

# PISA 2009

## – How Big are the Gaps? –

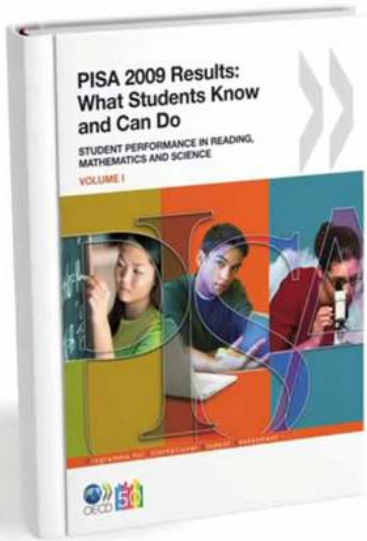
*Emily Knowles*

*Education Standards Analysis and Research*

# Outline

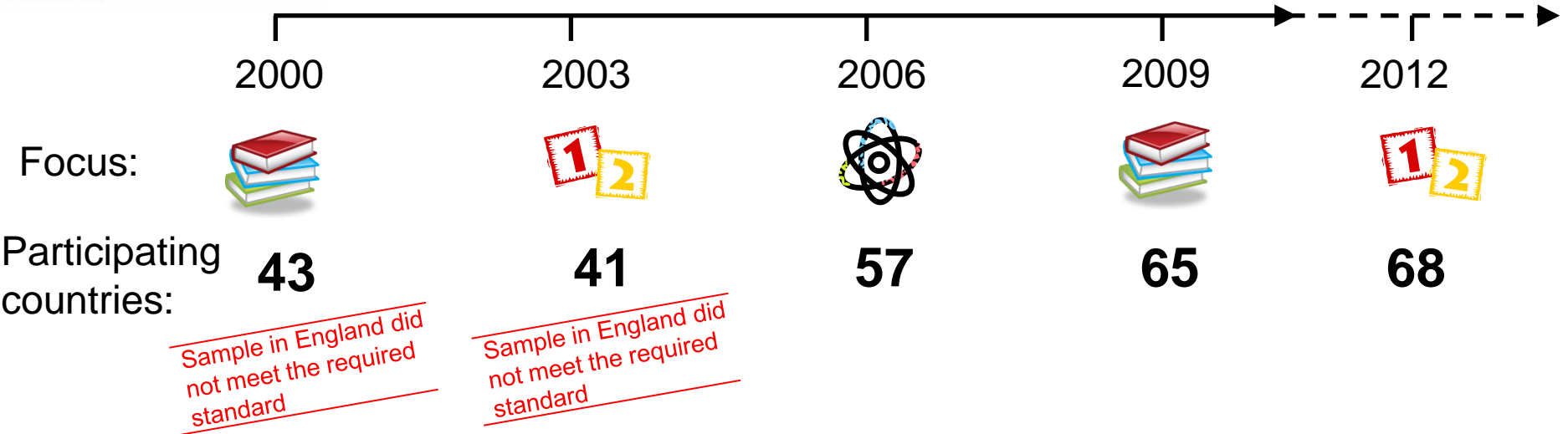
- Background to the PISA study
- Summary of pupil attainment in England
- Gap between average pupil attainment in England and that in top-performing countries
- Socio-attainment gaps
- More possibilities for analysis using the matched PISA-NPD file.

# Background to PISA



## Programme for International Student Assessment

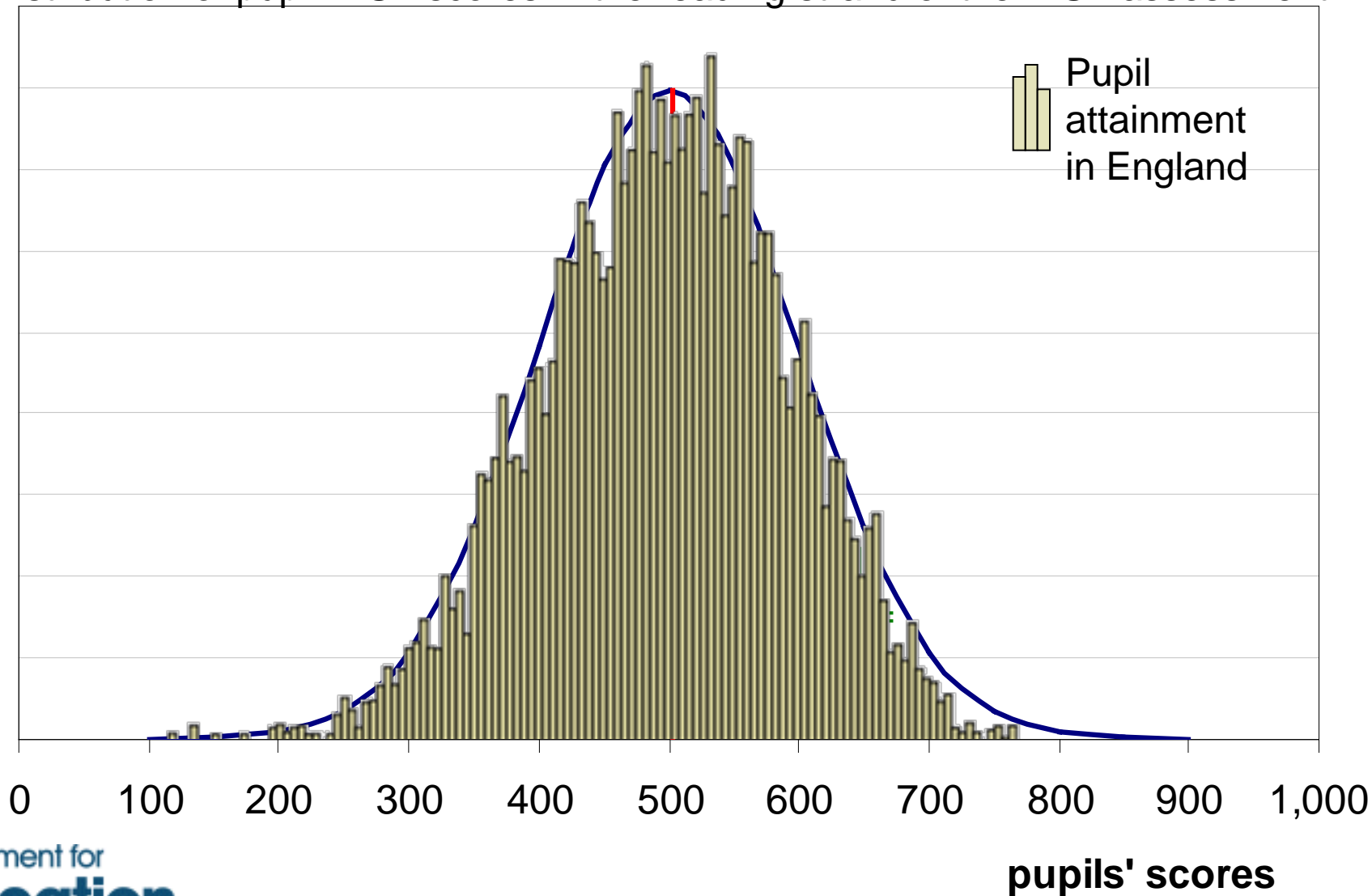
- Aims to compare the abilities of 15-year old pupils across participating OECD member states and partner countries;
- Consists of a triennial assessment of reading, mathematics and science ability and a student questionnaire to provide contextual information;



# Reading attainment in England very similar to the OECD average

PISA 2009

Distribution of pupil PISA scores in the reading strand of the PISA assessment



# And the distribution of scores is similar to those in the countries scoring significantly higher than England in the reading assessment

PISA 2009

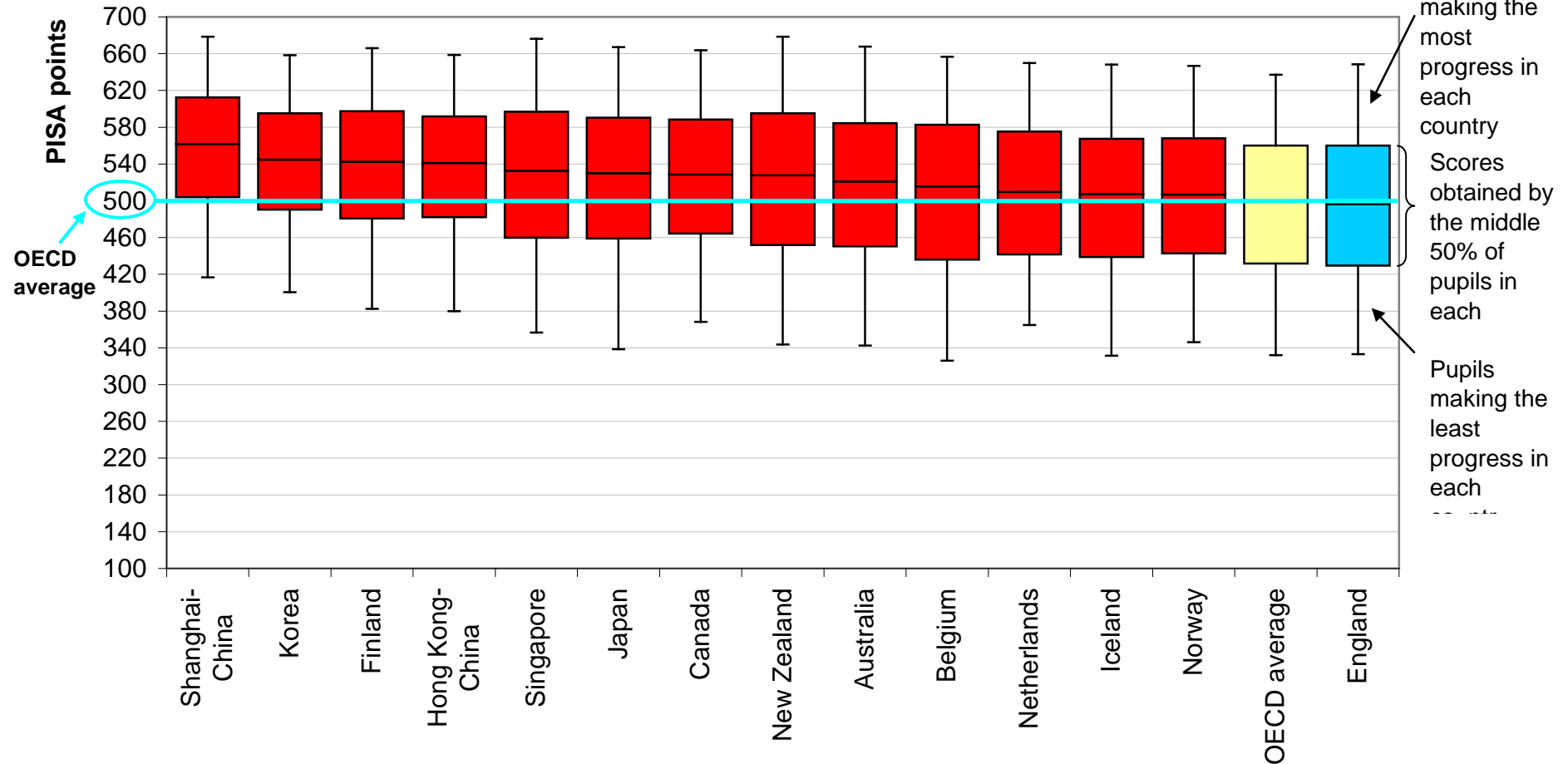
Box plots to show the distribution of pupils' scores in the 2009 PISA reading assessment for countries where pupils performed significantly higher on average than pupils in England

**Key**

Pupils making the most progress in each country

Scores obtained by the middle 50% of pupils in each

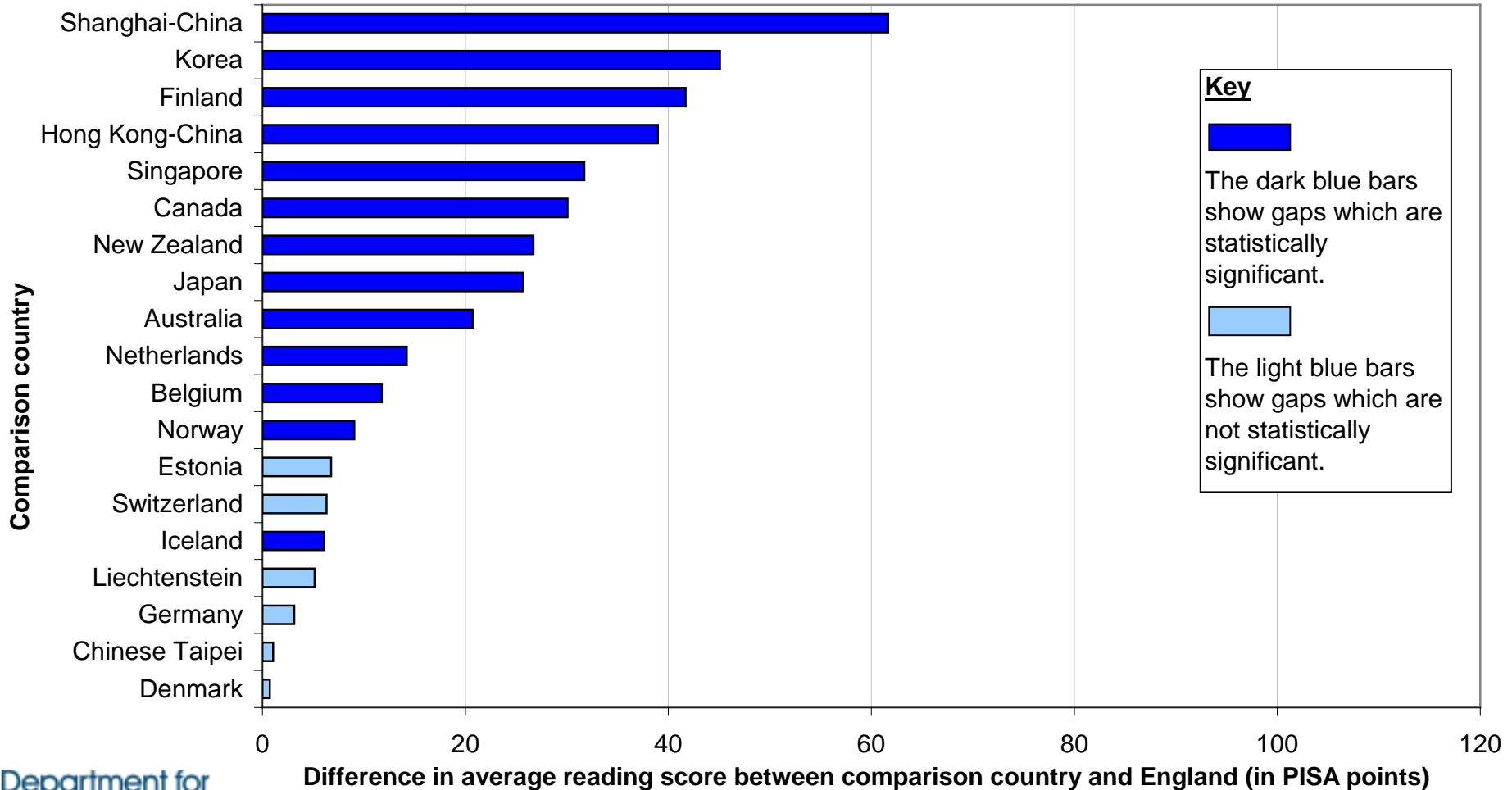
Pupils making the least progress in each



# The gap in average pupil attainment in the reading assessment between England and 13 other participating countries was statistically significant

PISA 2009

## Gap between pupils' average scores in the reading assessment in England and the top performing countries in the reading strand, PISA 2009



# Rather than express the gap in terms of PISA points, we translated the gap into attainment measures we are familiar with nationally

PISA 2009

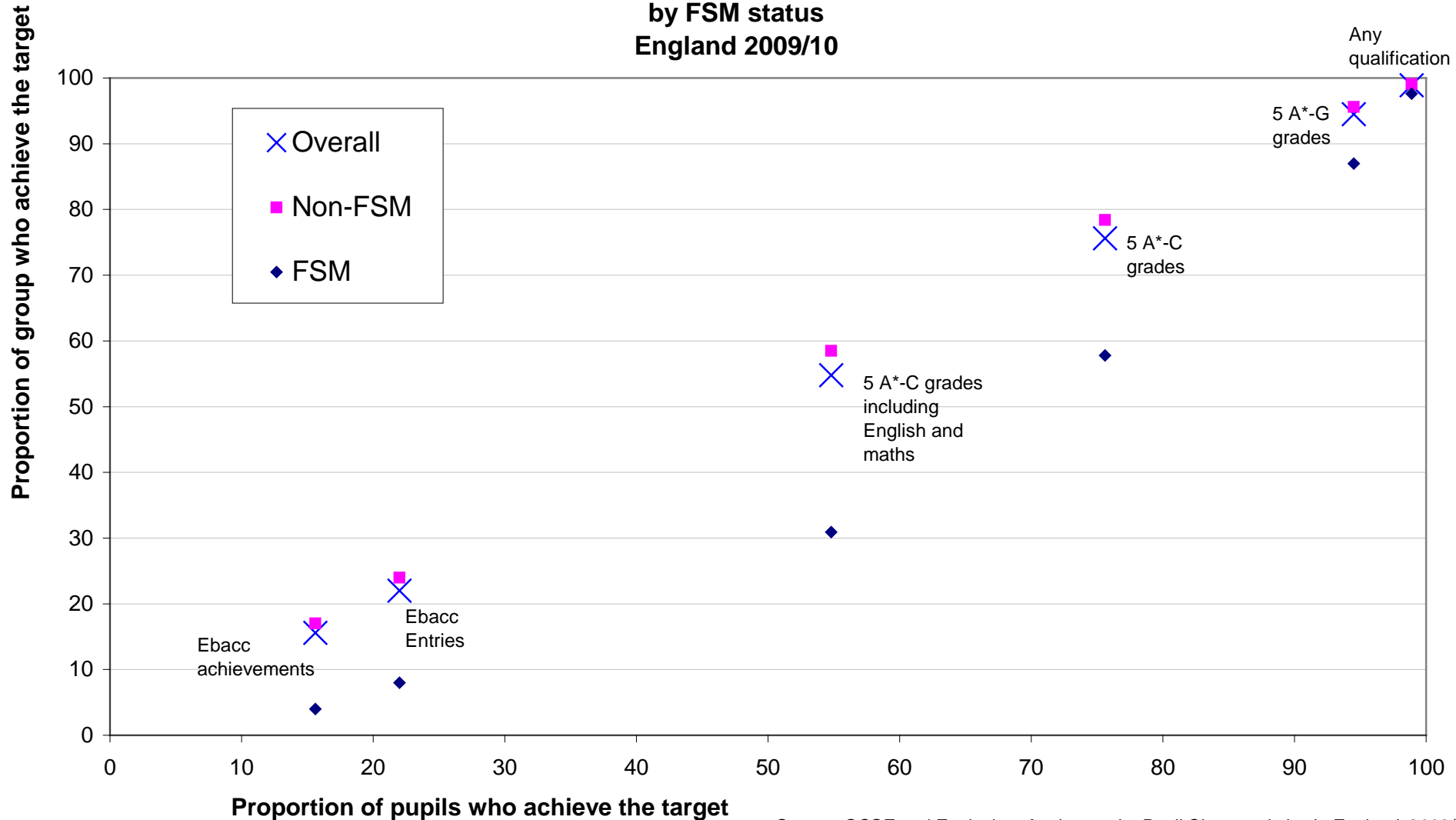
Difference in attainment...	...in PISA points	...as an Effect size	...in KS4 capped point scores	...in GCSE grades	...in additional % pupils achieving 5 A*-C (inc. English and maths)	...in years' progress
Shanghai-China	62	0.6	66	11	22%	1.5
<b>Korea</b>	45	0.5	48	8	18%	1.1
<b>Finland</b>	42	0.4	44	7	17%	1.0
Hong Kong-China	39	0.4	42	7	16%	0.9
Singapore	32	0.3	34	6	14%	0.7
<b>Canada</b>	30	0.3	32	5	13%	0.7
<b>New Zealand</b>	27	0.3	28	5	12%	0.6
<b>Japan</b>	26	0.3	27	5	11%	0.6
<b>Australia</b>	21	0.2	22	4	10%	0.5
<b>Netherlands</b>	14	0.1	15	3	7%	0.3
<b>Belgium</b>	12	0.1	13	2	6%	0.3
<b>Norway</b>	9	0.1	10	2	5%	0.2
<b>Iceland</b>	6	0.1	7	1	3%	0.1

1. Countries listed in **bold** are OECD member states

Source: OECD, PISA 2009 Database & additional DfE analysis (shaded sections)

# We have looked at raw attainment gaps, how do our social attainment gaps compare?

National performance of pupils attaining various threshold measures at the end of KS4,  
by FSM status  
England 2009/10



Source: GCSE and Equivalent Attainment by Pupil Characteristics in England, 2009/10



# Measure of socio-economic background in PISA

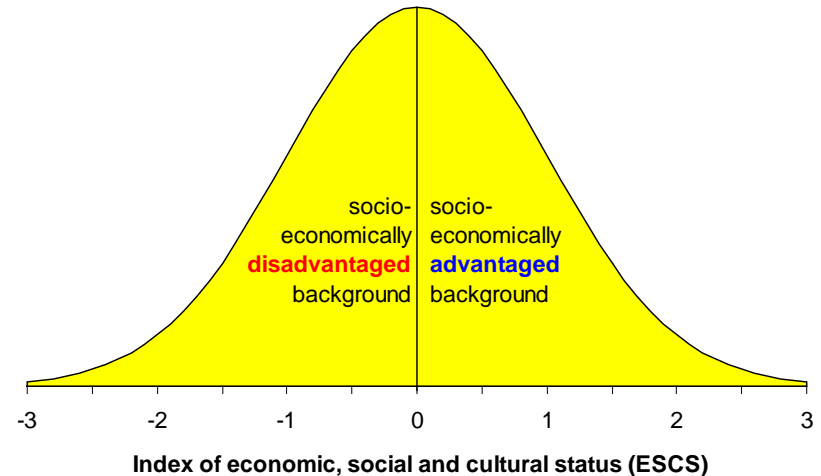
PISA 2009

To what extent does socio-economic background play a role in pupil attainment?

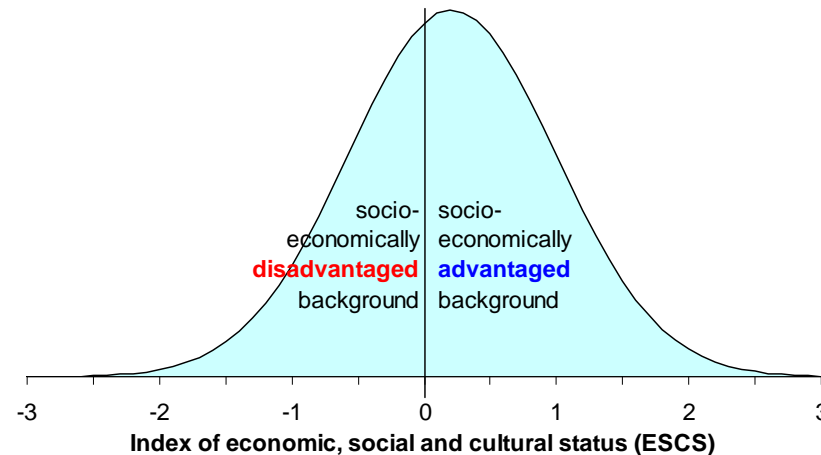
- Index of economic, social and cultural status (ESCS) derived from:

- \* parents' education;
- \* parents' occupation;
- \* home possessions.

Distribution of pupils' socio-economic backgrounds across OECD countries



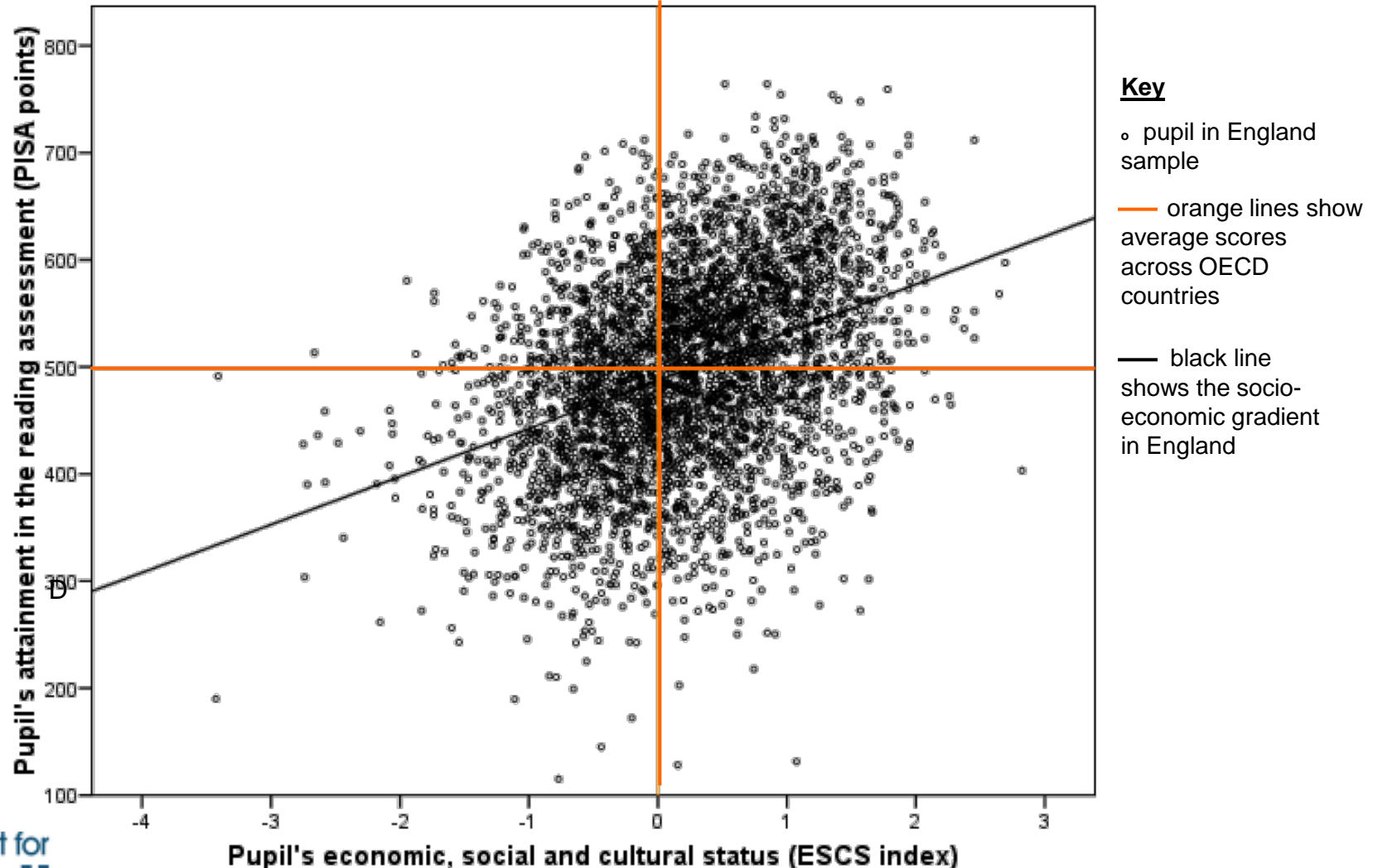
Distribution of pupils' socio-economic backgrounds in England



# Association between pupil ESCS and their attainment in England

PISA 2009

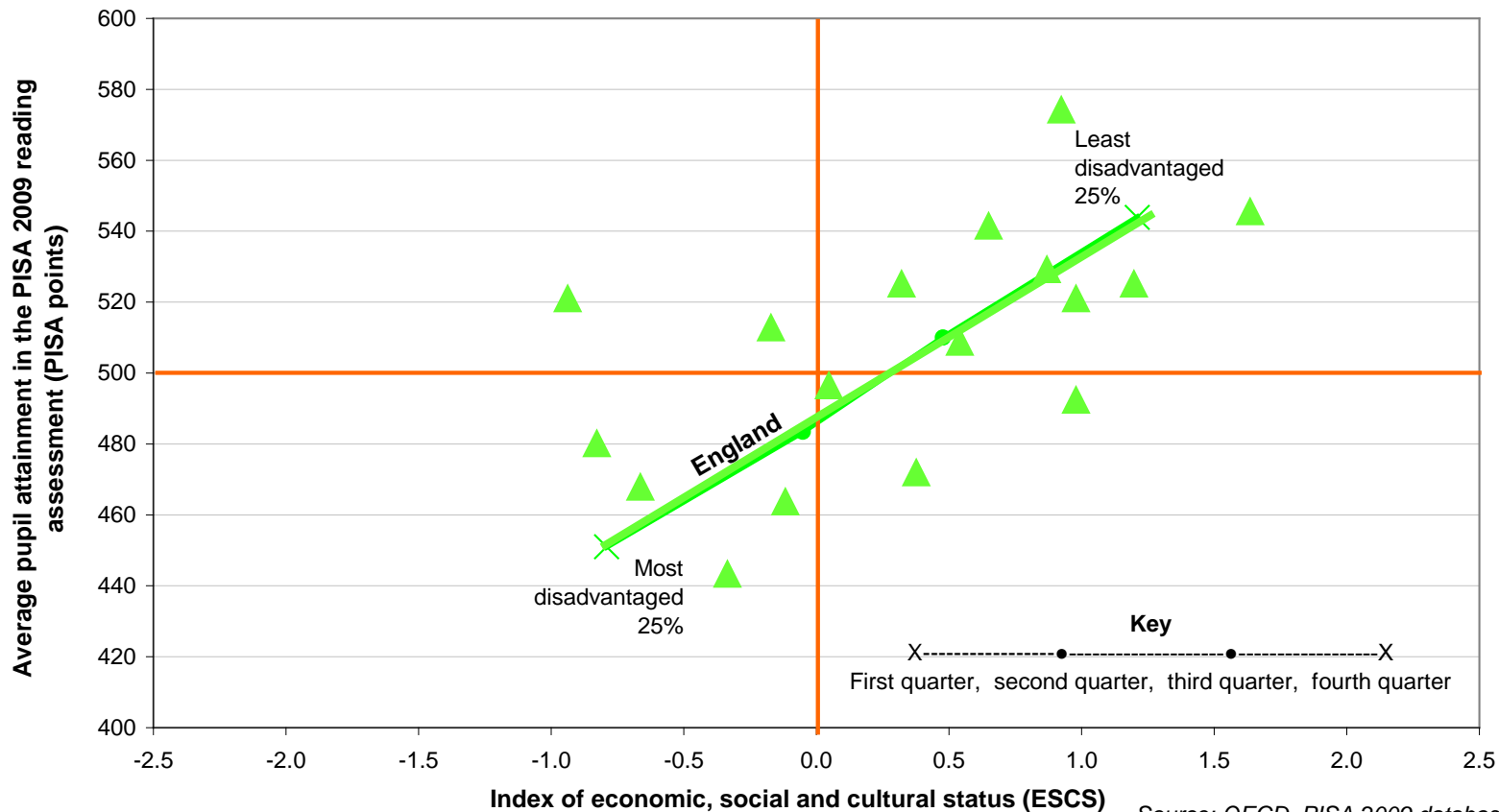
Scatter plot to show the association between pupils' economic, social and cultural status and their attainment in the PISA 2009 reading assessment



# Socio-economic gradient in England

PISA 2009

Average pupil performance in reading, by national quarters of the index of economic, social and cultural status in England, PISA 2009



**Slope**  
Steeper than  
OECD average

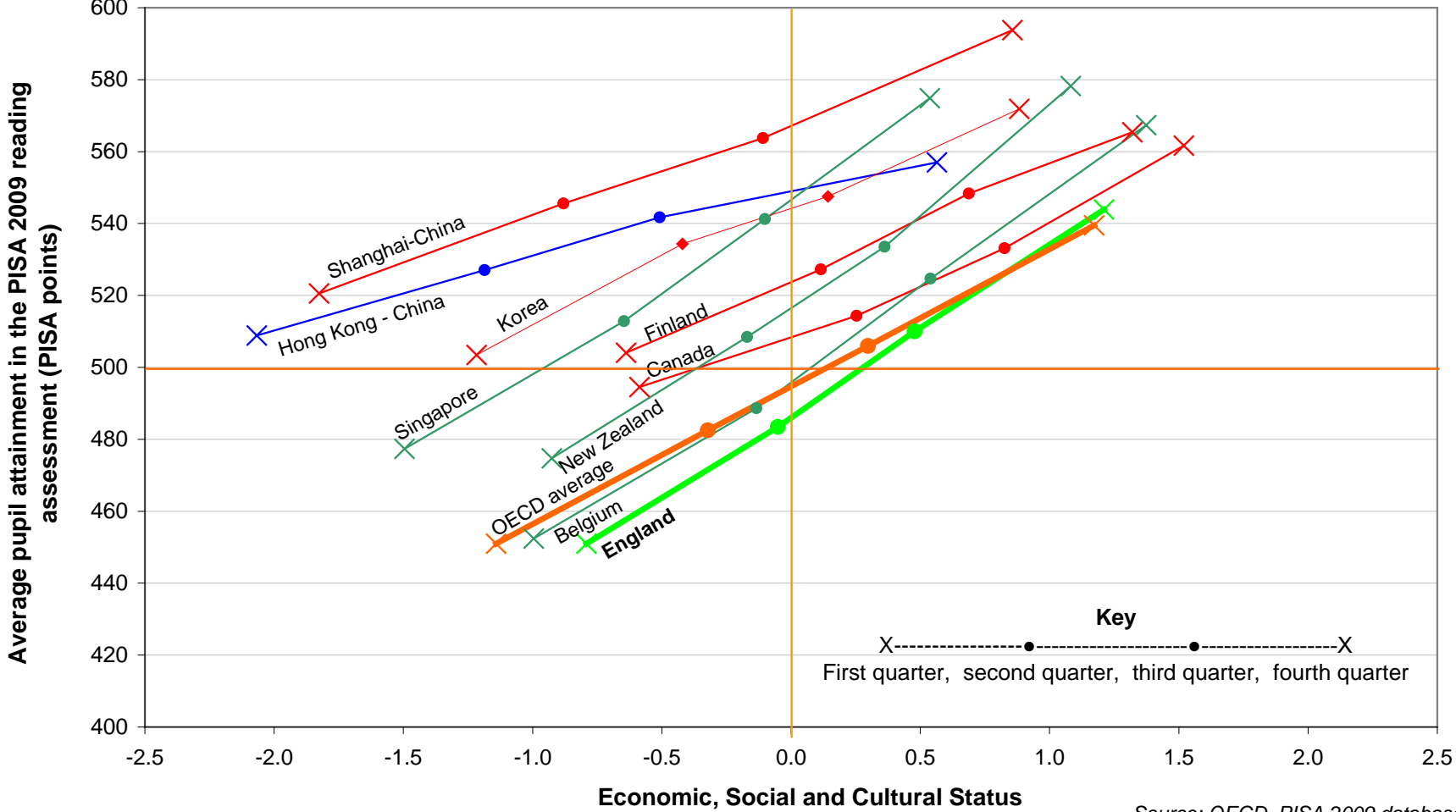
**Strength of  
association**

Attainment  
not more  
strongly  
associated  
with socio-  
economic  
background  
than on  
average  
across OECD

# Comparison of socio-economic gradient in England with that of PISA 2009 top-performing countries

PISA 2009

Average pupil performance on the reading scale by national quarters of economic, social and cultural status for a selection of top-performing countries, PISA 2009



Source: OECD, PISA 2009 database



Four countries scoring statistically significantly higher than England in the PISA 2009 reading assessment are not included in the chart as the patterns in these countries were very similar to others that have been included. Namely: Australia was very similar to Belgium; Japan similar to Finland; The Netherlands very similar to the OECD average; and Norway very similar to England

# Comparison of social attainment gaps between PISA 2009 participating countries

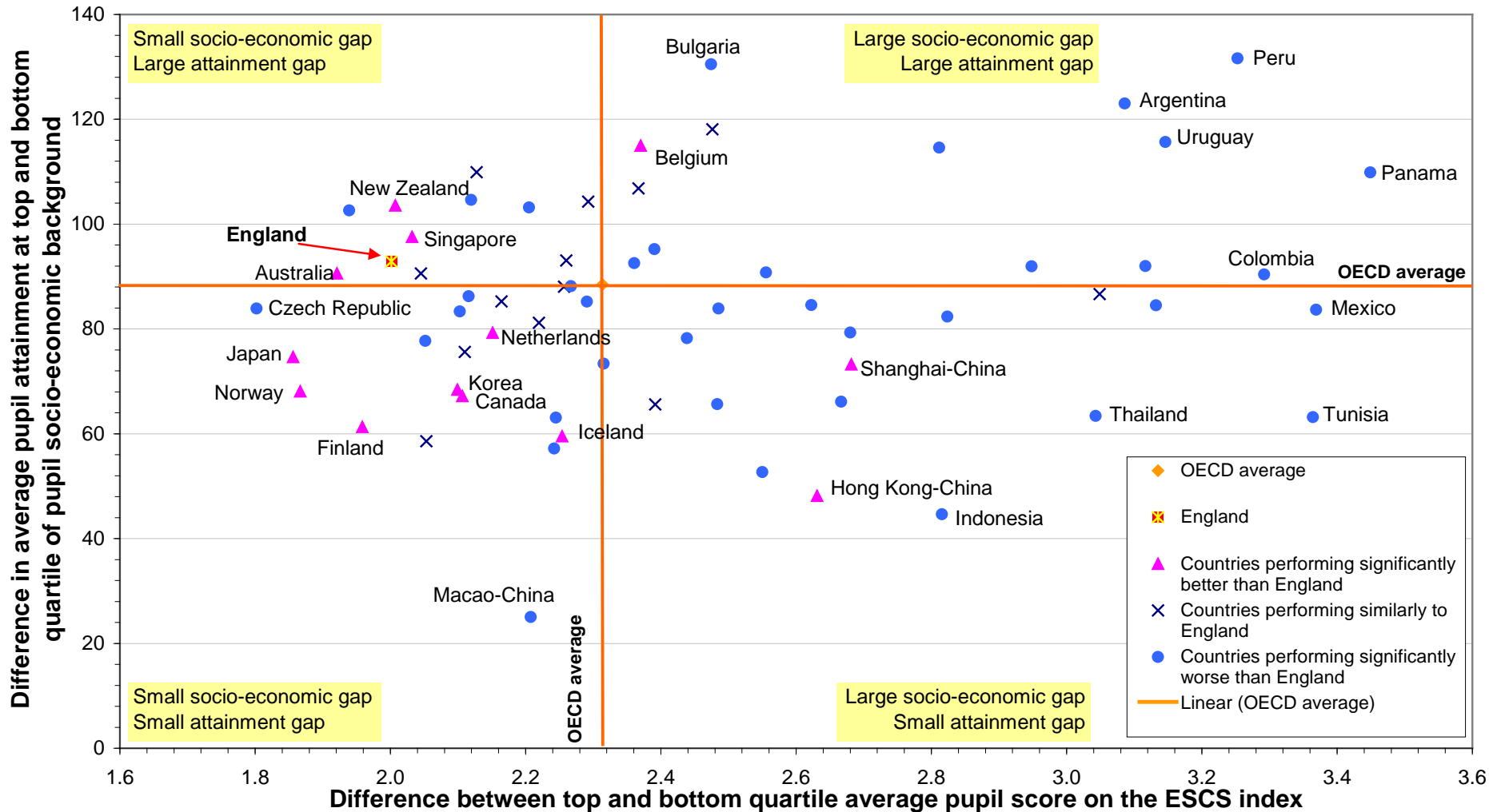
PISA 2009

Average pupil attainment by national quarters of the PISA index of economic, social and cultural status, ordered by size of attainment gap between top and bottom quartiles

Comparison country <sup>1</sup>	Standard deviation in pupil performance (A)	Performance on the reading scale, by national quarters of the PISA index of economic, social and cultural status								Gap between average performance of pupils in top and bottom quarters	
		Bottom quarter		Second quarter		Third quarter		Top quarter		Difference in mean score (C-B)	Difference expressed in Standard Deviations (C - B) / A
		Mean score (B)	S.E.	Mean score	S.E.	Mean score	S.E.	Mean score (C)	S.E.		
Peru	98	<b>303</b>	(3.3)	354	(3.1)	390	(3.7)	<b>434</b>	(7.3)	132	1.3
Hungary	90	<b>435</b>	(5.3)	485	(3.4)	505	(4.1)	<b>553</b>	(4.1)	118	1.3
Uruguay	99	<b>374</b>	(3.2)	407	(3.2)	438	(3.8)	<b>489</b>	(4.1)	116	1.2
Bulgaria	113	<b>368</b>	(5.8)	418	(6.6)	442	(7.7)	<b>498</b>	(6.2)	131	1.2
Argentina	108	<b>345</b>	(4.9)	377	(4.6)	410	(5.5)	<b>468</b>	(6.2)	123	1.1
<b>Belgium</b>	102	<b>452</b>	(3.3)	489	(3.3)	525	(2.5)	<b>567</b>	(2.6)	115	1.1
Turkey	82	<b>422</b>	(3.8)	454	(3.5)	469	(3.9)	<b>514</b>	(4.6)	92	1.1
Chile	83	<b>409</b>	(3.5)	435	(3.6)	457	(3.5)	<b>501</b>	(3.5)	92	1.1
Panama	99	<b>336</b>	(7.1)	351	(6.6)	375	(6.3)	<b>445</b>	(10.9)	110	1.1
United States	97	<b>451</b>	(3.6)	481	(3.6)	512	(3.6)	<b>558</b>	(4.7)	107	1.1
Luxembourg	104	<b>411</b>	(2.7)	460	(3.0)	497	(2.8)	<b>526</b>	(3.0)	115	1.1
Germany	95	<b>445</b>	(3.9)	494	(2.9)	515	(3.5)	<b>550</b>	(3.3)	104	1.1
Austria	100	<b>421</b>	(4.3)	457	(4.2)	482	(3.8)	<b>525</b>	(3.9)	105	1.0
Colombia	87	<b>371</b>	(4.7)	398	(4.4)	422	(3.9)	<b>462</b>	(4.7)	90	1.0
<b>New Zealand</b>	103	<b>475</b>	(3.9)	508	(3.1)	534	(3.3)	<b>578</b>	(3.6)	104	1.0
<b>Singapore</b>	97	<b>477</b>	(2.4)	513	(3.2)	541	(2.4)	<b>575</b>	(3.0)	98	1.0
Portugal	87	<b>451</b>	(4.2)	472	(3.4)	499	(3.4)	<b>537</b>	(3.7)	87	1.0
Switzerland	93	<b>457</b>	(3.9)	492	(2.7)	506	(3.0)	<b>550</b>	(3.7)	93	1.0
Mexico	85	<b>386</b>	(2.8)	413	(2.3)	434	(2.2)	<b>469</b>	(2.2)	84	1.0
Poland	89	<b>461</b>	(3.4)	488	(3.1)	507	(2.9)	<b>550</b>	(3.8)	88	1.0
England	95	<b>451</b>	(3.4)	483	(3.7)	510	(3.4)	<b>544</b>	(3.8)	93	1.0

# Comparison of social attainment gaps between PISA 2009 participating countries

A comparison of the range of socio-economic background and the social attainment gap between PISA 2009 participating



# PISA 2009 – NPD matched file

## Positives

Insight into translation between pupil attainment in PISA and attainment in national tests

PISA information on socio-economic background can be cross-referenced against national measures of socio-economic background e.g. FSM status

Further analysis into results for England not explored by OECD

## Negatives

Based on just over 3,800 pupils in England

Data ownership

Fuzzy matching

Data for England only, so comparisons with other countries can only be done using information published in the OECD's reports

# How are the OECD's ESCS index and FSM status linked?

PISA 2009

- 10% of PISA sample were eligible for Free School Meals
- Of these, only one in three were also in the bottom 10% of the OECD's distribution of economic, social and cultural status.

		Pupils known to be eligible for FSM, January 2009		
		No	Yes	Total
OECD's measure of social background (ESCS)	Bottom 10%	8%	29%	10%
	Not bottom 10%	90%	64%	88%
	ESCS missing	2%	7%	2%
	Total	100%	100%	100%

Source: OECD PISA 2009 database matched with National Pupil database 2009/10



# How this compares to what we know about FSM gaps

PISA 2009

	Attainment gap between pupils known to be eligible for FSM and those not eligible				Attainment gap between pupils in the bottom 10% of the OECD's ESCS distribution and the other 90%			
Point score measures of attainment	Non-FSM pupils	FSM pupils	FSM gap		Other 90%	Bottom 10%	ESCS split	
PISA 2009 attainment	<i>PISA points</i>	<i>PISA points</i>	<i>PISA points</i>	<i>Effect size</i>	<i>PISA points</i>	<i>PISA points</i>	<i>PISA points</i>	<i>Effect size</i>
Reading	503.3	438.0	65.4	0.7	503.2	438.7	64.5	0.7
Mathematics	502.5	437.8	64.7	0.7	502.2	440.4	61.8	0.7
Science	524.7	454.7	70.1	0.7	524.6	455.8	68.8	0.7

# Ideas for further analysis using the PISA 2009 – NPD matched file

Further analysis of the impact of socio-economic status on attainment at school-level

Comparing Key Stage 4 attainment and PISA attainment as predictors for progression to Key Stage 5

Comparison between variance in pupil attainment explained by separate components of the OECD's measure of socio-economic background and the factors identified from NPD-LSYPE analysis as having an impact on pupil attainment

# Comments Questions Suggestions for further analysis?

[Emily.Knowles@education.gsi.gov.uk](mailto:Emily.Knowles@education.gsi.gov.uk)