

Jenkins, Stephen P.; Micklewright, John; Schnepf, Sylke Viola

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## Social segregation in secondary schools: how does England compare with other countries?

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Stephen P. Jenkins  
John Micklewright  
Sylke V. Schnepf

January 2006

# **Social Segregation in Secondary Schools: How Does England Compare with Other Countries?**

**Stephen P. Jenkins**

*ISER, University of Essex,  
DIW Berlin and IZA Bonn*

**John Micklewright**

*S3RI, University of Southampton  
and IZA Bonn*

**Sylke V. Schnepf**

*S3RI, University of Southampton  
and IZA Bonn*

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IZA

P.O. Box 7240  
53072 Bonn  
Germany

Phone: +49-228-3894-0  
Fax: +49-228-3894-180  
Email: [iza@iza.org](mailto:iza@iza.org)

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## ABSTRACT

### **Social Segregation in Secondary Schools: How Does England Compare with Other Countries?\***

We provide new evidence about the degree of social segregation in England's secondary schools, employing a cross-national perspective. Analysis is based on data for 27 rich industrialised countries from the 2000 and 2003 rounds of the Programme of International Student Assessment (PISA), using a number of different measures of social background and of segregation, and allowing for sampling variation in the estimates. England is shown to be a middle-ranking country, as is the USA. High segregation countries include Austria, Belgium, Germany and Hungary. Low segregation countries include the four Nordic countries and Scotland. In explaining England's position, we argue that its segregation is mostly accounted for by unevenness in social background in the state school sector. Focusing on this sector, we show that cross-country differences in segregation are associated with the prevalence of selective choice of pupils by schools. Low-segregation countries such as those in the Nordic area and Scotland have negligible selection in schools. High segregation countries like Austria, Germany and Hungary have separate school tracks for academic and vocational schooling and, in each case, over half of this is accounted for by unevenness in social background between the different tracks rather than by differences within each track.

JEL Classification: D39, I21, I39

Keywords: social segregation, secondary schools, England, cross-national comparison, PISA

Corresponding author:

John Micklewright  
Social Statistics  
School of Social Sciences  
University of Southampton  
Highfield  
Southampton SO17 1BJ  
United Kingdom  
Email: [jm4@soton.ac.uk](mailto:jm4@soton.ac.uk)

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## 1. Introduction

Social segregation in schools – the uneven distribution across schools of children from different socio-economic backgrounds – has been much discussed in England in recent years. There has been debate about whether the 1988 Education Reform Act led to greater polarisation in the social composition of schools. Similar concerns have been expressed about the changes proposed in the 2005 White Paper on education (DfES 2005), with its emphasis on greater parental choice and greater independence for schools. Social segregation is of interest for several reasons. If children's performance at school depends on their peers, higher levels of social segregation lead to greater inequality in academic achievement and thence to greater inequality in later-life outcomes. And excessive segregation may threaten present-day social cohesion. In some circumstances, greater social segregation may even reduce average achievement levels.<sup>1</sup>

The extent of segregation in England's secondary schools may be assessed in two ways. Segregation today may be compared with segregation in earlier years (e.g. Gorard 2000, Noden 2000, Goldstein and Noden 2003, Allen and Vignoles 2006). Alternatively, it may be compared with levels elsewhere: does England have a little or a lot of social segregation when compared with other industrialised countries? We take this second route.

We compare the situation in England with that in 24 OECD countries using data from the 2000 and 2003 rounds of the Programme of International Student Assessment (PISA). We also compare England with Scotland and Northern Ireland, the two other countries in the UK that are natural comparators since (unlike Wales) they have educational systems that differ from England's. This analysis points to some intriguing differences that would have been hidden by analysis at the UK level.

Our research significantly extends the analysis by Gorard and Smith (2004), based on the 2000 PISA round. We use data from both the 2003 and 2000 rounds, we consider nearly all OECD countries rather than only the EU-15, and we look at England, Scotland and Northern Ireland separately rather than taken together as the UK. Much of their paper was about segregation other than by social background whereas that aspect is our focus. We also consider other measures of segregation

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<sup>1</sup> The evidence on peer group effects is reviewed by Vignoles *et al.* (2000), and other possible impacts of social segregation are described by Allen and Vignoles (2006).

itself, and we account for sampling variation by calculating standard errors and confidence intervals for our estimates of segregation indices. In addition, we use quantitative decompositions of segregation indices by school type (defined in various ways) to help explain the cross-national patterns observed. In constructing these explanations, we draw on PISA data about the prevalence of choice of schools by parents and of pupils by schools, statistics that are also of interest in their own right.

We show that England is a middle-ranking country, with segregation substantially higher than in Scotland and the Nordic countries, but with less segregation (according to most measures) than Germany and other countries with distinct academic and technical secondary school tracks.

How can one explain the degree of social segregation observed in England, and its position relative to other countries? How is it that children of different social backgrounds are distributed unevenly across a nation's schools? Three factors are likely to be of particular importance:

- Where parents of different social backgrounds live.
- How parents of different social backgrounds choose schools for their children, and of what type, e.g. private versus state.
- How schools choose their pupils, given that factors taken into account in admissions policies, including 'ability', are associated with social background.

PISA data do not allow us to examine the first factor: the only useful geography variable refers to urban versus rural location. But the survey does ask questions that allow us to construct measures of 'parental choice' and 'school choice' from the responses by children and schools.

Our strategy for exploring the drivers of observed social segregation patterns is a sequential one. First, we consider whether England's position can be attributed to the existence of the private school sector. Drawing on decompositions of segregation indices, we argue that England's segregation is driven largely by what happens within the state secondary school sector. The state secondary school sector is therefore the focus of the rest of the paper.

Comparisons of the segregation in England's state school sector with segregation in the state school sector of OECD countries confirm that England is a middle-ranking country in terms of segregation, although somewhat lower down compared to its all-schools ranking. And social segregation in England's state secondary schools is distinctly higher than in Scotland's. In the rest of the paper, we

explore whether PISA data about the prevalence of parental choice of schools, and the prevalence of schools' choice of pupils, help explain England's position relative to other countries.

England is found to have the highest level of parental choice among the OECD countries examined. At the same time, differences in parental choice across countries are not strongly associated with differences in levels of social segregation. In contrast, segregation is generally higher in countries with greater levels of school choice. State secondary school systems that are essentially selective, as in Austria, Germany and Hungary, contrast markedly with England's, which is largely comprehensive. The greater prevalence of school choice provides one explanation for why social segregation is higher in those countries than in England.

## **2. Data and Methods**

### *Data*

PISA collects information about 15 year old children and their schools using a cross-nationally harmonized questionnaire for countries belonging to the OECD. We use data for 27 countries that participated in both the 2000 and 2003 rounds of the PISA survey. See OECD (2001, 2004) for a description of the survey.

In each PISA round, samples of about 100 to 150 schools that are attended by 15 year olds are drawn in each country with probability proportional to school size, followed by selection of 35 of the 15 year olds in each school (or all 15 year olds if fewer than 35 are enrolled) using simple random sampling. Combining data from the two rounds has a major pay-off: sample sizes increase substantially. In the case of England, our pooled sample covers 314 schools and 7,886 children. The pooled samples from the other parts of the UK are smaller: 190 schools and 5,095 children for Scotland and 233 schools and 5,702 children in Northern Ireland. Wales was excluded from the analysis because the number of schools per survey round was too small (fewer than 10). Response rates in England at both school and student level were below the average for other countries in both 2000 and 2003. We investigated the likely impact of this on our results, and conclude that the effect is only minor: see the Appendix.

### *Measures of social background*

A range of family background information is collected from the 15 year olds. We focus on parental occupation. Children are asked for the current or last occupation of each of their parents (or of the adults they spend most time with). From the information about each parent's occupation, the PISA organisers derive the two-digit international index of socio-economic position proposed by Ganzeboom *et al.* (1992). The index captures the attributes of occupations that convert parents' education into income. Our measure of the child's social position is the higher of the two index values if two parents are present, and the index value itself in the single parent case. (More details are provided in the Appendix, which also describes how we deal with missing values.) We then transformed each child's index of social position into a variable with just two values: high and low. This is because we use conventional measures of segregation (see below), and these require a binary classification of social background.

We define high and low social position in each country in terms of the national distribution of social position index values. High refers to having a value above the national median; low refers to having a value equal to or below the median. The percentage of children classified as having a high or low social position is therefore the same in each country. In order to check the sensitivity of our results to the choice of cut-off, we also re-estimate our segregation measures using a number of alternative thresholds of the national distribution: the lower quartile, the upper quartile, and the top decile.

A social background variable based on the education of the child's mother was also used. High values were defined to mean that the mother had completed education to level 5 or above of UNESCO's International Standard Classification of Education, a commonly-used international benchmark, which corresponds to post-secondary tertiary education. The PISA data show that there is considerable cross-national variation in the proportion of mothers with high education: less than 20 percent in some countries, but greater than 40 percent in others. The fractions for England, Scotland and Northern Ireland are 33 percent, 45 percent and 31 percent respectively.



### *Summary indices of segregation*

We use two indices of the unevenness of the distribution of social background across schools: the dissimilarity index,  $D$  (Duncan and Duncan 1955), and the square root index,  $H$  (Hutchens 2001, 2004). The two indices are defined as follows. Let the number of children in school  $i = 1, \dots, S$ , with a low social position be denoted by  $p_i$  and the number of children in school  $i$  with a high social position be denoted by  $r_i$ .  $P$  and  $R$  denote the number of children in the country as a whole with a low and high social position, respectively. Then, the index formulae are:

$$D = \frac{1}{2} \sum_{i=1}^S \left| \frac{p_i}{P} - \frac{r_i}{R} \right|, \text{ and} \quad (1)$$

$$H = \sum_{i=1}^S \left[ \left( \frac{p_i}{P} \right) - \sqrt{\frac{p_i}{P} \cdot \frac{r_i}{R}} \right]. \quad (2)$$

$D$  and  $H$  each range between a minimum of 0 (the complete absence of segregation, in which case every school's proportions of children from different social backgrounds is exactly the same as the national proportions) and a maximum of 1 (when all pupils in each school have the same background). Higher values indicate greater segregation.  $D$  may be interpreted as the fraction of students with low social position that would need to be moved to different schools, without replacing them by other children, in order that every school had the same shares of children with low and high social background in the country as a whole.<sup>2</sup>  $H$  is the sum, over all schools, of each school's shortfall from distributional evenness. For each school, this shortfall is the difference between the geometric mean of the shares of children from different backgrounds were there to be no segregation ( $p_i/P$ ), and the geometric mean of the actual shares.<sup>3</sup>

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<sup>2</sup> Since we calculate  $D$  at the level of the country, and not the individual city or Local Education Authority, no link can be made between our estimates and evaluation of proposals such as, for example, that in the 2005 White Paper to extend the provision of free school transport for low-income children (see DfES 2005, chapter 3).

<sup>3</sup> If there is no segregation, then  $p_i/P = r_i/R$  in every school, and the geometric mean of the shares in school  $i$  in this case is simply  $p_i/P$  or, equivalently,  $r_i/R$ .

$D$  and  $H$  measure unevenness in shares at the school level in different ways. ( $D$  uses absolute differences, whereas in effect  $H$  uses proportionate differences.) Because of this, the two indices may lead to different orderings of countries in terms of their segregation; using both  $D$  and  $H$  enables us to check the robustness of our conclusions to the choice of index.

Although  $D$  is commonly reported, it does not always satisfy a property that is widely agreed to be important for segregation indices, i.e. the ‘transfers principle’. This states that if a student with a low social position moves from a school with a higher share of low-social-position children to a school with a lower share, then overall segregation must fall. See e.g. James and Taeuber (1985). By contrast,  $H$  does satisfy this property (Hutchens 2001, 2004).

More generally,  $H$  is ‘segregation curve consistent’. If the segregation curve for country  $A$  lies entirely above the segregation curve for country  $B$ , then we can say that segregation is lower in the first country according to all segregation indices that, like  $H$ , satisfy the transfers principle and three other desirable properties (organizational invariance, size invariance, and compositional invariance): see James and Taeuber (1985) and Hutchens (1991). To check the robustness of our conclusions, we supplement our calculations of  $D$  and  $H$  with comparisons of segregation curves for England, Scotland and Northern Ireland.

$H$  has the further attraction of being ‘additively decomposable’ by subgroups of schools. ( $D$  is not.) Suppose, for example, that every school can be classified as either a private school or a state school. For each country,  $H$  can be decomposed into two parts, segregation *within* state and private schools, and segregation *between* the state and private school sectors, as follows:

$$H = H_{\text{within}} + H_{\text{between}}, \quad \text{where } H_{\text{within}} = \sum_{g=1}^G w_g H_g \quad (3)$$

The first component of (3),  $H_{\text{within}}$ , is a weighted sum of the segregation within each sector ( $G = 2$  in the example of private and state schools).  $H_g$  is the value of  $H$  calculated using data for all schools in sector  $g$ , which is aggregated using weights ( $w_g$ ) reflecting the ‘importance’ of each sector (the formula for the weights is given by Hutchens 2004). The between-group term,  $H_{\text{between}}$ , shows the amount of segregation that would remain if there were no segregation within each school type. In this case,

the proportions of children with low and high social position within every private school are the same, and the proportions of low and high social position children within every state school are the same, though the proportions may differ between schools of different types.  $H_{\text{between}}$  expressed as a fraction of  $H$ , may be interpreted as the share of total segregation that is attributable (in an accounting sense) to the unevenness associated with differences in social background across school types.<sup>4</sup>

### *Sampling variation and related issues*

Since PISA is a sample survey, any measure of segregation estimated with the data is subject to sampling variation. We estimate standard errors and confidence intervals for  $D$  and  $H$  by applying the bootstrap method with 400 bootstrap replicate samples of schools. In addition, there is an issue that estimates of segregation indices based on sample surveys may be upwardly biased (Ransom 2000). We have investigated this issue, and our results (not reported here) suggest that the number of schools is sufficient to reduce bias to negligible levels, although some upward bias due to the size of the pupil samples may remain.

Our estimates of  $D$  and  $H$  are calculated using the final student weights supplied with the PISA data in order to derive the appropriate estimates of the population values. The weights take into account both the sampling of schools with probability proportional to size and the simple random sampling of students. They also take into account levels of response by both schools and pupils within schools. The same weights are used to derive all descriptive statistics.

### **3. Differences in social segregation across OECD countries**

Estimates of  $D$  and  $H$  for 27 countries, including England, Scotland and Northern Ireland, are shown in Figures 1 and 2. Each country's estimate is represented by a point, and the lines extending either side of each point show the 95 percent confidence interval for the estimate. High social background is defined by whether the parental

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<sup>4</sup> This is not to say that total segregation would fall to  $H_{\text{within}}$  were private schooling to be abolished. If this were to happen, some unevenness in social background would probably be introduced into the state sector as parents of ex-private-school pupils choose schools for their children, for example by moving into catchment areas of schools perceived to be of better quality.

occupation index is above the national median value; low social background is defined by a below-median value.

<Figure 1 near here>

According to the estimates of  $D$ , social segregation is highest for countries such as Austria, Germany and Hungary, each of which has secondary school systems with separate academic and technical school tracks. Among the seven countries with the lowest social segregation are the four Nordic countries: Norway, Sweden, Denmark and Finland. England is in the top half of the distribution, just ahead of Northern Ireland. Scotland is a low segregation country, right at the bottom of the figure. Although the USA is often viewed as a high inequality country – see e.g. Atkinson *et al.* (1995) on income inequality – it does not stand out as a high segregation country. The US estimate of  $D$  is below the median, at around the same level as Canada's.

When we switch to  $H$  as the segregation index, the picture changes little: the patterns in Figure 2 are similar to those in Figure 1. The Pearson correlation coefficient between the estimates of  $D$  and  $H$  is 0.97, and the Spearman rank correlation is 0.96. One notable difference is that, according to  $H$ , segregation in England is slightly larger than in Austria, whereas it is lower according to  $D$ .

<Figure 2 near here>

As a further check on the robustness of results, we compared the segregation curves for England, Scotland and Northern Ireland (see the Appendix for the graphs). We find that the curve for England lies everywhere outside that for Scotland, indicating that England is the more segregated country according to *all* segregation curve consistent indices of segregation, and not only  $H$ .

The confidence intervals around the estimates of the indices are quite wide in many cases (they are smallest for countries with larger than usual sample sizes, e.g. Canada). Reflecting this, the estimate of  $D$  for England is not significantly different from that for Northern Ireland or that for the country with the median value, Portugal. Nevertheless, we can reject the hypothesis at the five percent level that the estimate of  $D$  for England is the same as those for Germany or the USA and – at much more demanding levels of significance – Scotland. England's estimate of  $H$  is significantly greater than the estimate for Northern Ireland (the median country), as well as for the USA and Scotland.

We also examined the robustness of results to the definition of low and high social background. England's level of segregation relative to levels elsewhere could depend on the cut-off in each country's national distribution of parental occupation scores that is used to define high and low social positions. For example, it might be the children from the very top social backgrounds that are particularly segregated in England, whether in private schools or in state schools with very affluent catchment areas. Or, instead, it may be that the very poorest children are highly concentrated in part of the state sector. These aspects would be hidden by using the median value of the index as the cut-off defining high and low social backgrounds, as we did in Figures 1 and 2.

The Appendix gives tables of estimates, for all our countries, of  $D$  and  $H$  with four different thresholds of the parental occupational index, the lower quartile, the median, the upper quartile and the 90<sup>th</sup> percentile. Also reported there are estimates based on whether the mother had a tertiary education or not. For brevity, we report only a summary of these results and for a selection of countries including England. For selected countries, Table 1 shows the average country rank according to  $D$  and to  $H$ , with the average taken across the ranks in the five sets of estimates corresponding to the different social background measures.<sup>5</sup>

<Table 1 near here>

For both  $D$  and  $H$ , England has an average rank that is in the middle of the distribution of estimates for the 27 countries. A switch to the 90<sup>th</sup> percentile does not reveal England as a highly segregated country (England ranks 18<sup>th</sup> on this measure for  $D$  and 17<sup>th</sup> for  $H$ ). In fact, the values of both  $D$  and  $H$  are at their highest for England (in rank terms) when we use the median threshold to define high and low social background. Application of the other thresholds leads to England having lower segregation in relative terms. England's average rank is similar to that of the USA (a country which never appears in the top half of the rankings when using  $D$ ), and it is only when the median is the high/low cut-off that any difference between the two countries is statistically significant.

Northern Ireland appears slightly less segregated than England when we use the bottom quartile or the median to define the high/low cut-off and slightly more

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<sup>5</sup> We also summarized the Appendix tables by calculating the average index value for each country across the five estimates, and then ranking the countries according to the averaged index. The ranking produced is very similar to the one currently reported.

segregated when we use the upper quartile or the 90<sup>th</sup> percentile. However, most of the differences are statistically insignificant. By contrast, Scotland clearly has much lower segregation than England. In only one case – estimates of *D* with the top quartile threshold – is there no statistically significant difference between the estimates for the two countries.

More generally, the classification into high-segregation and low-segregation countries remains robust. Hungary is the most segregated country according to *D* and *H* and for all high/low thresholds – a very clear cut result. (The other two Central European countries in the survey, Poland and the Czech Republic, are usually in the top third of index values.) Germany also has relatively high segregation, regardless of index and threshold used. The Nordic countries continue to be among the countries with the lowest social segregation.

#### **4. The role of private schooling**

The expansion of choice of school that is made available to parents by a well-developed private sector is clearly one possible driver for England's social segregation in schools. To send children to private schools, parents need to be able to afford the fees and, also, many private schools have admission criteria based on academic ability (and academic ability is related to social background).

The first issue to resolve is the size of the private sector in England's secondary school system, and how the size compares with that for other countries. PISA estimates are given in Table 2. (For brevity, statistics are shown for only a selection of countries and for the OECD average.) Two definitions of a 'private' school are used. The first relates to the nature of the school's management, in which case private schools are those where the principal indicated that the school was managed directly or indirectly by a non-government organisation (rather than a public education authority, government agency or a governing body appointed by government or elected by public franchise). The second definition relates to funding. We define a school as private on this basis if the principal reported that more than 20 percent of total funding for the school in a typical year comes from 'student fees or school charges paid by parents'.

<Table 2 near here>

According to our PISA data, less than 10 percent of 15 year olds in England attend private schools (on either definition), which is slightly higher than the median value: seven percent on the management definition of a private school and eight percent on the funding definition. As it happens, the private sector is smaller in England than that in many other countries, although it is notably larger than in Scotland and Northern Ireland. France and Ireland are examples of countries with large numbers of 15 year olds in private schools. In the case of Ireland, the figure is high only on the management basis, whereas in France it is higher on the funding basis.

England's private schools are, in general, more exclusive than those in other countries. Table 3 contrasts, for a selection of countries, the percentage of 15 year olds with a high social background in private schools, defined on the management basis, with the corresponding percentage in state schools. Two definitions of 'high' are used: above the national median and above the national upper quartile. One half of all pupils at private schools in England are in the top quarter of the distribution of social position: the difference of nearly 30 percentage points from the figure for pupils in state schools much larger than the OECD average. In Scotland, the difference is slightly bigger again. Changing the high/low cut-off to the median produces even larger differences between children in private and state schools. (The situation in England and Scotland relative to other countries in part reflects the fact that privately managed English and Scots schools are invariably privately funded as well, whereas this is not the case with many privately managed schools in a number of other countries.)

<Table 3 near here>

Table 3 also underlines that many children in English private schools do not come from families with the highest social background. One half of the 15 year olds in private schools are not in the top quarter of the distribution of parental occupations. A fifth are not even in the top half (and only a quarter are in the top 10 percent, a figure not shown in the table).

This fact, coupled with the relatively small size of the private school sector in England, means that little of the social segregation in English secondary schools can be attributed to the existence of private schooling. We can demonstrate this more formally by decomposing the Hutchens index,  $H$ , into between- and within-group elements, as described in Section 2, where schools are classified into two groups

according to whether they are privately-managed schools or state schools.<sup>6</sup> The estimates are derived for the countries used in Tables 2 and 3, with the exception of Northern Ireland, where virtually no 15 year olds are in private schools, and Sweden. High and low social position are defined using the national median cut-off (as in Figures 1 and 2).

The estimate of  $H$  for each country as a whole is shown in the first column of Table 4. The next two columns give the estimates for the private and state school sectors (the  $H_g$  in equation 3). The weighted sum of the segregation in each sector, in the fourth column, is  $H_{\text{within}}$ . The final two columns show within- and between-group segregation as percentages of total segregation.

<Table 4 near here>

The spread of children from different backgrounds who do go to private schools is far from even: there is significant segregation within the private sector. The value of  $H_{\text{private}}$  for England is the highest in the table, but the cross-national differences should be treated with caution. The number of private schools in the samples for most countries, including England, is low and hence the estimates of  $H_{\text{private}}$  are subject to large sampling variation. (This is much less true of the figures for the private sector in Table 3, where it is the much larger sample sizes of pupils that is relevant.) The value of  $H$  for the state sector in England is not much smaller than for the country as a whole (the two estimates are even closer in other countries). This is because  $H_{\text{state}}$  drives the total within group value given in the next column (the weight for the state sector, not shown, is over 0.9), and because the within-group share is much more important than the between-group share, as shown by the last two columns.

The share of total segregation that is accounted for by school type is shown in the final column of Table 4. The value for England and Scotland, nearly 20 percent, is high by comparison with other countries, including those not shown in the table. For example, it is equalled, or exceeded, only in Spain (23 percent), and in Greece (19 percent). Ireland and Switzerland are the only other countries with a between group share of 10 percent or more. The USA is one of 11 countries with a figure of two percent or less. In this sense, the existence of the private sector contributes to social

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<sup>6</sup> In fact, the within-group value is a weighted sum of the values for three groups of schools rather than two: private schools, state schools, and a small group of schools for which information on private-state status is missing. Excluding the schools with missing data on status from the calculations, and using just two groups, made a negligible difference to the results.



segregation in England and Scotland much more than in most other countries. Nonetheless, and as in other countries, the overall level of segregation is accounted for much more by an uneven spread of social backgrounds across schools within the state sector.

## 5. Segregation within the state sector

How does England look, from a cross-national perspective, when we concentrate on segregation in the state sector only, excluding private schools? ('Private' is defined on a management basis.) Estimates of  $D$  and  $H$  for state schools are shown in Figures 3 and 4, with the high/low social position cut-off again being the national median (among all children and not just those in state schools). The values of  $H$  reported for England and the other countries concerned are the same as the  $H_{\text{state}}$  values in Table 4. There are wide confidence intervals for some countries, e.g. Belgium and Ireland and, especially, the Netherlands. This reflects the fact that there is a relatively large private sector in these countries, so that the sample size of state sector schools is correspondingly smaller.

England's place in the rankings in these graphs is lower than when all schools were considered (Figures 1 and 2). (The move down the ranking is to be expected given the differences in  $H_{\text{between}}$  shown earlier.) According to  $D$ , England is just below the median country, Switzerland, and according to  $H$ , not far above the median country, Northern Ireland (with a value that is insignificantly different). And, according to estimates based on the five different thresholds (as in Table 1), England's average rank falls to 16.6 on  $D$  and 16.8 on  $H$  (from 14.0 and 13.8 respectively).

Despite these changes, it remains the case that England's segregation is bounded above by the values for high-segregation countries such as Hungary and Germany, and bounded below by the values for the low-segregation countries such as the Nordic countries and Scotland.

### *Choice of schools by parents, and choice of pupils by schools*

The current debate on social segregation in England's state secondary schools revolves around the issue of choice, both of schools by parents and of pupils by schools. The subtitle of the 2005 White Paper (DfES 2005), 'More choice for parents and pupils', emphasises the former. But much of the concern expressed about the possible impact of the proposed changes on segregation relates to the latter – that by gaining more control over their admissions, schools will be able to become more selective, a concern that the government states is unfounded.<sup>7</sup> The question arises as to the extent of choice currently exercised by parents and schools in England, how this compares with that in other countries, and whether the differences help explain the cross-national pattern of social segregation.

PISA collects information from schools about their admissions practices. School principals are asked how much consideration is given to a range of factors relating to admissions. Table 5 shows, for selected countries, the percentage of children in schools where the principal reports that at least some consideration is given to a child's academic ability and/or the recommendation of feeder schools.<sup>8</sup> We label this 'school choice'.

The survey also collects information from the children on why they attend their current school. Table 5 shows the percentage of pupils who said that this is because the school 'is known to be a better school than others in the area'. We label this 'parental choice'.

Neither variable is a perfect measure of choice. For example, there are aspects of choice made by both schools and parents that are not covered by these measures, including where to live in the case of the parents. The table refers to 2003 data only for parental choice because the relevant question was not asked in the 2000 round.

<Table 5 near here>

The prevalence of parental choice for England and Northern Ireland – 52 percent – is greater than in any other country, including those not shown in the table. Scotland is also above the OECD average. It is conceivable that 15 year olds in the

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<sup>7</sup> The White Paper (DfES 2005) proposes that many schools become their own 'admissions authorities', a function that has until now been performed by LEAs. However, schools would still have to have regard to the *School Admissions Code of Practice*, issued by the Department for Education and Skills (DfES 2003), which describes permitted practices.

<sup>8</sup> These two factors are asked about separately but we have combined them into a single category.

UK are more attuned to the debate on choice of schools and therefore are more aware of their parents' decisions than 15 year olds in other countries. But there is no reason to believe that this is the most important explanation for the striking cross-national differences. The relatively high prevalence of parental choice in England corresponds with figures for a different measure found in different data. According to the Pupil Level Annual School Census, the percentage of children in all English secondary schools who do not attend their nearest school is 55 percent (Burgess *et al.* 2004).

Not surprisingly, parental choice is more prevalent in large urban areas where there are more schools within easy travelling distance. In England, 60 percent of 15 year olds in cities (population 100,000+) say that they attend a school that is known to be better than others in the area, compared to 50 percent of children in large towns (population 15,000 to 100,000) and 45 percent in rural areas (population of town or village less than 15,000). And, in rural areas, more children report attending their school because it is 'the local school for students who live in this area': 74 percent, compared to 62 percent in large towns and 52 percent in the cities.<sup>9</sup> This pattern is consistent with the somewhat lower levels of segregation in schools in rural areas that we find when we decompose  $H$  by urban versus rural location. Parental choice is also somewhat more common in England for children with more educated mothers: its prevalence is 59 percent among children with mothers with tertiary education and 50 percent for other children.

By contrast with parental choice, the prevalence of school choice is low in England by OECD standards. Just over a quarter of 15 year olds in England are in schools where the principal reports any selection as defined above compared to more than one half in the OECD on average. The prevalence of school choice is also low in Scotland.

The prevalence of school choice in state schools in England may seem surprisingly high for a country with a state school system that is primarily comprehensive, with small residual amounts of selective grammar schooling. However, even comprehensive schools have some discretion to select on ability under the School Admissions Code that governs admissions policies in the state sector (DfES 2003). Schools that specialise in particular subject areas (including languages, arts, sport, and design and technology) are permitted to select up to 10 percent of their

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<sup>9</sup> As these figures imply, some children report attending their school both because it is the local school for the area and because it is known to be better than other schools in the area.

pupils on aptitude for the subject concerned. And some schools operate an admissions policy involving ‘fair banding’ by ability: selection of applicants in strict proportion to their numbers in each of a number of bands across the ability range. The principals of these schools would presumably report to PISA that they use ability as an admissions criterion, but this form of selection should not lead to an increase in social segregation. Put another way, the measure of school choice may not capture well the diversity of dimensions of school choice that now exist in England.

### *Segregation, parental choice, and school choice*

Does cross-national variation in school choice and in parental choice help explain differences in segregation and hence England’s place in the rankings? (Clearly it cannot explain all of the differences as segregation in England and Northern Ireland are at about same level, but school choice is distinctly more prevalent in the latter.) We investigate this first by plotting the values of  $H$  for the state sector in each country against the prevalence of school and parental choice in state schools: see Figures 5 and 6. The scatterplots suggest that school choice is an important factor: higher levels of segregation in state secondary schools *are* associated with higher prevalences of school choice. The correlation between the two is 0.58. (This rises to 0.72 if the outlier with a very high school choice prevalence and low segregation, Japan, is excluded.) A greater prevalence of parental choice may also be related to higher segregation, but this is not apparent from Figure 6. This shows no association, and the correlation is only 0.12. (The association is no stronger if we control for the level of school choice in each country.) We focus on aspects of school choice from now on.

The next step in the analysis was to decompose  $H$  by school types distinguishing between schools according to whether they choose pupils or not (according to our definition). It turns out that virtually all of the state sector segregation in England is *within* the two groups of school, those that choose and those that do not, and that the level of segregation in each sector is similar.<sup>10</sup> That is,  $H_{\text{between}}$  is only a small fraction of total  $H$ . (This was true for some other countries as well.) Indeed the social position of 15 year olds in state secondary schools in England that do choose pupils according to our definition differs very little on average from

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<sup>10</sup> This does not mean that social segregation at the level of the LEA is no higher in those LEAs that still operate a grammar school system. On this subject, see Burgess *et al.* (2004).

that of children in other state schools. (High social position is taken here as being above the national median.)

Our resolution of the apparent contradiction between the scatterplot in Figure 6 and the decomposition analysis concerns the suitability of the PISA-based definition of school choice. Although the school choice variable is harmonized on a cross-national basis (by construction), this aspect is also its Achilles heel: the variable may not distinguish important country-specific aspects of school choice and the school system itself.<sup>11</sup> We elaborate this argument by first contrasting England and Northern Ireland (both middle-ranking countries in terms of social segregation, broadly speaking), and then contrast the high- and low-segregation countries.

The secondary school systems in England and Northern Ireland differ. In the latter case, there are a substantial number of state grammar schools that select explicitly on academic ability. School choice according to our definition is common in Northern Ireland and above the OECD average, and there are large differences in social position between children in schools exercising choice and those that do not. Where there is no school choice, 38 percent of pupils have a social position above the national median cut-off compared with 56 percent of pupils in schools that do choose, and 64 percent if the definition of school choice is restricted to selecting on academic ability alone, excluding feeder school recommendation. Decomposition of  $H$  for Northern Ireland yields a between-group share of 16 percent if school choice is defined as including feeder school recommendations, and 37 percent if those recommendations are excluded from the definition.

Hence the existence of school choice does seem to explain a significant part of the social segregation in Northern Ireland's state secondary schools. The PISA variable does encapsulate the key dimensions of school choice that characterize the Northern Irish system. But the same measure does not encapsulate the various dimensions of school choice in England that were described earlier and, correspondingly, the measure's power to account for the level of social segregation is weaker.

Now consider the high-segregation countries. For several of these, PISA provides another measure of how pupils are placed in secondary schools, one that is intimately related to the nature of the national school system. In particular, Austria,

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<sup>11</sup> It is possible that the PISA-based measure of parental choice is subject to similar limitations. For example, we have not been able to consider the impact of the decision on where to live.

Germany and Hungary have distinct academic and vocational secondary school tracks that are intended to cater for children with different types and levels of ‘ability’. The average social position of children differs markedly between the various types of schools. Decomposition of  $H$  by school track leads to between-group shares of total segregation of between 55 and 60 percent in all three countries (high social position is defined as above the national median of the parental occupation index). Most segregation would remain even if children of different social positions were evenly distributed within each school track. The bulk of segregation in these countries stems from the existence of the different school types with their different admissions policies.<sup>12</sup> By contrast, low-segregation countries such as the Nordic ones and Scotland may be characterized as having secondary school systems without selection related to academic ability.

## 6. Summary and conclusions

Our comparisons of social segregation in England’s secondary schools with that in other industrialised countries may be summarised as follows:

- England is a middle-ranking country in OECD terms. Making allowance for sampling variation, and for the fact that England’s position varies somewhat with choice of segregation index and with the measure of social position, the safest conclusion is that it comes near the middle of the distribution of social segregation found in OECD countries.
- High-segregation countries include Austria, Belgium, Germany, and Hungary. Hungary stands out as having the highest level of segregation, whatever our choice of index or social position.
- Low-segregation countries include the Nordic countries of Denmark, Finland, Norway and Sweden. They also include Scotland. We are able to reject almost always the hypothesis that social segregation is the same in Scotland and England.

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<sup>12</sup> We define school type in these decompositions to have seven categories in Germany, seven in Austria and four in Hungary. The three most important school tracks (in terms of numbers of 15 year olds in the PISA samples) are Gymnasium, Realschule and Hauptschule in Germany, Gymnasium, vocational and high vocational in Austria, and grammar, vocational secondary and vocational in Hungary.

- The USA occupies a position in the country rankings that is similar to that of England – towards the middle of the distribution.
- England’s segregation is not largely driven by the existence of private schools. Most segregation in England is accounted for by the uneven spread of children from different social backgrounds within the state sector.
- The prevalence of parental choice of school is high in the state sector in England from a cross-national perspective, and the prevalence of school choice is low, according to PISA-based measures of choice. Higher levels of segregation are found in countries with a higher prevalence of school choice. The same is not true for parental choice.
- Several countries with separate school tracks for academic and vocational schooling – Austria, Germany and Hungary – have relatively high social segregation, and over half of this is accounted for by unevenness in social background between the separate school tracks.

When interpreting these findings, it should be remembered that we calculate levels of segregation for whole countries, not for specific districts or cities within each country. Hence, for example the finding that social segregation in England is similar to that the USA means that, taking each country *as a whole*, the distribution of children from different social backgrounds across secondary schools is similar in the two countries. We were unable to investigate whether individual cities in the USA have lower or higher levels of segregation than individual English cities, because the numbers of schools and pupils are too small in the PISA surveys at this level of analysis.

Whether a country-level or city-level analysis is undertaken is also likely to affect the conclusions drawn about the underlying drivers of segregation. For example, we noted in the Introduction that social segregation in a country may reflect three factors: where families with different socio-economic characteristics live, parents’ choice of schools given where they live, and schools’ choice of pupils, i.e. their admissions policies. The first of these factors is likely to play a smaller role in studies of segregation in specific districts or cities because, in that case, segregation is measured conditional on the district or city in which parents live.

Our analysis provides international perspectives that help benchmark for levels of social segregation in contemporary England. The research suggests that

greater selectivity in admissions by schools – which the current UK government promises will not happen – would be likely to increase social segregation, especially if this were coupled with any move towards separate academic and vocational school tracks.

Our research also provides benchmarks for the levels of parental and school choice in England, and these can be monitored using data from future rounds of the PISA survey. At the same time, the investigation of the underlying causes of cross-national differences in social segregation in schools has underlined the importance of having measures of school and parental choice that appropriately summarize particular country-specific features of a national education system.

## References

- Allen, R. & Vignoles, A. (2006 forthcoming) A critique of research on measuring social segregation in schools 1989 to 2004, Working paper, February 2006 (London, Institute of Education).
- Atkinson, A.B., Rainwater, L., & Smeeding, T.M. (1995) *Income distribution in OECD countries: evidence from the Luxembourg Income Study* (Paris, OECD).
- Burgess, S., McConnell, B., Propper, C., & Wilson, D. (2004) Sorting and choice in English secondary schools, CMPO Working Paper 04/111, October 2004 (University of Bristol, Centre for Market and Public Organisation).
- Department for Education and Skills (DfES) (2003) *School admissions code of practice*, DfES/0031/2003, February 2003 (London, DfES). Available at <http://www.dfes.gov.uk/sacode>
- Department for Education and Skills (DfES) (2005) *Higher standards, better schools for all. More choice for parents and pupils*, Cm 6677, October 2005 (Norwich, HMSO). Available at <http://www.dfes.gov.uk/publications/schoolswhitepaper>.
- Duncan, O. & Duncan, B. (1955) A methodological analysis of segregation indexes, *American Sociological Review*, 20, 210–217.
- Ganzeboom, H., De Graaf, P. & Treiman, D.J., with De Leeuw, J. (1992) A standard international socio-economic index of occupational status, *Social Science Research*, 21, 1–56.



- Goldstein, H. & Noden, P. (2003) Modelling social segregation, *Oxford Review of Education*, 29, 225–237.
- Gorard, S. (2000) *Education and social justice* (Cardiff, University of Wales Press).
- Gorard, S. & Smith, E. (2004) An international comparison of equity in education systems, *Comparative Education*, 40, 15–28.
- Hutchens, R.M. (1991) Segregation curves, Lorenz curves, and inequality in the distribution of people across occupations, *Mathematical Social Sciences*, 21, 31–51.
- Hutchens, R.M. (2001) Numerical measures of segregation: desirable properties and their implications, *Mathematical Social Sciences*, 42, 13–29.
- Hutchens, R. (2004) One measure of segregation, *International Economic Review*, 45, 555–578.
- James D.R. & Taeuber K.E. (1985) Measures of segregation, *Sociological Methodology*, 15, 1–32.
- Noden, P. (2000) Rediscovering the impact of marketisation: dimensions of social segregation in England's secondary schools, *British Journal of Sociology of Education*, 21, 371–390.
- OECD (2001) *Knowledge and skills for life – first results from PISA 2000* (Paris, OECD).
- OECD (2004) *Learning for tomorrow's world – first results from PISA 2003* (Paris, OECD).
- Ransom, M. (2000) Sampling distributions of segregation indexes, *Sociological Methods and Research*, 28, 454–475.
- Vignoles, A., Levacic, R., Walker J., Machin, S. & Reynolds, D. (2000) The relationship between resource allocation and pupil attainment: a review, Discussion Paper 2, November 2000 (London School of Economics Centre for the Economics of Education).

Table 1  
Average country rank on *D* and *H* for five measures of social background,  
selected OECD countries

	Dissimilarity ( <i>D</i> )	Hutchens ( <i>H</i> )
England	14.0	13.8
Scotland	24.6	24.8
Northern Ireland	12.4	15.6
USA	16.6	13.6
Norway	25.8	23.8
Finland	21.4	22.8
Germany	5.0	4.6
Hungary	1.0	1.0

Note: four of the social background measures are based on the parental Ganzeboom occupational index, but use different cut-offs to define high and low social position: the lower quartile, median, upper quartile, and top decile of the national distribution. The fifth measure defines high social background to be if the child's mother had tertiary education.

Table 2  
Percentage of all 15 year old pupils attending private schools,  
selected OECD countries

	Definition of 'private' school	
	Management (%)	Funding (%)
England	8	9
Scotland	4	4
Northern Ireland	1	2
Ireland	61	8
France	22	36
Germany	6	2
Sweden	4	0
USA	6	9
OECD median	7	8

Note. Schools are defined as private on the funding criterion if more than 20 percent of their income comes from fees. The OECD median is calculated by counting England, Scotland and Northern Ireland as separate countries. Data for France refer to 2000 only. The percentages in each column are calculated after excluding pupils in schools for which information is missing on the variable concerned.

Table 3  
Percentage of pupils with high social background in selected OECD countries:  
state schools versus privately managed schools

	High/low cut-off = median			High/low cut-off = upper quartile		
	Private (%)	State (%)	Difference (%)	Private (%)	State (%)	Difference (% points)
England	79	40	39	51	22	29
Scotland	81	42	39	57	21	36
Northern Ireland	57	50	7	25	24	1
France	47	48	-1	25	24	1
Germany	74	48	26	46	24	22
Ireland	54	38	16	30	18	12
Sweden	58	44	14	29	20	9
USA	59	48	11	33	21	12
OECD average	61	44	17	35	22	12

Note: the lumpy nature of the national distributions of the parental occupation index means that in some cases a country has 50 percent or more of both private and state sector pupils above the median (e.g. Northern Ireland). See the Appendix. The OECD average is calculated by counting England, Scotland and Northern Ireland as separate countries. Data for France refer to 2000 only.

Table 4  
Segregation within and between the private and state school sectors,  
selected OECD countries

	All schools $H$	Private schools $H_{\text{private}}$	State schools $H_{\text{state}}$	Within groups $H_{\text{within}}$	Within groups $H_{\text{within}}$ (as % of $H$ )	Between groups $H_{\text{between}}$ (as % of $H$ )
England	0.126	0.194	0.098	0.100	80.5	19.5
Scotland	0.068	0.035	0.057	0.055	81.0	19.0
Ireland	0.078	0.062	0.072	0.065	83.9	16.1
France	0.105	0.120	0.100	0.105	99.5	0.5
Germany	0.129	0.046	0.128	0.120	93.2	6.8
USA	0.095	0.084	0.087	0.094	98.7	1.3

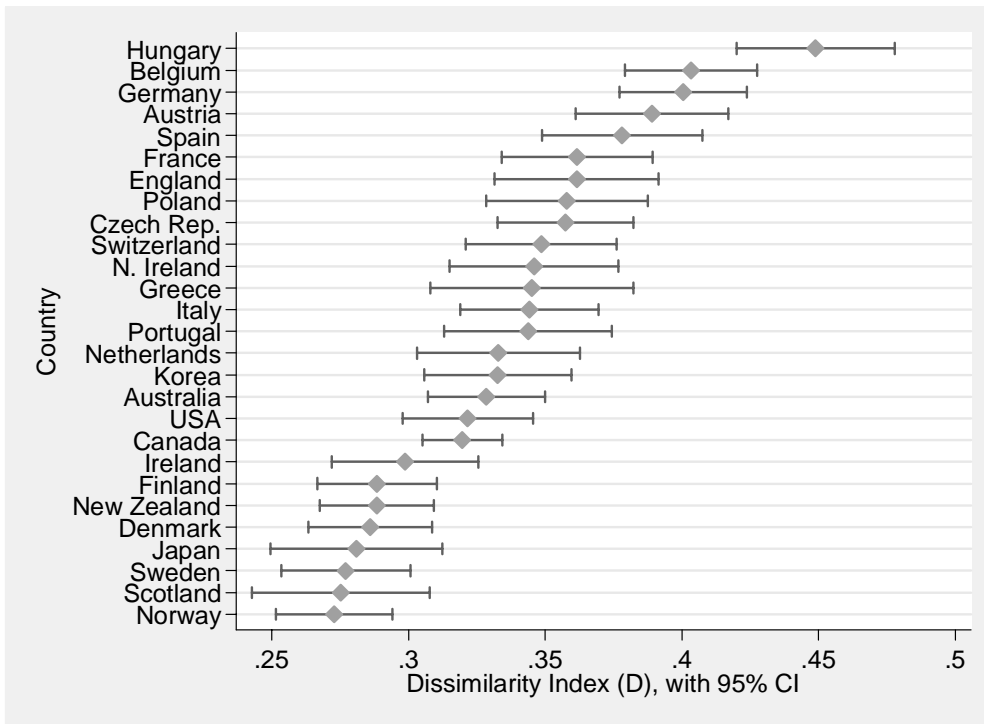
Note: decomposition of  $H$  based on eqn. (3). High (low) family background is defined by whether the parental occupation index value is above (below) the national median. Data for France refer to 2000 only. The private school samples for Northern Ireland and Sweden are too small to undertake decomposition analyses. Schools for which information is missing on school management are included as a third group but the value of  $H$  is not reported for them.

Table 5  
Parental choice and school choice in state schools,  
selected OECD countries

	Parental choice (% of children in a school 'known to be a better school than others in the area')	School choice (% of children in schools with selection on ability or feeder school recommendation)
England	52	28
Northern Ireland	52	63
Ireland	40	41
Scotland	36	22
Germany	24	75
Sweden	11	24
USA	–	47
OECD average.	25	56

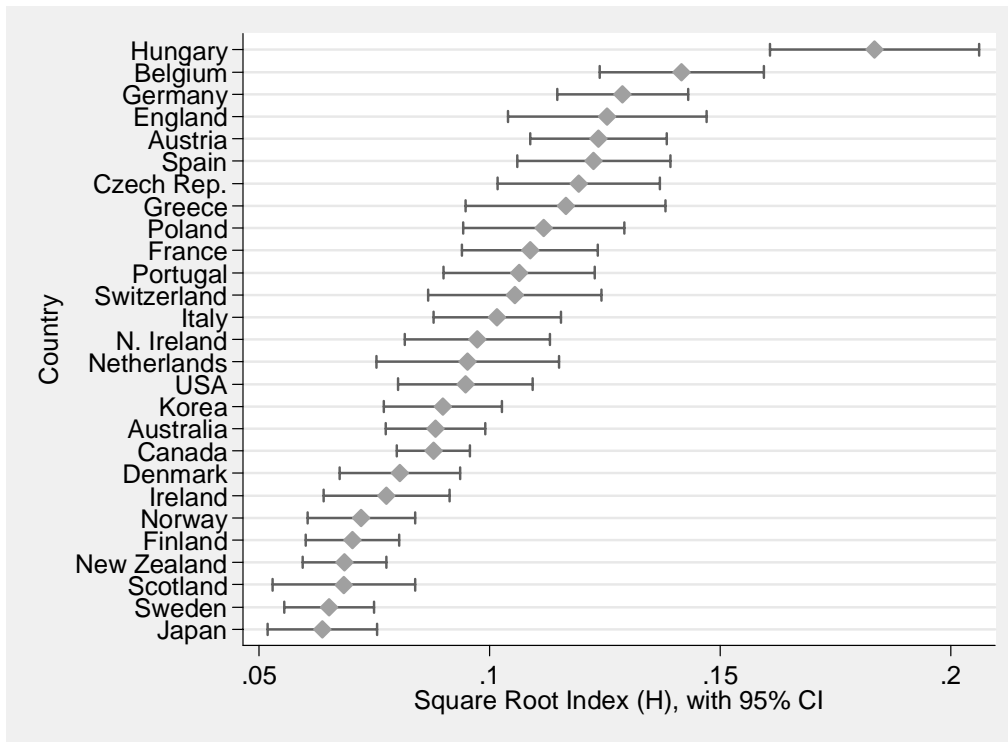
Note: Information on parental choice refers to 2003 only and is missing for the USA is missing altogether. The percentages in each column are calculated after excluding children for whom information is missing on the variable concerned.

Figure 1  
 Social segregation in schools, 27 countries, Dissimilarity index ( $D$ )



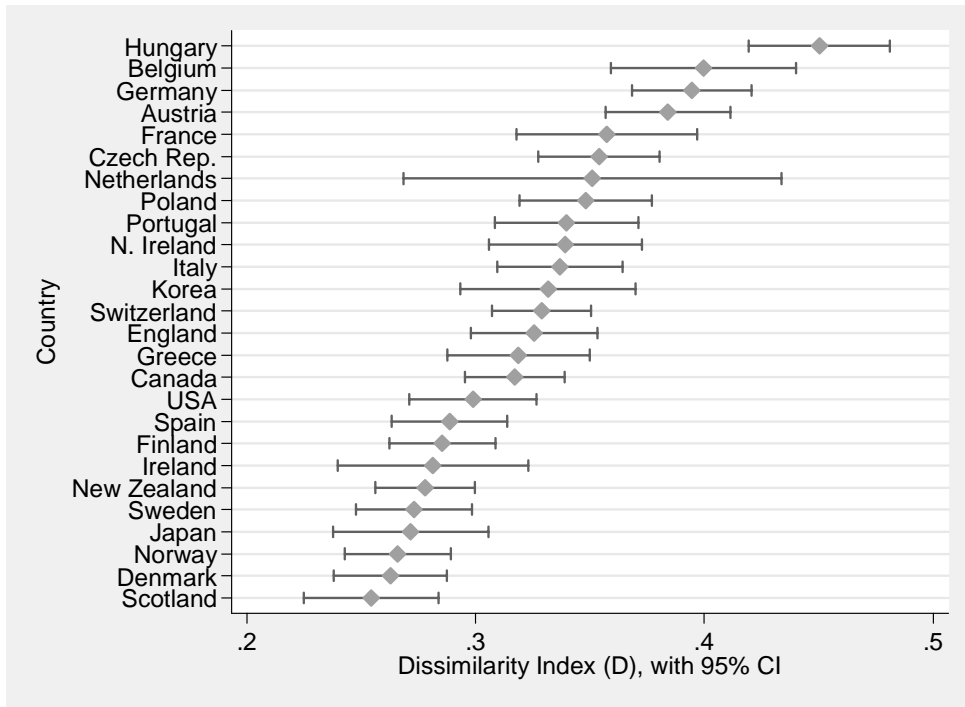
Note: high (low) family background defined by whether the parental occupation index value is above (below) the national median. The horizontal lines show 95 percent confidence intervals. Data for Japan refer to 2003 only.

Figure 2  
 Social segregation in schools, 27 countries, Hutchens index ( $H$ )



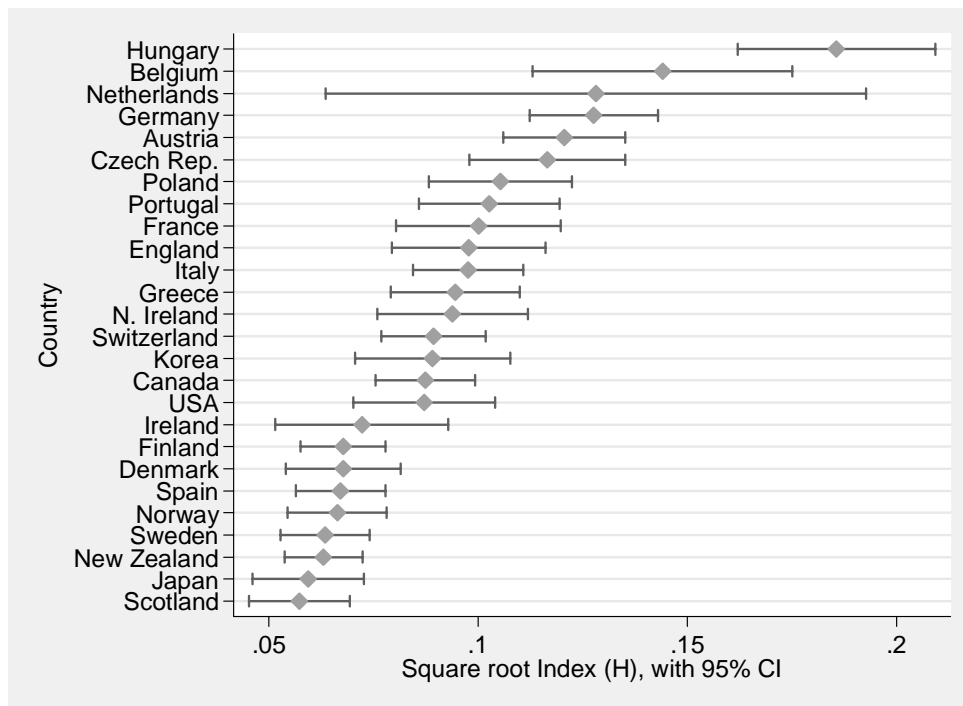
Note: high (low) family background defined by whether the parental occupation index value is above (below) the national median. The horizontal lines show 95 percent confidence intervals. Data for Japan refer to 2003 only.

Figure 3  
 Social segregation in state schools, 27 countries, Dissimilarity Index ( $D$ )



Note: high (low) family background defined by whether the parental occupation index value is above (below) the national median. The horizontal lines show 95 percent confidence intervals. For Canada, information about state/private status is only available for 2003, for France only for 2000, and no information is available for Australia.

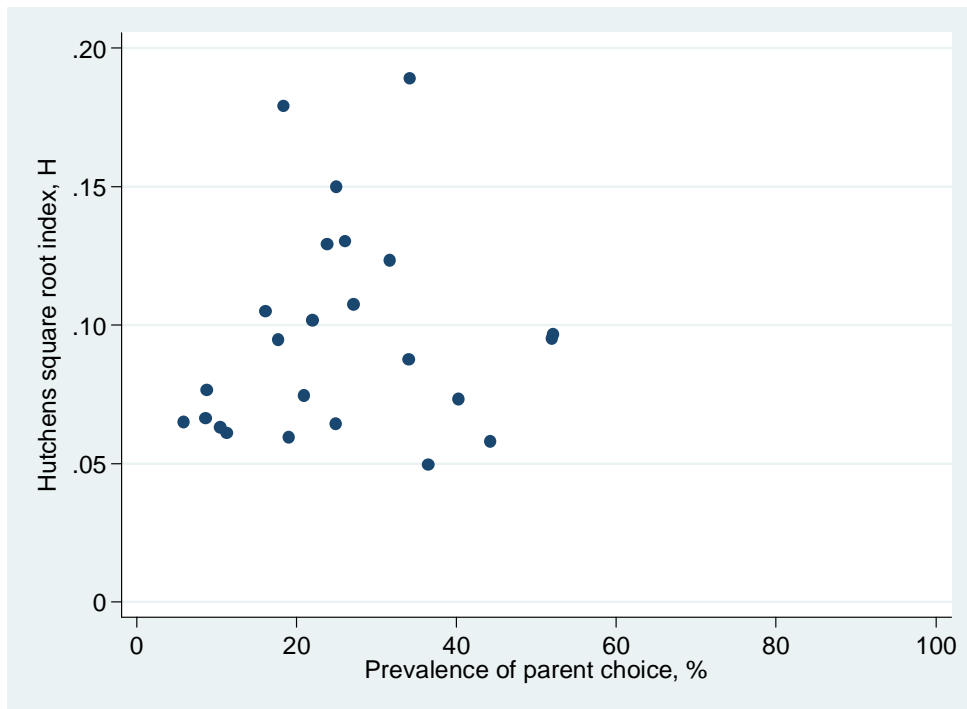
Figure 4  
 Social segregation in state schools, 27 countries, Hutchens index ( $H$ )



Note: high (low) family background defined by whether the parental occupation index value is above (below) the national median. The horizontal lines show 95 percent confidence intervals. For Canada, information about state/private status is only available for 2003, for France only for 2000, and no information is available for Australia.

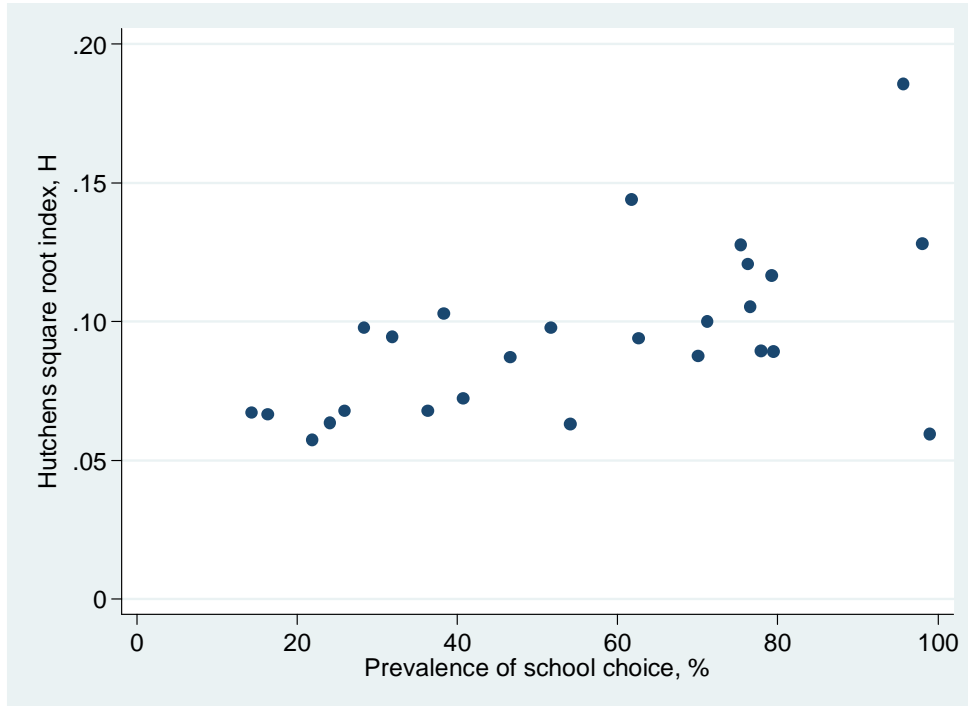


Figure 5  
Hutchens index ( $H$ ) in state schools and prevalence of parental choice (%),  
24 countries



Note: high (low) family background defined by whether the parental occupation index value is above (below) the national median. Parental choice is defined as in Table 5.

Figure 6  
Hutchens index ( $H$ ) in state schools and prevalence of school choice (%),  
26 countries



Note: high (low) family background defined by whether the parental occupation index value is above (below) the national median. School choice is defined as in Table 5.

**Appendix to**  
**‘Social segregation in secondary schools:**  
**How does England compare with other countries?’**  
**By Stephen P. Jenkins, John Micklewright and Sylke V. Schnepf**

*Response to PISA in England*

Response to PISA in England fell short of the OECD average in both the 2000 and 2003 rounds. Response rates in England were 82 percent for schools and 81 percent for pupils in 2000 and 78 percent and 77 percent respectively in 2003. This compares with OECD averages of 92 percent for schools and 90 percent for pupils in 2000 and 95 percent and 90 percent in 2003. The first OECD report on PISA 2003 (OECD, 2004, *Learning for tomorrow’s world – first results from PISA 2003*, Paris, OECD) did not include results for the UK because of the extent of non-response in England and concern over possible biases that could result from this.

The weights provided in the database for England take account of differences in school response by average level of academic achievement in the school as measured by GCSE results. The weights also take account of the level of response among pupils in each school. We apply these weights in our analysis. We have also investigated the sensitivity of our results to use of weights that in addition allow for differences in pupil response by GCSE score and other individual characteristics. This draws on logistic regression analyses of the probability of pupil response in 2000 and 2003 that exploits information about PISA respondents and non-respondents that is held in the Department for Education and Skills’ National Pupil Database (Micklewright, J. & Schnepf, S.V., 2006, *Response Bias in England in PISA 2000 and 2003*, Report prepared for the Department for Education and Skills, forthcoming). Use of these weights slightly increases our estimates of social segregation in England, typically moving England up by one place in the rankings of the 27 countries (i.e. towards the higher segregation countries).

*Index of Socio-Economic Status*

There are missing values of our index for the child’s social position (i.e no value coded for either parent) in every country. Over 60 percent of values are missing in Japan in 2000 and for this reason we use data for 2003 only (when 11 percent of

values are missing) for all calculations of social segregation in this country. In the combined dataset for the 2000 and 2003 PISA rounds, the percentage missing in the other OECD countries ranges from 1.6 percent in Finland to 10.5 percent in New Zealand, with an average for all countries of 4.6 percent. Taking England, Scotland and Northern Ireland together, 5.7 percent of values are missing. We impute values where they are missing using the results of OLS regression models of highest parental value of the socio-economic index estimated separately for each country (but combining the UK countries for this purpose) on the pooled 2000 and 2003 data. The explanatory variables measure mother's and father's education, number of books in the household, migrant status, language spoken in the household, indices of cultural possessions and home educational resources in the household, maths test score (2000), reading test score (2003) and year of interview. R-squared is 0.29 for the UK (the average value for all countries is 0.34). (Details of the regressions are available on request.) The thresholds of the national distributions that we use to define high and low social position are based on the distributions of index values that include the imputed values. In the case of England, Scotland and Northern Ireland, we impute using the pooled UK regression but the thresholds are defined separately for each of the three countries' distributions of values.

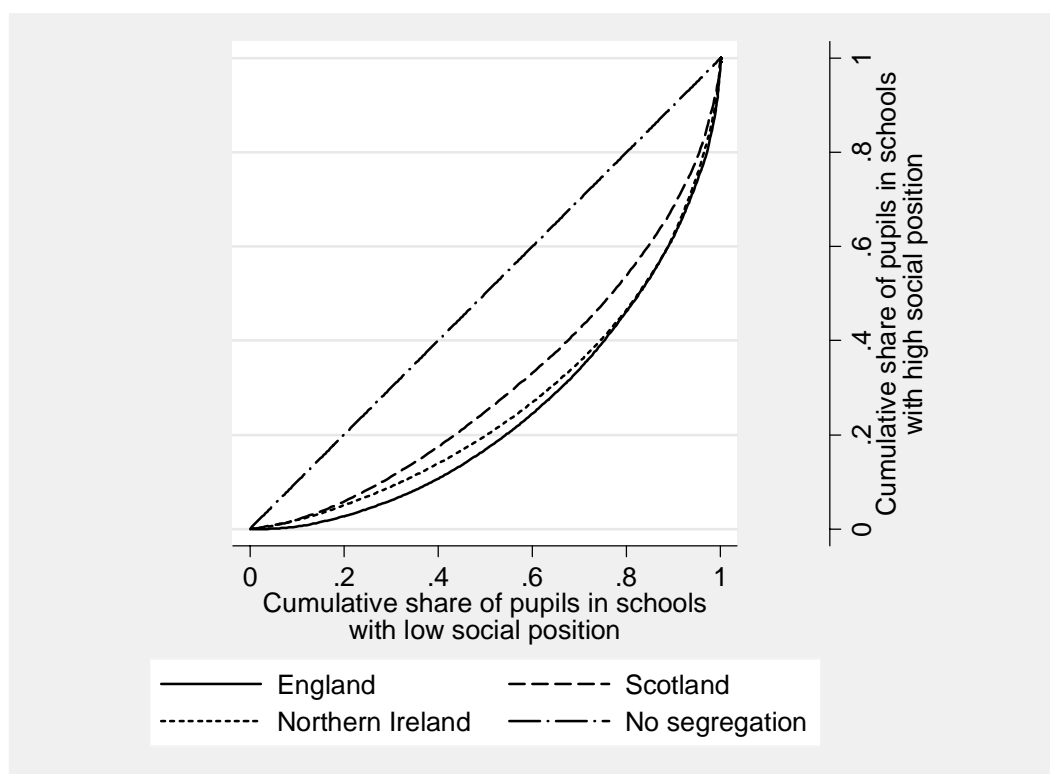
The national distributions of social position values are lumpy. In most countries five values account for at least a third of all coded values and ten values account for over a half. The lumpiness in the data means that the median cut-off that we use in most of our analysis does not separate exactly the distribution into two halves since the median value is often for an occupation in which there are a significant number of observations. The same applies to other cut-offs i.e. lower quartile, upper quartile, 90<sup>th</sup> percentile. In each case we define high social position as being above the threshold value and low position as being equal to or below that value.

### *Segregation curves for England, Scotland and Northern Ireland*

Appendix Figure 1 shows segregation curves for England, Scotland and Northern Ireland. Schools are ranked in each country by their shares of all children of low social position ( $p_i/P$  in equations (1) and (2)) and these values are shown on the horizontal axis. The vertical axis show the shares of each school of all children of high social position ( $r_i/R$ ). Since the curve for England lies everywhere outside the

curve for Scotland, one can conclude that segregation is higher in England than in Scotland for all indices that are ‘segregation curve consistent’, i.e that satisfy the axioms listed in Section 2.

Appendix Figure 1  
 Segregation curves for England, Scotland and Northern Ireland



Note: high social position is defined as being above the national median of the distribution of social position index values.

*Estimates of segregation with different definitions of high and low social position*

Appendix Tables 1 and 2 give estimates of  $D$  and  $H$  with four different thresholds of the national distributions of the parental occupational index, the lower quartile, the median, the upper quartile and the 90<sup>th</sup> percentile. It also gives estimates with social position measured by whether the mother had completed tertiary education or not. (Children with missing information on mother’s education are excluded from the calculations in the final column.) The countries are sorted by the values in the first column where the median value of parental occupation is used as the threshold. Table

1 in Section 3 shows the average of the rankings in each column that is occupied by England and selected other countries.

The shadings in the tables allow the rankings in each column to be compared in a simple way. In each column, cells with values in the top third of the distribution are shaded dark grey, cells with values in the middle third are shaded light grey and cells with values in the bottom third are unshaded. A country for which the cells have the same shading in each column is in the same third of the distribution in each case. For example, the dark grey shading in all five columns for Hungary and Poland for *D* shows that these two countries are always in third of the distribution with the highest values of social segregation. By contrast, the shadings show England to be in the top third for one measure, the middle third for three measures and the bottom third for one measure, something true for both *D* and *H*. It should be noted that the ‘traffic lights’ summary given by these shadings, which split the distributions into thirds, is a relatively crude one. In terms of the underlying index values, England is not far from the middle group in both cases where the relevant cells are dark grey or unshaded. For example, in the case of the unshaded cell, the index value for England is the highest in the bottom third.

Appendix Table 1  
Dissimilarity Index (*D*) with different family background measures

	Median	Lower quartile	Upper quartile	90 <sup>th</sup> percentile	Mother's education
Hungary	0.449	0.418	0.460	0.565	0.471
Belgium	0.403	0.403	0.399	0.447	0.343
Germany	0.400	0.388	0.429	0.470	0.374
Austria	0.389	0.383	0.413	0.497	0.348
Spain	0.378	0.345	0.402	0.491	0.406
England	0.362	0.352	0.359	0.416	0.291
France	0.362	0.381	0.397	0.463	0.304
Poland	0.358	0.380	0.395	0.516	0.423
Czech Republic	0.357	0.374	0.380	0.509	0.427
Switzerland	0.349	0.339	0.385	0.503	0.36
Northern					
Ireland	0.346	0.339	0.388	0.459	0.318
Greece	0.345	0.367	0.363	0.497	0.308
Italy	0.344	0.360	0.408	0.555	0.381
Portugal	0.344	0.345	0.382	0.522	0.355
Korea	0.333	0.359	0.326	0.401	0.392
Netherlands	0.333	0.338	0.315	0.425	0.310
Australia	0.328	0.352	0.376	0.415	0.313
USA	0.322	0.345	0.363	0.417	0.289
Canada	0.320	0.311	0.335	0.384	0.257
Ireland	0.299	0.307	0.307	0.420	0.260
Finland	0.288	0.279	0.303	0.378	0.351
New Zealand	0.288	0.332	0.315	0.406	0.257
Denmark	0.286	0.313	0.330	0.437	0.272
Japan	0.281	0.349	0.337	0.332	0.298
Sweden	0.277	0.274	0.313	0.390	0.230
Scotland	0.275	0.300	0.323	0.345	0.245
Norway	0.273	0.301	0.300	0.376	0.230

Note: data for Japan refer to 2003 only.

Appendix Table 1  
Hutchens Index (*H*) with different family background measures

	Median	Lower quartile	Upper quartile	90 <sup>th</sup> percentile	Mother's education
Hungary	0.183	0.168	0.208	0.352	0.197
Belgium	0.142	0.144	0.147	0.221	0.097
Germany	0.129	0.134	0.164	0.254	0.146
England	0.126	0.122	0.116	0.204	0.071
Austria	0.124	0.134	0.163	0.269	0.122
Spain	0.123	0.115	0.140	0.254	0.152
Czech Republic	0.119	0.158	0.146	0.295	0.182
Greece	0.116	0.124	0.140	0.280	0.091
Poland	0.112	0.129	0.132	0.265	0.176
France	0.109	0.123	0.140	0.238	0.082
Portugal	0.106	0.115	0.139	0.311	0.125
Switzerland	0.105	0.106	0.131	0.282	0.129
Italy	0.102	0.124	0.142	0.332	0.141
Northern Ireland	0.097	0.099	0.123	0.225	0.089
Netherlands	0.095	0.100	0.099	0.233	0.087
USA	0.095	0.128	0.137	0.203	0.082
Korea	0.090	0.109	0.090	0.179	0.130
Australia	0.088	0.113	0.131	0.188	0.085
Canada	0.088	0.094	0.105	0.168	0.058
Denmark	0.081	0.104	0.110	0.232	0.072
Ireland	0.078	0.097	0.082	0.221	0.062
Norway	0.072	0.090	0.086	0.168	0.053
Finland	0.070	0.071	0.078	0.151	0.093
New Zealand	0.068	0.101	0.087	0.191	0.054
Scotland	0.068	0.078	0.087	0.142	0.049
Sweden	0.065	0.072	0.091	0.173	0.046
Japan	0.064	0.101	0.095	0.133	0.079

Note: data for Japan refer to 2003 only.