the only factor found to be more strongly associated with achievement was special educational needs. Variables that might be expected to have a larger effect were found to have a very small association with low achievement. These included:

- at a *school level* – pupil-teacher ratios, school size and type; and
- at an *individual level* – ethnicity and having a first language other than English.

In confirmation of our findings, the data showed that at the school level, too, eligibility for free school meals was strongly associated with low achievement. We did not, however, have time to investigate the extent to which this simply reflected the numbers of eligible children within the school, or whether the association was magnified by a "school effect". That is to say, we did not analyse whether pupils who were not themselves eligible for free school meals, but attended a school where a high proportion of children were eligible, also had lower achievement, in terms of the percentage reaching the expected level.

### WHERE NEXT?

This is just one example of the further work that would need to be done to make use of our findings. However, even initial conclusions raise the next question: "What can be done?"

Poor reasoning at this stage can be quite as damaging as in the initial analysis. For example, it would obviously be nonsensical to conclude that the problem could be addressed by cutting back eligibility for free school meals. Its importance is as an indicator of family circumstances, and in particular of family income. Pupils eligible for free school meals usually have parents who are unemployed and/or bringing children up on their own. Eligibility is highly correlated with various measures of deprivation.

What our work may, however, suggest – and this is in line with current educational thinking – is that achievement levels may be raised by targeting help towards specific types of pupil with specific needs. If boys tend to do worse in English than girls, they may require more teaching effort in order that a higher percentage achieves the expected level.

It may, however, also be possible to target a problem at source. The strong association between eligibility for free school meals and low achievement may indicate that tackling deprivation and boosting incomes at the bottom of the distribution would have more effect on low achievement than entirely education-based policies.

Clearly, the empirical analysis needs to be extended to provide more fine-grained information for policy makers. To help the development of targeted policies, identifying groups that are borderline pupils would be informative, as would a further breakdown of the characteristics of pupils in the low achievement groups. However, given the strong association of low achievement with measures indicative of deprivation, it is critical that further research is carried out that focuses on the importance of these factors for educational outcomes.

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