The dynamics of school attainment of England's ethnic minorities

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Web Appendix

(available from http://www.bristol.ac.uk/cmpo/people/researchers/wilson)

1 Representativeness of the balanced panel

We chose to run the analysis as a balanced panel. The proportion of students who have a full record is high. With the exception of one group, students of Black African Heritage, the analysis cohort accounts for most of the students sitting the test. Appendix Table 1 below shows that, for example in the KS4 tests, the analysis sample accounts for 85% of Black Caribbean students, 81% of ethnic Bangladeshi students, 89% of Indian and 86% of Pakistani ethnic origin students. The average is 92% and the minimum is 77%, apart from Black African heritage students. This group is rather different, with 97% of KS2 students covered, but only 69% of KS3 students and 59% at KS4.

Table WA1: Sample sizes (Analysis cohort as % of all observations at Key Stage)

Ethnicity	KS2	KS3	KS4	KS3 & KS4
Black African	97.12	68.76	58.64	71.33
Black Caribbean	96.10	86.60	85.32	89.67
Black Other	94.96	87.92	87.03	91.32
Bangladeshi	95.87	82.56	81.73	85.29
Indian	98.93	90.97	89.59	91.76
Pakistani	97.04	87.28	85.60	89.12
Chinese	98.96	81.24	77.98	83.30
Other	96.51	81.84	77.87	84.80
White	96.02	92.78	93.43	95.22
Total	96.14	91.85	92.01	94.26

Size of the analysis cohort is in Table 1 in the paper this Web Appendix accompanies.

In Table 2 we compare the scores of the cohort 2 students used in the analysis with all students who took each test, and compute the percentage difference for KS4. We can see that again, for all but this same group, the differences are minor. The difference between the mean score of each cross section and the balanced panel increases for all groups, but for all the change in this difference is minor: 2.8 percentage points for Black Caribbean

students, between KS2 and KS4, 0.45 percentage points for whites for example. In terms of scores, these are negligible: 0.6 KS4 points for Black Caribbean students for example. For Black African heritage students, the difference at KS4 is 10% - the analysis cohort students averaging 40.09 relative to 36.22 for all such students. The gap is the same way, but lower at KS3 (4.4%) and at KS2 (0.26%). Thus we need to bear in mind that the KS4 scores of this ethnic group are unrepresentative of the total of that group taking that exam at that time.

Table WA2: Scores

Ethnicity	KS2 Cohort	KS2 All Obs	KS3 Cohort	KS3 All Obs	KS4 Cohort	KS4 All Obs	KS4 % Difference
Black African	24.151 (4.42)	24.089 (4.44)	30.787 (6.60)	29.487 (6.96)	40.088 (17.65)	36.220 (18.32)	10.68
Black Caribbean	24.247 (4.06)	24.178 (4.07)	29.895 (5.93)	29.487 (6.08)	33.567 (16.88)	32.491 (17.12)	3.31
Black Other	24.637 (4.10)	24.531 (4.12)	30.778 (6.22)	30.500 (6.33)	35.488 (18.27)	35.065 (18.37)	1.21
Bangladeshi	23.700 (4.38)	23.634 (4.39)	29.961 (6.35)	29.495 (6.49)	40.130 (17.98)	38.749 (18.38)	3.56
Indian	25.412 (4.06)	25.387 (4.07)	33.635 (6.39)	33.491 (6.58)	47.230 (17.35)	46.699 (17.77)	1.14
Pakistani	23.241 (4.30)	23.183 (4.31)	29.573 (6.37)	29.276 (6.47)	37.428 (17.99)	36.683 (18.21)	2.03
Chinese	26.923 (4.07)	26.909 (4.08)	36.416 (6.49)	36.145 (6.76)	53.713 (17.68)	51.940 (19.61)	3.41
Other	25.605 (4.33)	25.506 (4.37)	33.174 (6.81)	32.435 (7.21)	42.821 (19.63)	41.035 (20.30)	4.35
White	26.077 (4.09)	25.952 (4.15)	33.567 (6.40)	33.35 (6.52)	41.576 (18.88)	41.18 (19.08)	0.96

Standard deviations in parentheses

However, in terms of one of the most interesting findings above, the balanced panel under-estimates the full population facts. We observed a substantial acceleration in test score gains from (KS2➔KS3) to (KS3➔KS4) for this group. Appendix Table 3 shows that comparing the cohort with the population on this feature, the whole population data shows an even greater acceleration. The Table also shows, that with the exception of the Other ethnicity group, the differences between the cohort and the full population are minor for all other groups.

Table WA3: Gain and Acceleration

Ethnicity	Gain (KS3-KS2) Cohort	Gain (KS3-KS2) All Obs	Gain (KS4-KS3) Cohort	Gain (KS4-KS3) All Obs	Acceleration (KS4-KS3) – (KS3-KS2) Cohort	Acceleration (KS4-KS3) – (KS3-KS2) All Obs
Black African	0.029	-0.137	0.325	0.295	0.296	0.432
Black Caribbean	-0.133	-0.159	0.118	0.099	0.251	0.258
Black Other	-0.091	-0.089	0.084	0.080	0.175	0.169
Bangladeshi	0.009	-0.028	0.455	0.426	0.446	0.454
Indian	0.165	0.159	0.262	0.237	0.097	0.078
Pakistani	0.06	0.047	0.373	0.351	0.313	0.304
Chinese	0.232	0.199	0.173	0.110	-0.059	-0.089
Other	0.696	-0.029	0.100	0.101	-0.596	0.130
White	-0.006	0.003	-0.035	-0.030	-0.029	-0.033

This takes the z-score representation of the Key Stage scores, and computes the difference in the group means between stages using both the data from our analysis cohort and using all available data at each individual Key Stage. The final pair of columns calculates the change in the gain.

Table WA4: Regressions of standardised values of Key Stage 4 test scores for Cohort 2

	Explanatory Variables	1	2	3	4
Ethnic Group	Black African	-0.079 (4.91)**	0.169 (11.99)**	0.308 (22.03)**	0.215 (15.34)**
	Black Caribbean	-0.423 (33.73)**	-0.190 (17.24)**	-0.045 (4.09)**	-0.091 (8.37)**
	Black Other	-0.322 (19.36)**	-0.120 (8.24)**	0.003 (0.18)	-0.035 (2.49)*
	Bangladeshi	-0.076 (4.86)**	0.275 (19.71)**	0.484 (34.64)**	0.307 (21.76)**
	Indian	0.299 (32.65)**	0.273 (34.04)**	0.376 (47.52)**	0.288 (34.20)**
	Pakistani	-0.219 (23.34)**	0.019 (2.26)*	0.222 (26.82)**	0.093 (9.97)**
	Chinese	0.642 (25.12)**	0.603 (26.85)**	0.639 (28.82)**	0.589 (27.76)**
	Other	0.066 (5.85)**	0.166 (16.85)**	0.230 (23.57)**	0.182 (19.02)**
Personal Characteristics	Gender (= 1 if female)	No	0.177 (68.84)**	0.182 (72.00)**	0.192 (79.06)**
	Free School Meal Status (= 1 if has FSM)	No	-0.605 (154.37)**	-0.448 (112.32)**	-0.333 (84.86)**
	SEN (=1 if SEN without statement)	No	-1.009 (270.61)**	-0.977 (265.40)**	-0.915 (258.46)**
	SEN (=1 if SEN with statement)	No	-1.297 (148.41)**	-1.275 (147.60)**	-1.211 (146.31)**
	Month of Birth	No	Yes	Yes	Yes
Neighbourhood Characteristics	Index of Multiple Deprivation	No	No	Yes	No
	Mosaic Classification	No	No	No	Yes
R^2		0.008	0.251	0.293	0.346
Observations[1]		467, 463	467, 144	456, 000	461, 461

Absolute values of t-statistics in parentheses. * Significant at 5%   ** Significant at 1%

Notes: [1] Different numbers of observations for different specifications is due to missing data on some controls.

Table WA5: Regressions of Key Stage 2 to 4 value added for Cohort 2

	Explanatory Variables	1	2	3	4
Ethnic Group	Black African	1.961 (24.40)**	2.767 (35.82)**	3.234 (41.67)**	2.971 (37.35)**
	Black Caribbean	-0.701 (11.14)**	-0.026 (0.43)	0.489 (8.08)**	0.372 (6.04)**
	Black Other	-0.493 (5.91)**	0.107 (1.34)	0.486 (6.02)**	0.434 (5.41)**
	Bangladeshi	2.429 (30.79)**	3.693 (48.37)**	4.440 (57.26)**	3.837 (47.89)**
	Indian	2.987 (65.09)**	2.975 (67.64)**	3.334 (75.87)**	2.988 (62.43)**
	Pakistani	2.001 (42.47)**	2.819 (61.85)**	3.534 (76.98)**	3.056 (57.52)**
	Chinese	3.249 (25.38)**	3.196 (26.02)**	3.310 (26.89)**	3.205 (26.58)**
	Other	1.059 (18.79)**	1.419 (26.23)**	1.645 (30.32)**	1.517 (27.97)**
Personal Characteristics	Gender (= 1 if Female)	No	1.381 (98.23)**	1.404 (99.81)**	1.435 (104.26)**
	Free School Meal Status (= 1 if has FSM)	No	-2.278 (111.64)**	-1.721 (77.57)**	-1.273 (57.05)**
	SEN (=1 if SEN without statement)	No	-2.278 (111.64)**	-2.157 (105.51)**	-1.938 (96.25)**
	SEN (=1 if SEN with statement)	No	-1.142 (23.87)**	-1.063 (22.15)**	-0.841 (17.89)**
	Month of Birth	No	Yes	Yes	Yes
Neighbourhood Characteristics	Index of Multiple Deprivation	No	No	Yes	No
	Mosaic Classification	No	No	No	Yes
R^2		0.02	0.10	0.12	0.14
Observations[1]		467, 305	466,987	455, 848	461, 306

Absolute values of t-statistics in parentheses
* Significant at 5%   ** Significant at 1%

Notes: [1] Different numbers of observations for different specifications is due to missing data on some controls.

Table WA6: Quantile regressions (25th percentile) of standardised values of overall Key Stage score[1]

Explanatory variable	Cohort 2 Age 16[2]
Black African	0.248 (15.03)**
Black Caribbean	-0.053 (4.16)**
Black Other	-0.041 (2.46)*
Bangladeshi	0.309 (18.65)**
Indian	0.293 (29.65)**
Pakistani	0.098 (8.88)**
Chinese	0.563 (22.62)**
Other	0.132 (11.78)**
Gender (= 1 if Female)	0.201 (70.72)**
Free school meal status (= 1 if has FSM)	-0.340 (72.00)**
SEN (= 1 if without statement)	-0.923 (219.16)**
SEN status (= 1 if with statement)	-1.175 (120.55)**
Pseudo R^2	0.22
Observations	461,461

Absolute values of t-statistics in parentheses
* Significant at 5%   ** Significant at 1%

Notes:
[1] Also included in the regressions but not reported here were dummies for Mosaic classification.
[2] This refers to Key Stage 4.

Figure WA1a: Raw values for overall standardised values of key-stage[1] scores through time for cohorts 1 and 2 by ethnicity
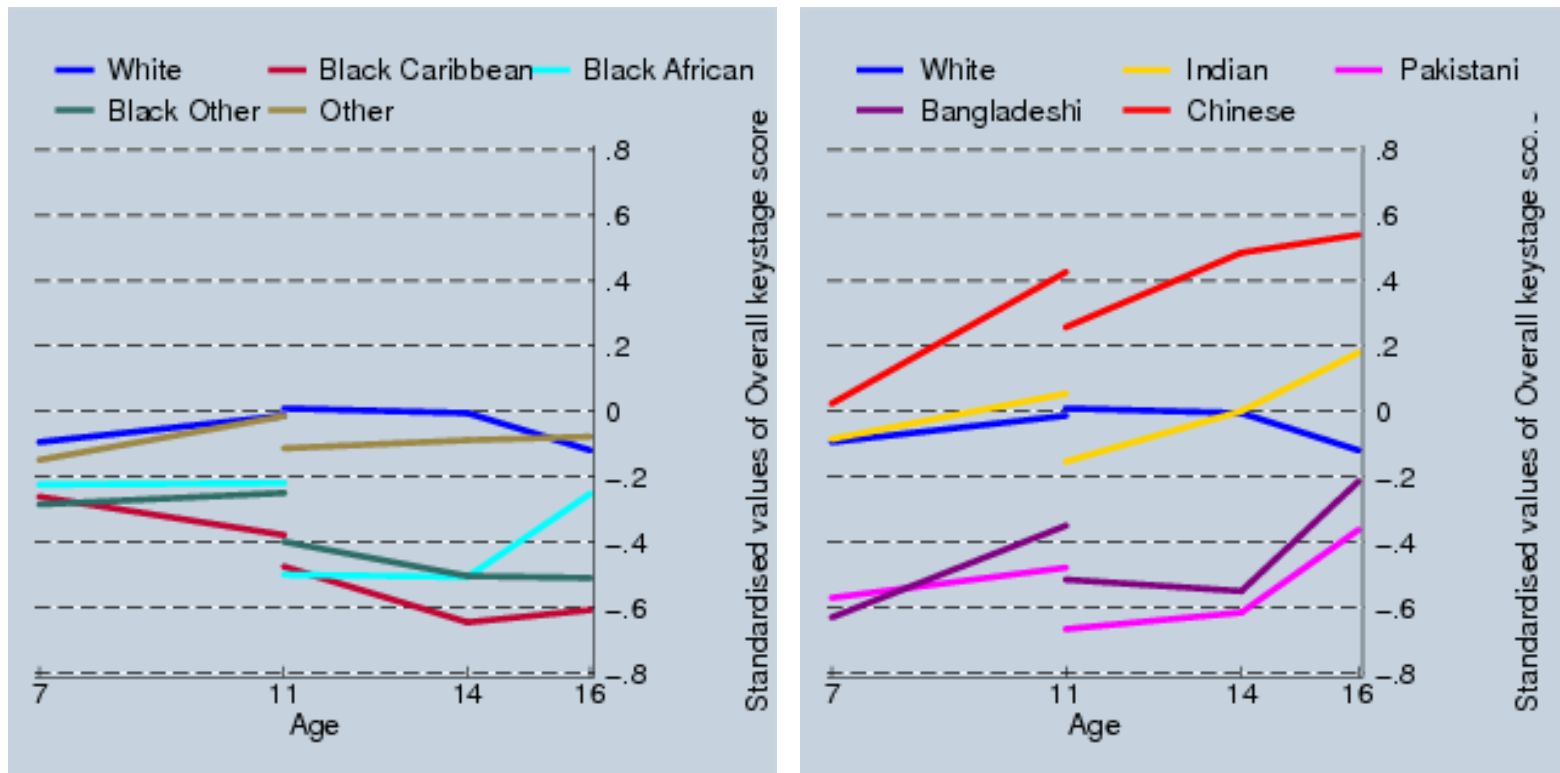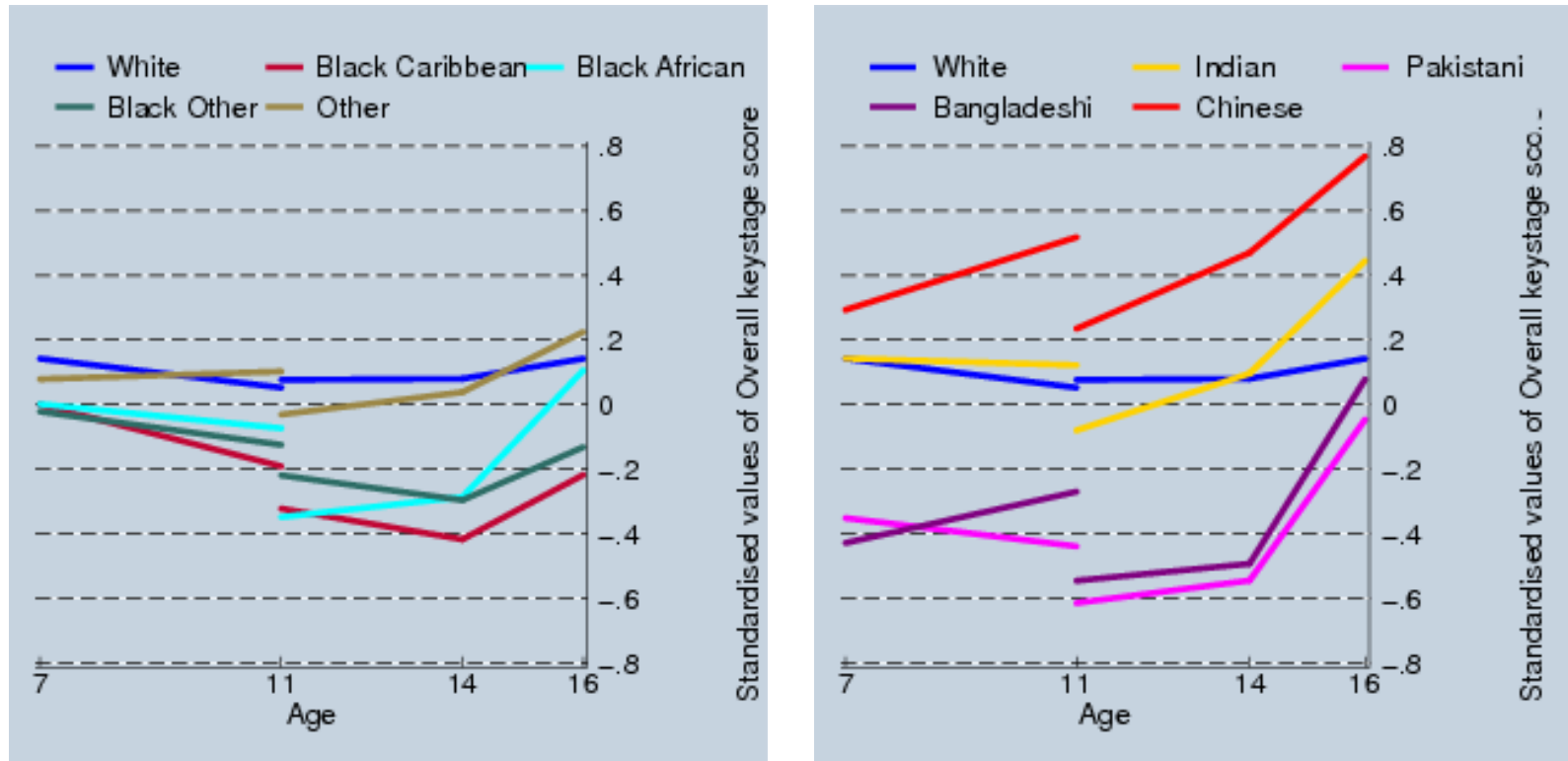
Pupils with FSM status
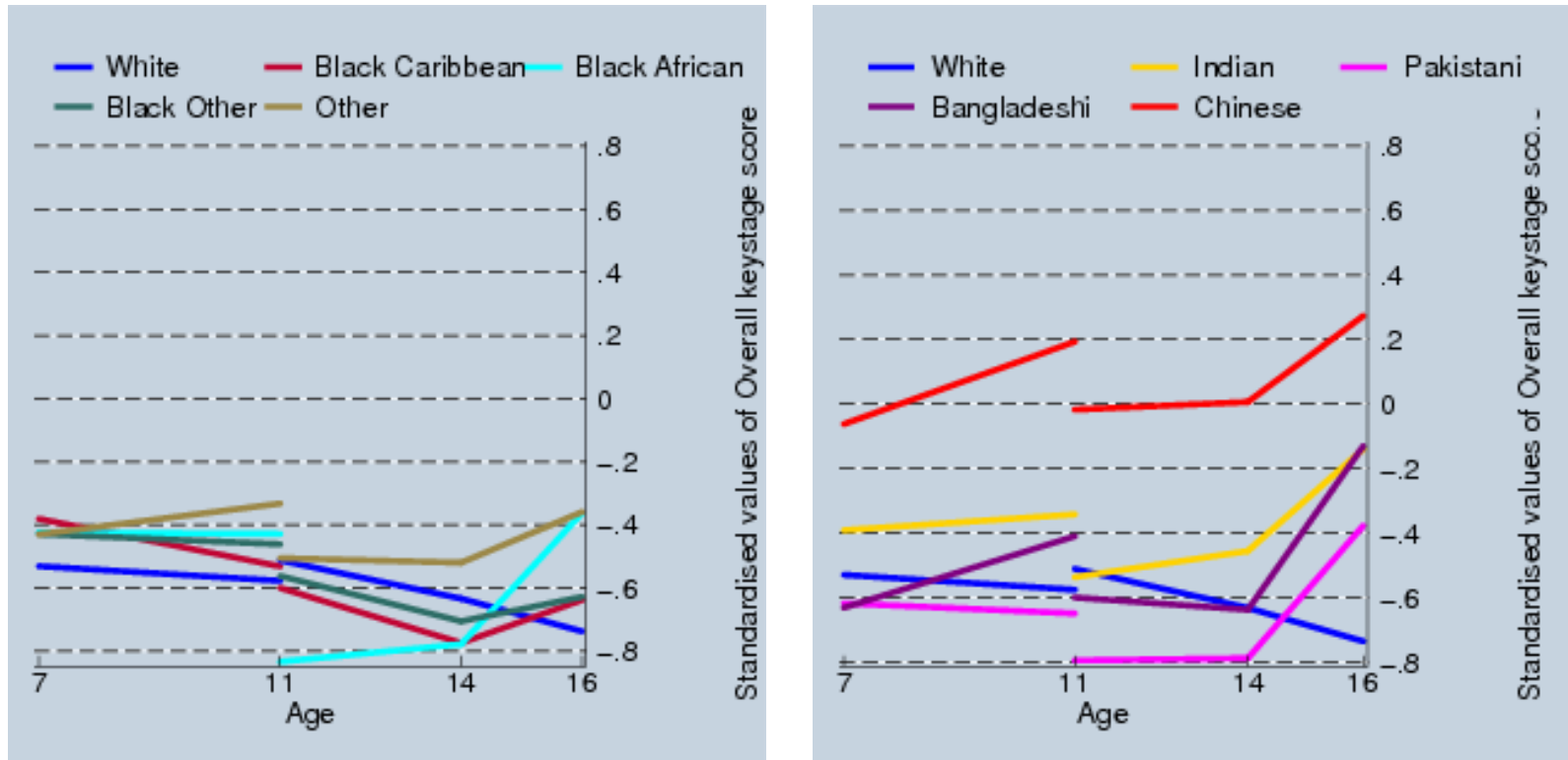
Notes:
[1] Key-stage 1 assessment takes place at age 7, key-stage 2 at age 11, key-stage 3 at age 14 and key-stage 4 at age 16.

Figure WA1b: Raw values for overall standardised values of key-stage[1] scores through time for cohorts 1 and 2 by ethnicity

Pupils without FSM status
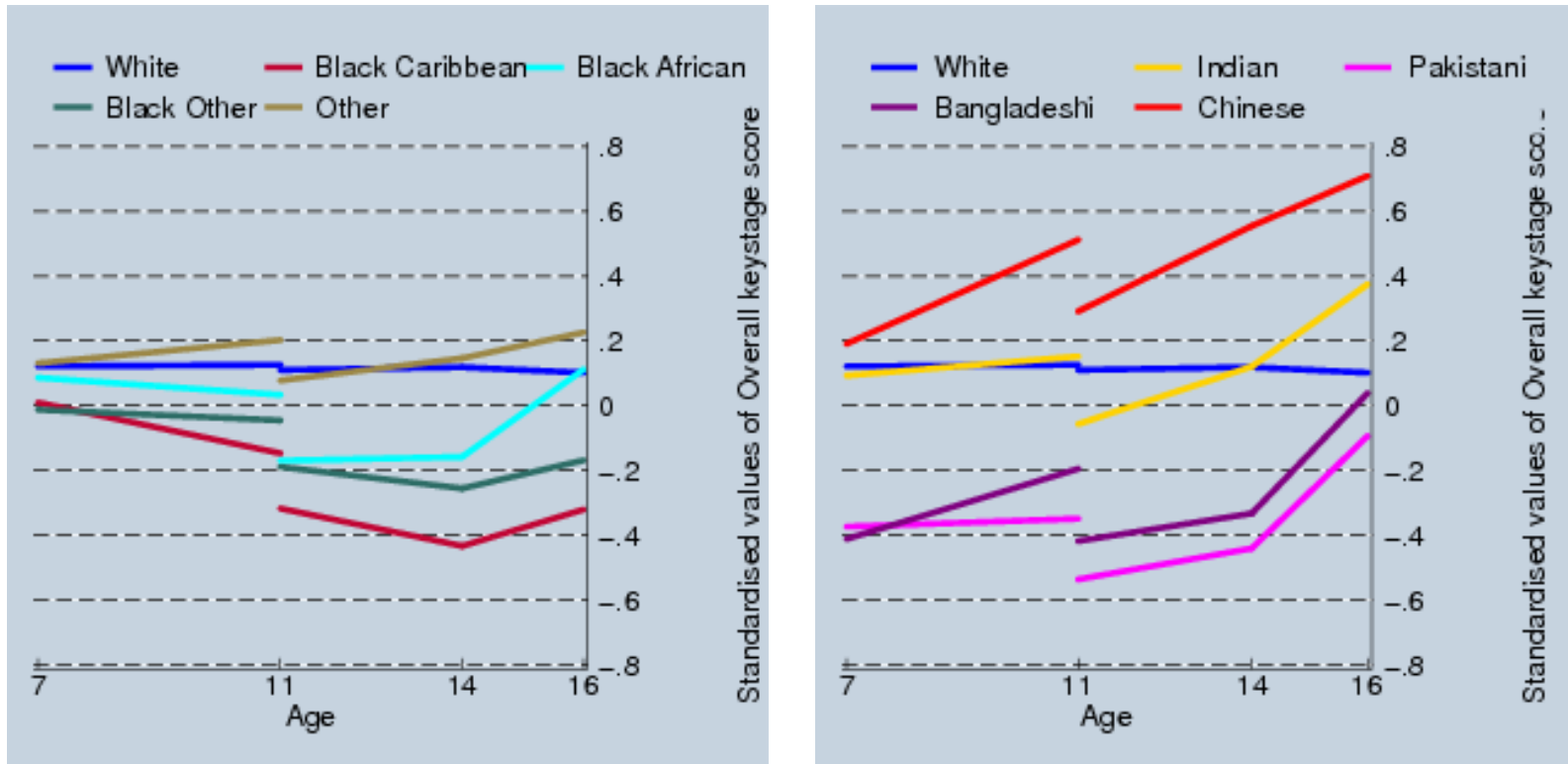
Notes:
[1] Key-stage 1 assessment takes place at age 7, key-stage 2 at age 11, key-stage 3 at age 14 and key-stage 4 at age 16.

Figure WA2a: Raw values for overall standardised values of key-stage[1] scores through time for cohorts 1 and 2 by ethnicity

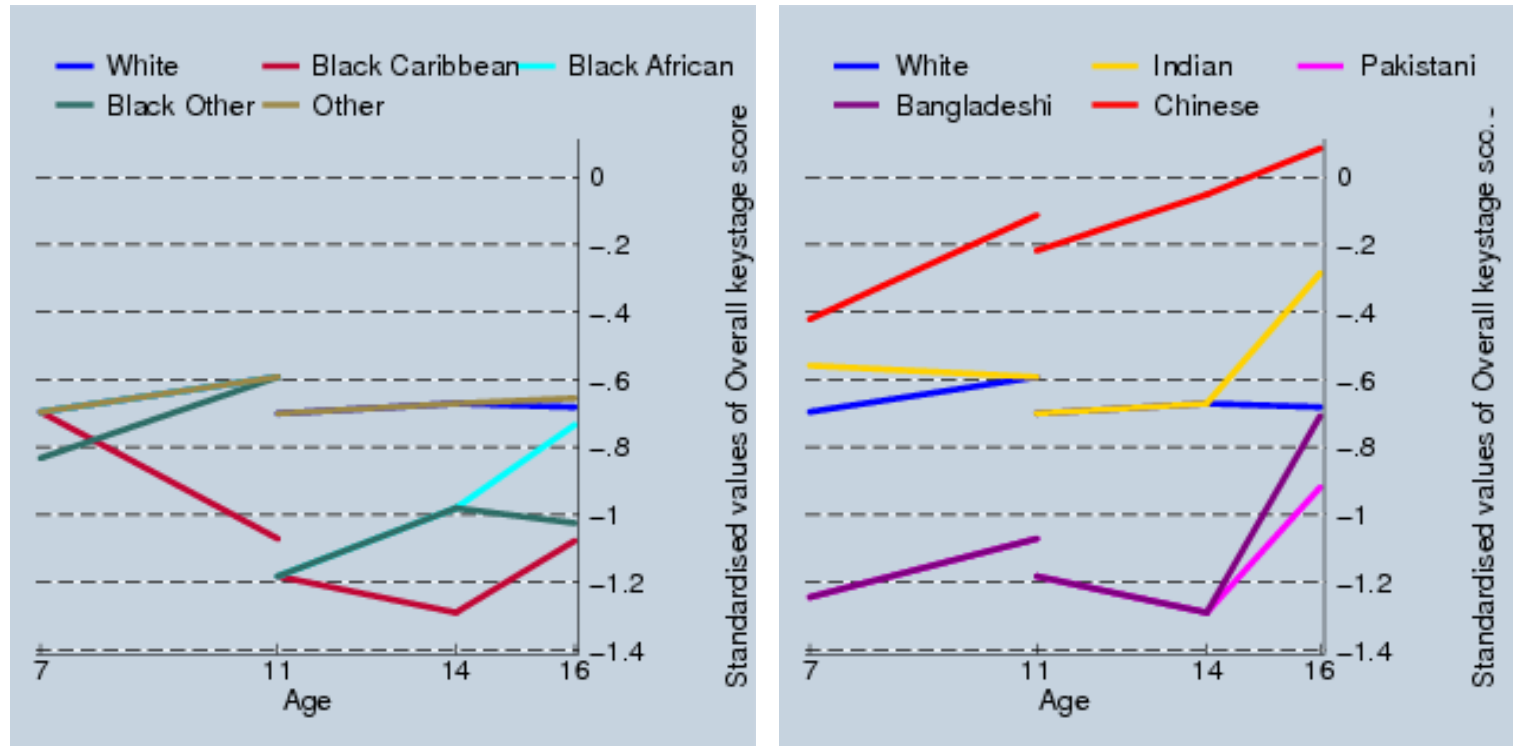For Male pupils

Notes:
[1] Key-stage 1 assessment takes place at age 7, key-stage 2 assessment takes place at age 11, key-stage 3 at age 14 and key-stage 4 at age 16.

Figure WA2b: Raw values for overall standardised values of key-stage[1] scores through time for cohorts 1 and 2 by ethnicity

For female pupils

Notes:
[1] Key-stage 1 assessment takes place at age 7, key-stage 2 assessment takes place at age 11, key-stage 3 at aged 14 and key-stage 4 at age 16.

Figure WA3: Raw values of standardised values of key-stage[1] scores through time for cohorts 1 and 2 using the twenty-fifth percentile
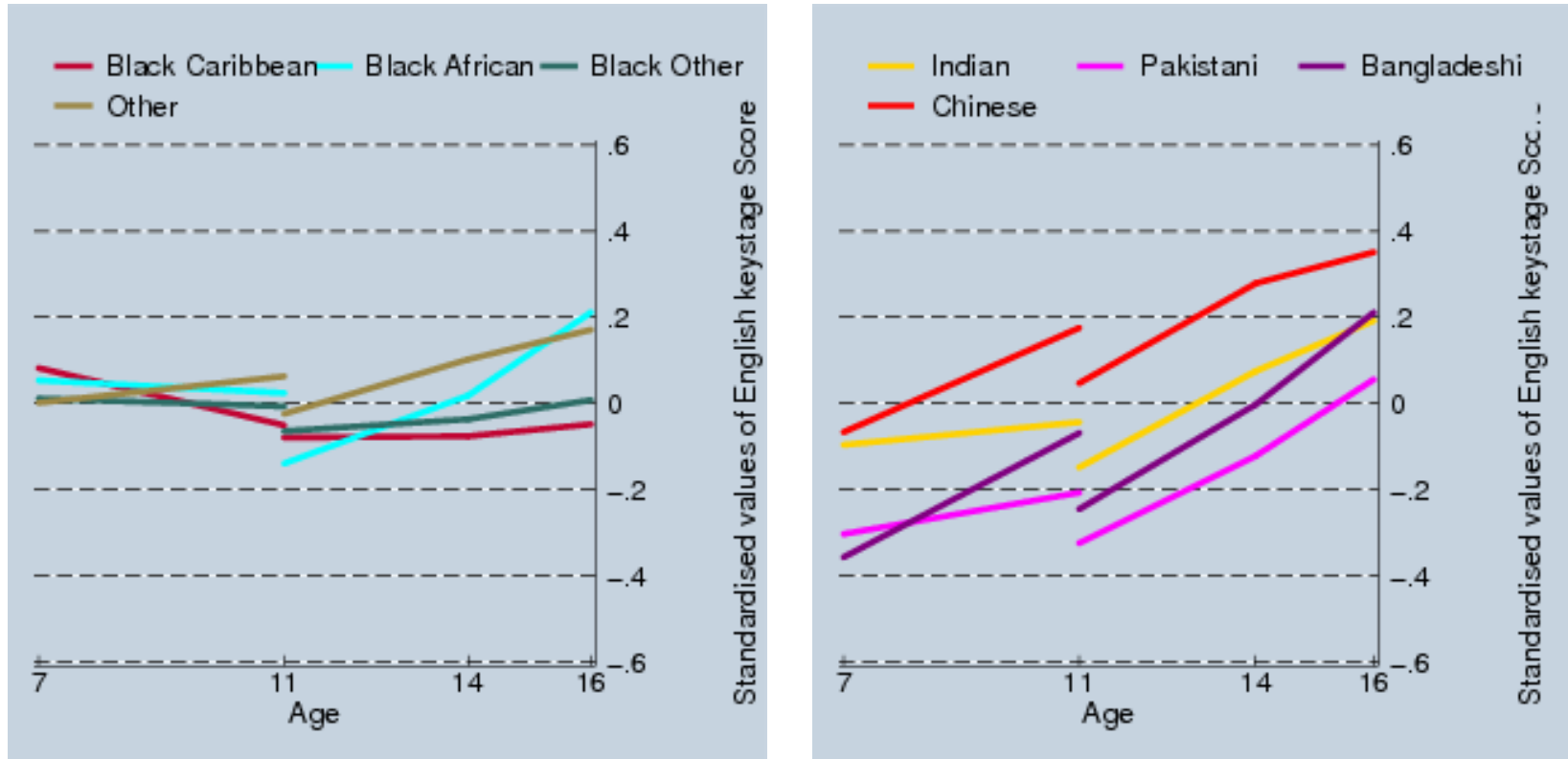

Notes:
[1]Key-stage 1 assessment takes place at aged 7, key-stage 2 at aged 11, key-stage 3 at aged 14 and key-stage 4 at aged 16.
White and Black African pupils have the same value as Other pupils and Pakistani pupils have the same values as Bangladeshi pupils in cohort 1.
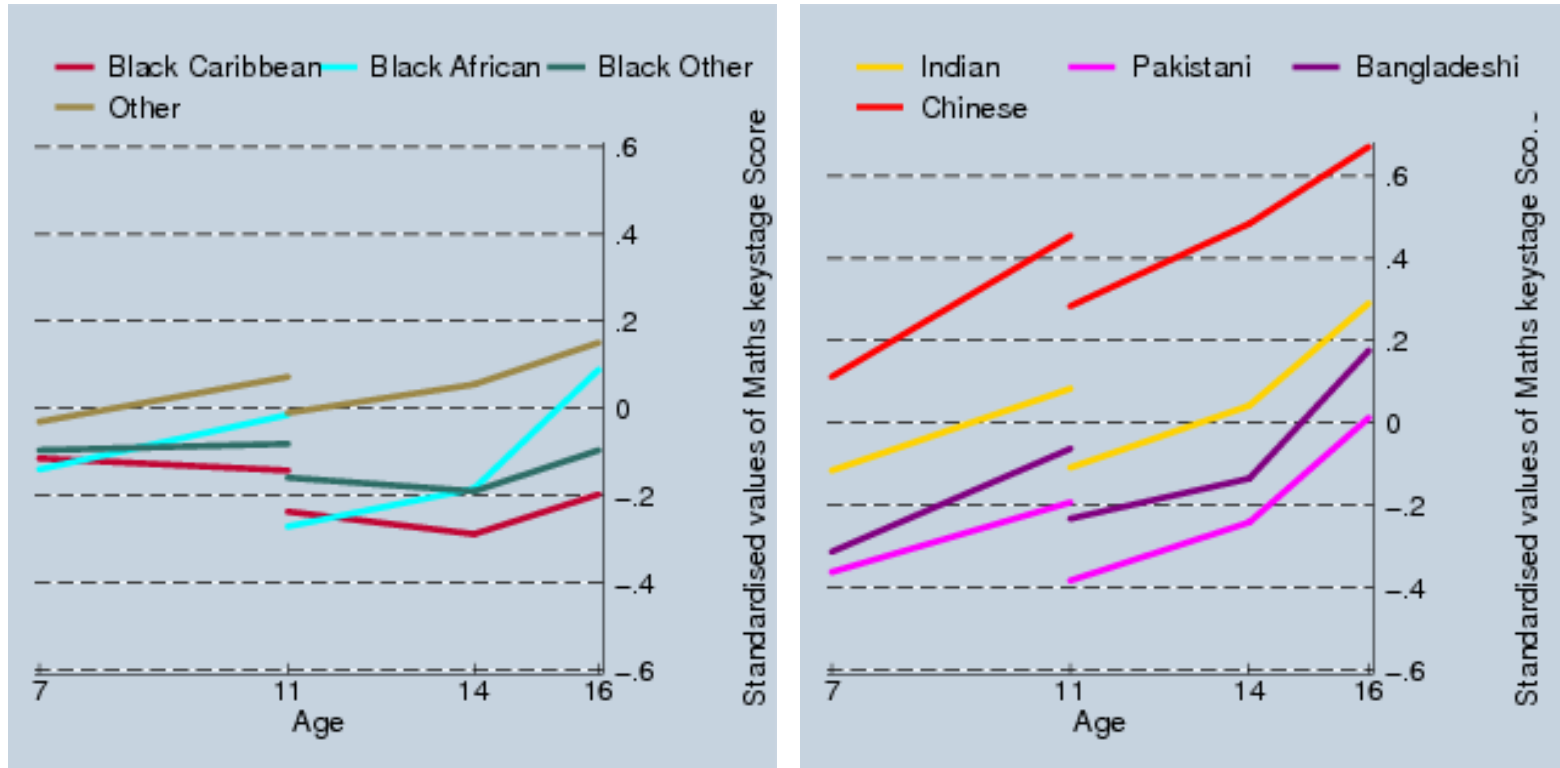
Figure WA4a: 'Group'-White ethnicity conditional gaps[1] in standardised values of English key-stage scores through time for cohorts 1 and 2

Notes:
[1]These 'gaps' are the coefficients on the relevant ethnic group dummy of a regression of the standardised value of the specific overall key-stage test score on dummies for ethnic group (White pupils are the control group), Gender, FSM status, SEN status and Mosaic classification.
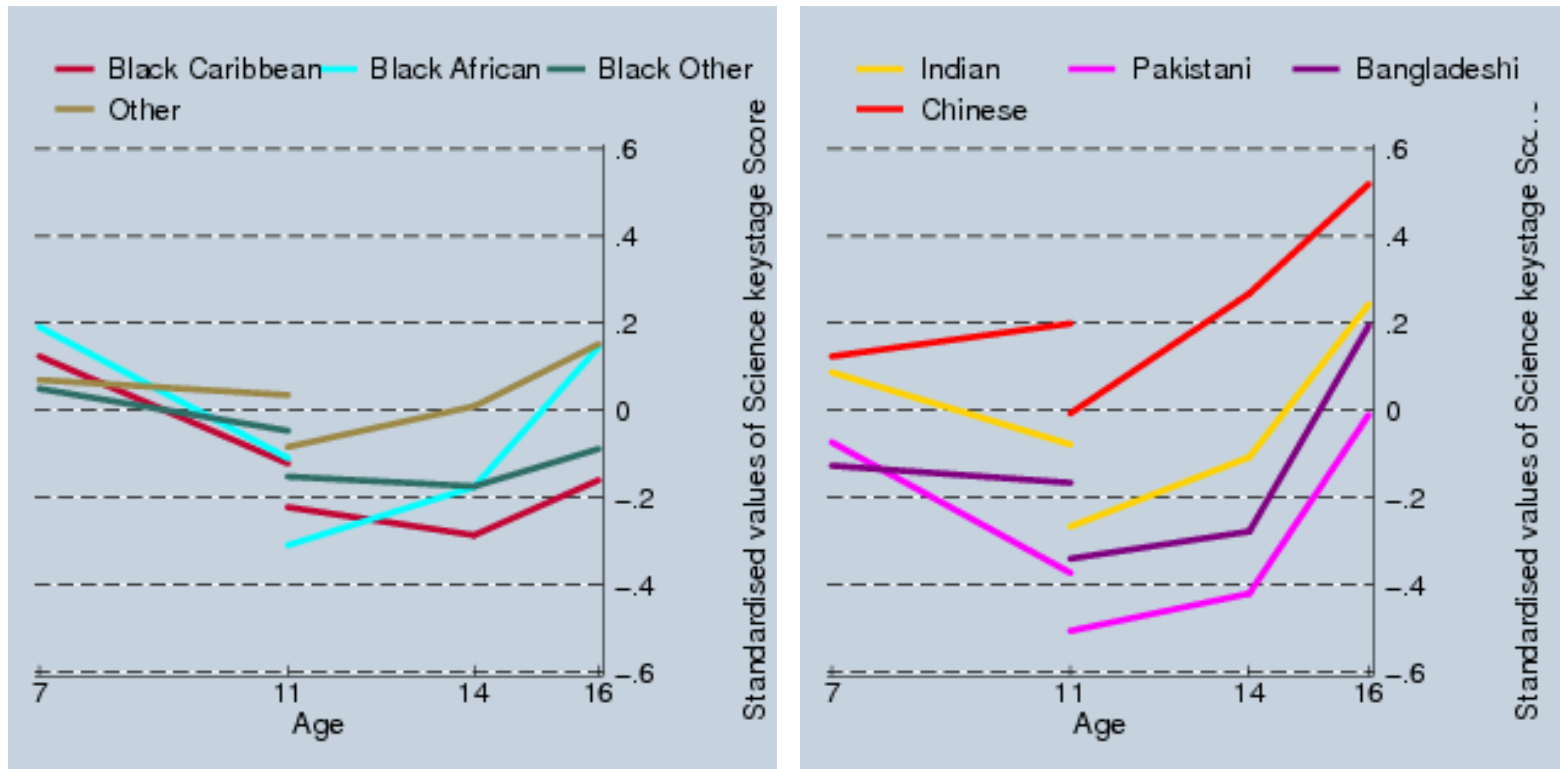
Figure WA4b: 'Group'-White ethnicity conditional gaps[1] in standardised values of maths key-stage scores through time for cohorts 1 and 2

Notes:
[1]These 'gaps' are the coefficients on the relevant ethnic group dummy of a regression of the standardised value of the specific overall key-stage test score on dummies for ethnic group (White pupils are the control group), Gender, FSM status, SEN status and Mosaic classification.

Figure WA4c: 'Group'-White ethnicity conditional gaps[1] in standardised values of science key-stage scores through time for cohorts 1 and 2

Notes:
[1]These 'gaps' are the coefficients on the relevant ethnic group dummy of a regression of the standardised value of the specific overall key-stage test score on dummies for ethnic group (White pupils are the control group), Gender, FSM status, SEN status and Mosaic classification.