A longitudinal analysis of UK second-generation disadvantaged immigrants

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ABSTRACT We consider the relative academic achievement in primary school of second-generation immigrant children in the UK. We use data for a cohort born in 1970 and find that children born to South Asian or Afro-Caribbean parents have significantly lower levels of cognitive achievement in both mathematics and language in primary school. Our analysis also reveals that the negative impact from being born to South Asian parents decreases during primary school while the negative effect from being born to Afro-Caribbean parents remains approximately stable. Evidence from the current education system suggests that although ethnic minority children have relatively low achievement on exit from primary school, they also experience considerable catch up and indeed overtake their White counterparts during secondary school. Our evidence shows that even as long ago as the late 1970s, some groups of ethnic minority pupils, namely those from South Asia, were showing signs of 'catch up' in primary school.

KEY WORDS: Second-generation immigrants; educational disadvantage.

1. Introduction

It is well known that in the UK, immigration status matters for economic outcomes later on in life (Dustmann and Fabbri, 2003). However, there is only limited empirical evidence on how the disadvantage (or advantage) of being an *immigrant* impacts on a child's progression through the UK education system. In this paper we take a longitudinal perspective, assessing the impact of being a second-generation immigrant child in the 1970s on the child's cognitive skill development between the ages of 5 and 10 i.e. in primary school. The analysis therefore can shed light on the extent to which historically the UK education system narrowed the cognitive skill gap between second-generation immigrant children and natives in primary school.

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This work adds to the evidence from three recent papers that have examined these issues in the context of English *secondary* schools. Firstly, Wilson et al. (2009) modeled the progression of ethnic minority students (as distinct from immigrants per se) through secondary school and found that ethnic minority students make more progress than their white counterparts in today's secondary schools. A paper by Dustmann and Theodoropoulos (2008) investigated both the magnitude of the gaps in education achievement between ethnic minority students and their white counterparts, confirming that most ethnic minority groups have higher levels of education achievement than whites. This paper also explored reasons why this educational advantaged does not translate into economic advantage in the labour market. Finally, Algan et al. (2009) compares education and labour market performance of first and second-generation immigrants in three main European countries (France, Germany and the UK). They show that second-generation immigrants in general increased their leaving age from education in the UK compared to the native population. But they showed the progress between first and second generations vary according to national origins, in particular Bangladeshi and Pakistani second-generations immigrants manage to close the gap that existed for their parents, while Caribbean children increase only marginally their leaving age.

The contribution of our paper to this literature is twofold. Firstly, we consider the progression of migrant children in *primary* school (as distinct from the existing literature which has generally focused on secondary school), and secondly, we take a historical perspective and can therefore determine whether the "catch up" of ethnic minority students in today's English secondary schools is mirrored in the 1970s English education system. This latter point is of course relevant if we want to understand whether it is recent government policy that has caused the improvement of the position of ethnic minority students in terms of their education achievement, or if the "catch up" of ethnic minorities is part of a longer term trend.

In the UK, policy-makers have been concerned about the education achievement of children from ethnic minority groups since the end of seventies. In March 1979 the UK government set up the Committee of Enquiry into the education of children from ethnic minority groups, with a particular focus on the children of Caribbean origin. The Committee published an interim report in 1981 and the final report in 1985 (*Education for all*). The final report, also called the Swann Report, concluded that

"West Indian children, on average, are underachieving at school. Asian children, by contrast, show, on average, a pattern of achievement which resembles that of White children, though there is some evidence of variation between different sub-groups".

In this study, we use data on individuals born in 1970, comparing the cognitive skills of children born to immigrants as compared to non immigrant children. We are able to consider the cognitive skill development of four ethnic groups: children with both parents born in a) UK or Europe; b) South Asia; c) Caribbean and d) other countries and mixed combinations. Data unfortunately precludes a more disaggregated categorisation of the ethnic origin of migrants. We seek to measure the impact of migrant status on cognitive skills at age 5 and at age 10 and progression between these ages. The advantage of the data set we use is that it contains rich panel data on a range of individual and family characteristics and therefore in the analysis we are able to control for a range of factors that influence cognitive skill development, including individual characteristics, family environment and family resources. The added-value of this paper is we then analyse the cognitive skill development of these children, to determine the role of immigrant status on how these children progressed up or down the cognitive skill distribution between ages 5 and 10.

The paper is organized into six parts. Section 2 below outlines the data used in our analysis, defines ethnic groups and the three measures of outcomes used in the paper. Section 3 presents the different samples used. Section 4 introduces the methodology and analyzes the impact of ethnic group origin on ability tests at age 5 and 10. Section 5 investigates the progression between ages 5 and 10 with a value-added model. Section 6 concludes with a summary of findings.

2. The Data

In this study, we focus on second-generation immigrants. One reason for this is that first-generation immigrants migrate at a range of different ages and experience different situations before moving to the host country. Depending on the language of origin country, educational system and labour market, these people are more or less disadvantaged when they move to the host country. However, second-generation immigrants are all born in UK so that they have generally experienced the same education system.

The British Cohort Study (BCS) 1970 is an excellent data source with which to analyse second-generation immigrants because the sample is based on all children who were born in UK during one week in April 1970[1] and the data collected on these children throughout their life course is incredibly rich. Following Brewer and Haslum (1986), we define the ethnic groups to which children belong according to the parental region of birth. As presented in table 1, we focus on three ethnic groups: both parents are born in UK or Europe; both parents

are born in South Asia; and both parents are born in the Afro-Caribbean region.[2] Other ethnic groups (e.g. children of parents born in other countries - 100 observations) and other combinations (e.g. children from mixed parents - 752 in total) are grouped together in a fourth category.

Table 1. Ethnic groups of second-generation immigrants (BCS 1970)

	BCS 1970	
Parental region of birth	N	%
UK/Europe	15670	91.23
South Asia	366	2.13
Afro Caribbean	288	1.68
Other/Mixed	852	4.96
Total	17176	

Data Sources: 1970 BCS Age 0 survey. Missing data n=1897.

In terms of modern classifications of ethnicity, the BCS70 data is obviously quite crude. We are unable to disaggregate these ethnic origin groups as finely as we would like. Thus there is some heterogeneity within the different ethnic groups.

Our analysis necessarily suffers from a number of limitations. Ideally we would like to explore children's cognitive skill development throughout their compulsory schooling. Although the BCS children sat the tests at in primary school (ages 5 and 10) *and* secondary school (age 16), unfortunately the test score information at age 16 is generally considered to be of poorer quality.[3] We therefore focus on cognitive development in primary school only. We also have to be mindful of the need to maximize the number of second-generation immigrants from South Asia and of Afro Caribbean origin in our sample. This too prompted us to examine cognitive skill development only between the ages of 5 and 10, which maximises our sample size.

At age 5, the purpose of the BCS70 survey was to study pre-school health and environment and capture elements of these children's entry into the education system. Tests and assessments of the children's ability were administered in their homes by health visitors. Various tests were administered, including the *Human Figure Drawing Test*, a *Copying Designs Test* and the *English Picture Vocabulary Test* (*EPVT*).

The scoring of the *Human Figure Drawing* and *Copying Designs* tests was relatively subjective e.g. coders had to determine whether the drawing conformed to certain standards specified in the instructions. By contrast, other tests were more objective. In particular the

mean vocabulary *EPTV* scores showed no differences across coders. We therefore rely on the EPV Test as a potentially more objective measure of the child's cognitive ability.

The *English Picture Vocabulary Test* (*EPVT*) is an adaptation by Brimer and Dunn (1962) of the American Peabody Picture Vocabulary Test. It is a test which requires the child to match a word to a picture and the test becomes increasingly difficult. The test scores produced from the *EPVT* test were skewed so raw scores were then transformed to a standard normal distribution (mean of zero and standard deviation of one).

The BCS70 Ten-year Follow-up survey was specifically designed to focus on children's educational progression through primary school and the ways in which educational development may be influenced by other events and characteristics. The age 10 tests were administered by the class teacher, and the children were tested in reading, mathematics, language, and reasoning.[4] The exact tests administered were the *Edinburgh Reading Test* (*ERT*), the *British Ability Scales* (*BAS*), the *Friendly Maths Test* (*FMT*) and the *Pictorial Language Comprehension Test* (*PLCT*).

The tests were selected to measure respondents' inherent ability and the cognitive skills that were meant to be acquired during primary education. Clearly not every aspect of the primary school curriculum was covered by these tests. Instead, the tests focused on the children's reading, mathematics, cognitive ability, language comprehension and expression.

The *Edinburgh Reading Test* (*ERT*) is a word recognition test and the BCS70 Age 10 follow up used an abridged version (Godfrey Thomson Unit, 1978). The test is designed to cover a wide age range of ability (age 7-13) and avoid large amounts of left censoring due to poor readers. The shortened test contained 67 items and was not heavily right or left censored (Child Health and Education Study, First Report to the Department of Education and Science on the 10 year Follow-up, Department of Child Health, University of Bristol, 1982).

The *Friendly Maths Test* (*FMT*) was a multiple choice test covering basic mathematical skills, including arithmetic, number, algebra, fractions etc. It consisted of a total of 72 multiple choice questions. The FMT was a specially developed test for this survey, produced with advice from researchers who specialised in primary school mathematics (C. Appleton and J. Kerley).

Two other tests were also administered: the *Pictorial Language Comprehension Test* (*PLCT*)[5] and the *British Ability Scales* (*BAS*)[6]. However we chose to use the *Friendly Maths Test* and the *Edinburgh Reading Test* because these are arguably the most consistent measure of cognitive ability at age 10 compared to our choice of tests at age 5.[7]

3. Descriptive statistics

The tests are scored on different scales at each age. This is problematic as we want to compare different tests at different ages. Our main approach is therefore to standardise each test score. That is, separately for each test, we subtract the test score mean from each pupil's score and divide it by the test score standard deviation. This means that the z-scores are comparable across tests.

We work with different samples for different parts of the analysis. Table 2 presents the proportion of each ethnic group in each sample for each of the tests we used (EPVT, ERT and FMT) and in the restricted sample of pupils who took the tests at age 5 and 10. Sample sizes vary according to the test being considered (10733 children for *English Picture Vocabulary Test at age 5 or* 10683 children for the *Edinburgh Reading Test* and 10696 children for *Friendly Maths Test* at age 10). The restricted sample includes 8613 children who have been tested both in EPVT at age 5 and in ERT and FMT at age 10.

Table 2. Samples

Parental region of birth	Full sample (age 5 - EPVT)		Full sample (age 10 - ERT)		Full sample (age 10 - FMT)		Restricted sample (ages 5 AND 10)	
	N	%	N	%	N	%	N	%
UK/Europe	10144	94.51	9954	93.18	9964	93.16	8140	94.51
South Asia	92	0.86	167	1.56	168	1.57	63	0.73
Afro Caribbean	126	1.17	141	1.32	142	1.33	94	1.09
Other/Mixed	371	3.46	421	3.94	422	3.95	316	3.67
Total	10733		10683		10696		8613	

Data Sources: 1970 BCS Age 0 survey, 1975 BCS Age 5 survey and 1980 BCS Age 10 survey.

In figures 1 to 3 we show the distribution of standardised tests score at age 5 and 10 by ethnic groups.[8] From those figures it may be inferred that at age 10, regardless of the test we consider, children born from Other/Mixed and UK/European parents show quite similar score distributions to one another and higher achievement than children from other ethnic origins.

Figure 1. Standardized EPVT at age 5 by ethnic groups

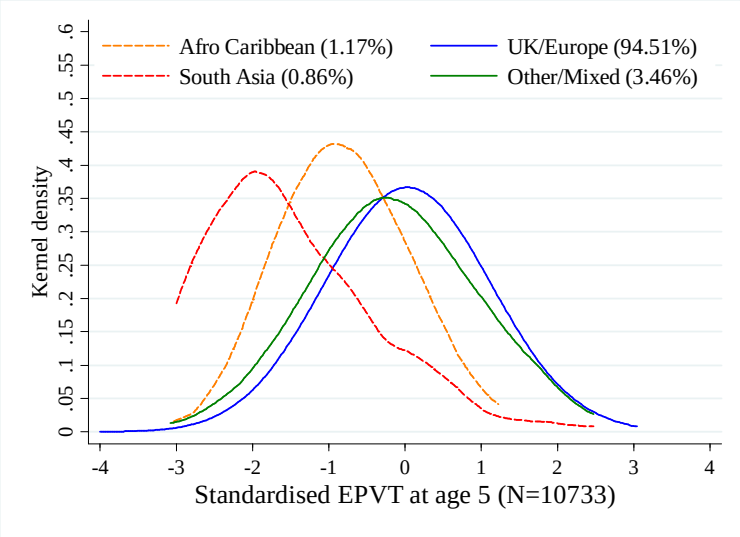


Figure 2. Standardized ERT at age 10 by ethnic groups

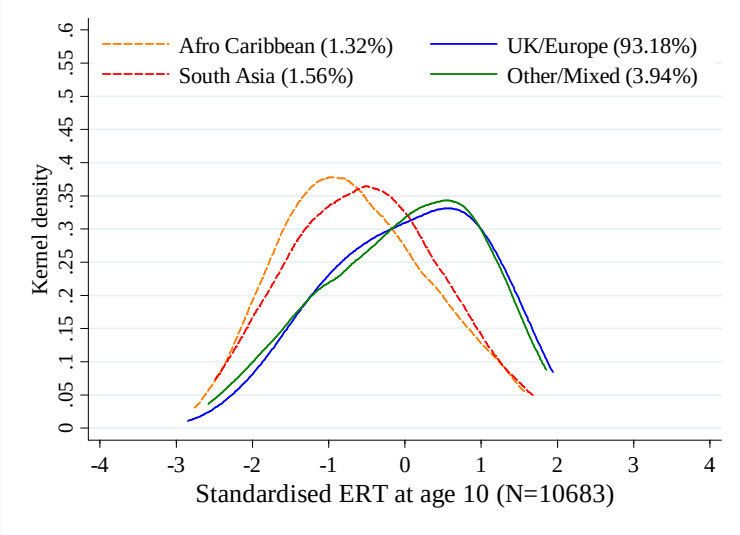
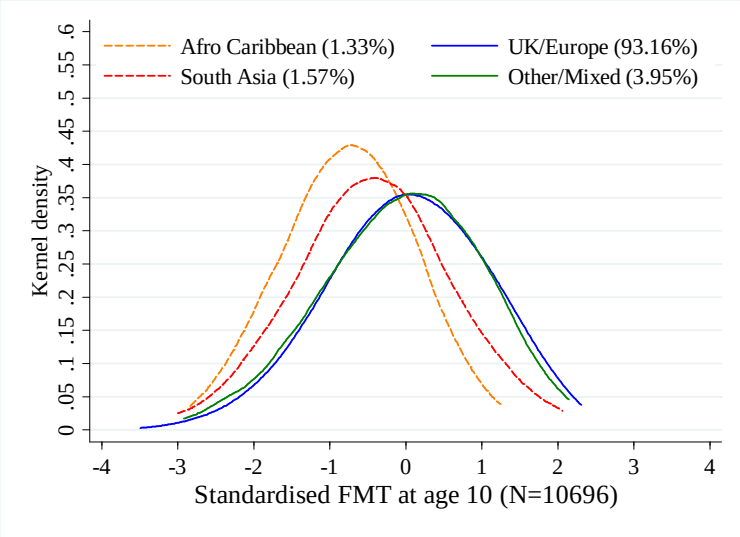


Figure 3. Standardized FMT at age 10 by ethnic groups



4. The impact of ethnic group on early tests scores

Children's educational achievement is influenced by many factors. It is well known that there is a strong relationship between children's academic performance and their characteristics and family background (Coleman, 1966; Leibowitz, 1974; Haveman and Wolfe, 1995).

For this paper we adopt an Educational Production Function framework (EPF). This approach assumes that various characteristics (individual and family for example) impact on a pupil's cognitive ability or their school achievement. In its general form, it can be modeled in the following way:

$$A_i = \beta . Z_i + u_i \quad (1)$$

where A is an individual measure of cognitive skill or educational achievement, Z is a vector of individual characteristics and variables describing family background and u_i a random disturbance. In this paper we analyze the determinants of age 5 and 10 cognitive skills (as measured by the EPVT, ERT or FMT test scores). We specifically control for pupil characteristics (gender, birth-weight for example), as well as family background and resources (e.g. language used in the home, number of siblings, family income and parental social class, as well as parental education and interest in the child's education). In addition we control for some parenting behaviors, such as whether the mother reads to the child, in an attempt to allow for what is usually unobserved characteristics of the mother that may influence the child's cognitive development. In Section 5, we then estimate a value added model e.g. measuring the value added between the age 5 and 10 (Dolton et al., 2005). The model regresses the age 10 tests on prior cognitive skill of the child as measured by age 5 scores and we add the same control variables as to the models described earlier:

$$A_i = \beta_0.\text{ethnic\_group} + \beta_1.\text{individual\_characteristics} + \beta_2.\text{family\_background} + \beta_3.\text{number of days read to at age 5 (unobserved mother's abilities)} + \beta_4.\text{test scores at age 5 (prior abilities of the children)} + u_i \quad (2)$$

This approach enables us to measure cognitive development during primary school and the role of different individual and family background characteristics. Our variable of main interest is the migrant status of the child.

Table 3 presents the association between parental ethnic origin and test scores at age 5 (EPVT) and 10 (ERT and FMT), with no additional controls in the model. Children with both parents born in South Asia or in Afro Caribbean perform worse than children with both

parents born in UK/Europe. The disadvantage of being a second-generation immigrant decreases between age 5 and 10, hinting at a potential catch up.

At age 5, the most disadvantaged children are those with both parents born in South Asia (our results show a 55% lower performance for South Asian origin children as compared to the UK/Europe reference group)[9], followed by those with parents of Afro/Caribbean origin (30% poorer performance than the reference group) and finally those with parents in the "Other/Mixed" category. At age 10, the most disadvantaged children are those with both parents born in Africa/Caribbean, followed by those with both parents born in South Asia. The difference between children with both parents born in UK or Europe and children with parents in the "Other/Mixed" category is insignificant.[10]

What is noticeable is that the coefficients on the various ethnic groups changes from age 5 to age 10. The negative impact from being born to South Asian parents decreases between age 5 and age 10 and the negative effect from being born to Afro-Caribbean parents remains stable. These results hint therefore that as children progress through primary school the ethnic gap reduces for South Asian pupils but not for those of Afro-Caribbean origin.

Table 3. The impact of ethnic group on ability tests at ages 5 and 10

	Age 5		Age 10		Age 10	
	EPVT (1)	EPVT (2)	ERT (3)	ERT (4)	FMT (5)	FMT (6)
UK/Europe	ref.	ref.	ref.	ref.	ref.	ref.
South Asia	-1.5417***	-1.4506***	-0.5449***	-0.4872***	-0.4632***	-0.3756***
	(0.1027)	(0.1042)	(0.0775)	(0.0801)	(0.0770)	(0.0794)
Afro Caribbean	-0.8405***	-0.7648***	-0.6572***	-0.5466***	-0.7854***	-0.6436***
	(0.0879)	(0.0905)	(0.0842)	(0.0879)	(0.0837)	(0.0870)
Other/Mixed	-0.2053***	-0.2073***	-0.0610	-0.0545	-0.0717	-0.0547
	(0.0519)	(0.0518)	(0.0494)	(0.0495)	(0.0492)	(0.0491)
LEAs fixed effects		✓		✓		✓
Constant	0.0399***	0.0383***	0.0262***	0.0236**	0.0248**	0.0209**
	(0.0097)	(0.0097)	(0.0100)	(0.0099)	(0.0099)	(0.0098)
Obs.	10733	10733	10683	10683	10696	10696
Adjusted R^2	0.0292	0.0476	0.0099	0.0247	0.0112	0.0323

Data Sources: 1970 BCS Age 0 survey, 1975 BCS Age 5 survey and 1980 BCS Age 10 survey. Notes: dependant variables are standardised test scores at age 5 and 10. Standard errors are in parentheses. ***: significant at 1%, **: significant at 5%, *: significant at 10%. LEAs: Local Education Authorities.

The raw differences above may however be spurious if other individual characteristics and family background factors vary by ethnicity and have their own independent effect on test

scores. Table 4 therefore presents regression results with additional controls for individual and family characteristics. Whilst these factors are not the focus of this paper, we discuss them later. In terms of the key variables of interest, Table 4 shows that the impact of being a second-generation immigrant remains negative and significant at age 5 and 10 (in math) once we control for individual and family characteristics. The coefficients decrease by half once we control for the individual and family characteristics discussed above (e.g. children born to South Asian parents achieve almost 30% lower scores than the reference group, at age 5).[11] This suggests that some of the apparent negative effect of being born to an immigrant family is really attributable to other factors, such as family financial circumstances. The negative association between being born to South Asian parents and cognitive outcomes disappears by age 10, once we control for individual characteristics. Although the standard errors are relatively large and we should be cautious about this result, it suggests that South Asian second generation immigrants appear to catch up with UK born children during primary school, at least in terms of their language (if not their mathematics). The same is not true for children born to Afro-Caribbean parents, who continue to have lower cognitive skills in mathematics *and* language at age 10.[12]

Due to the richness of the data, we are also able to control for some aspects of the family environment. We include a variable measuring parental interest in the child's education, a proxy for both time invested in children by mother and father and unobserved parental characteristics. This variable is positively and significantly related to academic achievement. We also include a variable measuring the extent to which mothers read to their children at age 5, which we use as a proxy for the unobserved attitudes and abilities of the mother. This proxy may be particularly important for mothers from minority ethnic groups whose education and labour market status, for example, may be a poorer indicator of their actual ability because their education and skills may not be fully recognised in the UK system. Our results show that the number of days of reading has a positive significant effect on children's test scores. The most important impact is at age 5, as one might expect given that as children age one might expect them to read for themselves. However, we may also be under-estimating the effect at age 5 as those with missing values on this variable (4% at age 5 and 17% at age 10) have higher test scores. In any case, inclusion of these family environment measures impacts on the coefficients on migrant status but does not eliminate our result, e.g. that children with South Asian and Afro-Caribbean parentage achieve less well in cognitive achievement tests at ages 5 and 10.

Table 4. The impact of ethnic group on ability tests at ages 5 and 10, controlling for individual characteristics and family background

	Age 5		Age 10		Age 10	
	EPVT (1)	EPVT (2)	ERT (3)	ERT (4)	FMT (5)	FMT (6)
UK/Europe	ref.	ref.	ref.	ref.	ref.	ref.
South Asia	-0.8268***	-0.7969***	-0.0706	-0.0473	-0.1512*	-0.0894
	(0.1105)	(0.1126)	(0.0799)	(0.0828)	(0.0807)	(0.0833)
Afro Caribbean	-0.4906***	-0.4370***	-0.3123***	-0.2126***	-0.4437***	-0.3064***
	(0.0812)	(0.0839)	(0.0746)	(0.0780)	(0.0754)	(0.0785)
Other/Mixed	-0.1003**	-0.0978**	-0.0142	0.0001	-0.0074	0.0164
	(0.0479)	(0.0482)	(0.0439)	(0.0441)	(0.0444)	(0.0445)
Individual characteristics	✓	✓	✓	✓	✓	✓
Family Background	✓	✓	✓	✓	✓	✓
LEAs fixed effects		✓		✓		✓
Constant	-2.8709***	-1.9318***	-2.8789***	-2.6215***	-3.6648***	-3.4298***
	(0.4246)	(0.4921)	(0.4003)	(0.4686)	(0.4049)	(0.4714)
Observations	10733	10733	10683	10683	10696	10696
Adjusted R^2	0.2048	0.2096	0.2467	0.2519	0.2220	0.2336

Data Sources: 1970 BCS Age 0 survey, 1975 BCS Age 5 survey and 1980 BCS Age 10 survey. Notes: dependant variables are standardised test scores at age 5 and 10. Standard errors are in parentheses. ***: significant at 1%, **: significant at 5%, *: significant at 10%. LEAs: Local Education Authorities. Definition of variables and summary statistics are reported in tables A5 and A6 in appendix.

Language skills are important to perform well at school and language used at home is directly linked with ethnicity. Poor national performances in international tests are sometimes explained by the fact that there are a lot of immigrants in the country and that these immigrants are not fluent in the language of the host country (OECD, 2006). Specifically Schnepf (2007) found that "in the UK and the USA, language skills seem to be the greatest barrier for immigrants to reach similar achievement scores than natives". We test these arguments in our data by including a variable indicating whether or not the individual speaks English in the home. If a child does not speak English in the home at age 5, this has a significant and negative effect on their EPVT score but not at age 10. The impact of language at home is probably different depending on maternal education. Speaking another language other than English at home may be less important if parents are well educated and this may be particularly so if the mother is well educated. When we control for mother's education, language spoken in the home remains significant in the reading and mathematics equations at age 5 and at age 10 in the mathematics model only. When we control for family income

however, the language variable becomes insignificant at age 5 but remains significant at age 10 (at the 1% level).

To investigate the importance of language in the home, we also explored interactions between language spoken and migrant status.[13] Counterintuitively, the interaction between being of South Asian origin and not speaking English at home has a *positive* and significant impact on ERT scores at age 10. The main effect from being of South Asian origin remains negative and significant. Whilst this result may seem surprising, we note that only 6.55% of children of South Asian parentage actually claim to speak English in their homes so this sample size means we should be cautious in reading too much into this result.

Our results indicate that the number of siblings in the family is important, presumably because family size affects both income per head and time allocation per child by parents. In our data the average number of siblings for UK born pupils is just over 2 and around 3.5 for South Asian children and just under 3 for Afro-Caribbean children. However, in the regressions the number of siblings is only negatively significant (at the 1% level) at age 5. Having an additional brother (or sister) is associated with a reduction in the child's standardized EPVT score of about 0.076 points.[14] Controlling for family size does impact on the migrant/ethnicity variables. Specifically the apparently negative effect from being born to South Asian or Afro-Caribbean parents is reduced once we control for family size. Some of the literature has also shown that birth order is an important determinant of academic achievement (Hauser and Sewell, 1985; Behrman et al. 1986; Hanushek, 1992 and Black et al. 2005). Controlling for the fact that the child was first born or not does not however change our results, although the first born variable is negative and significant (at 1%) at age 5, positive and significant (at 1%) at age 10 in reading and not significant in the mathematics equation at age 10.

Differences in the quality of schooling pupils experience will also impact on their cognitive achievement (research suggests that around 10-20 of the variation between pupils appears attributable to the school they attend (Reynolds et al., 1996)). School quality however, is extremely difficult to define (Gray, 2004). More crucially from a modelling perspective, it is clearly the case that school choice is endogenous. Parents move to particular areas to access particular schools (see Gibbons and Machin (2003) who also show that parents pay a considerable premium to access good quality secondary schools). A simple OLS regression which controls for school characteristics is implicitly assuming that pupils are randomly allocated to schools. Additionally in our data we only have one or two children per school so identifying any school effect is impossible. We therefore acknowledge that we are

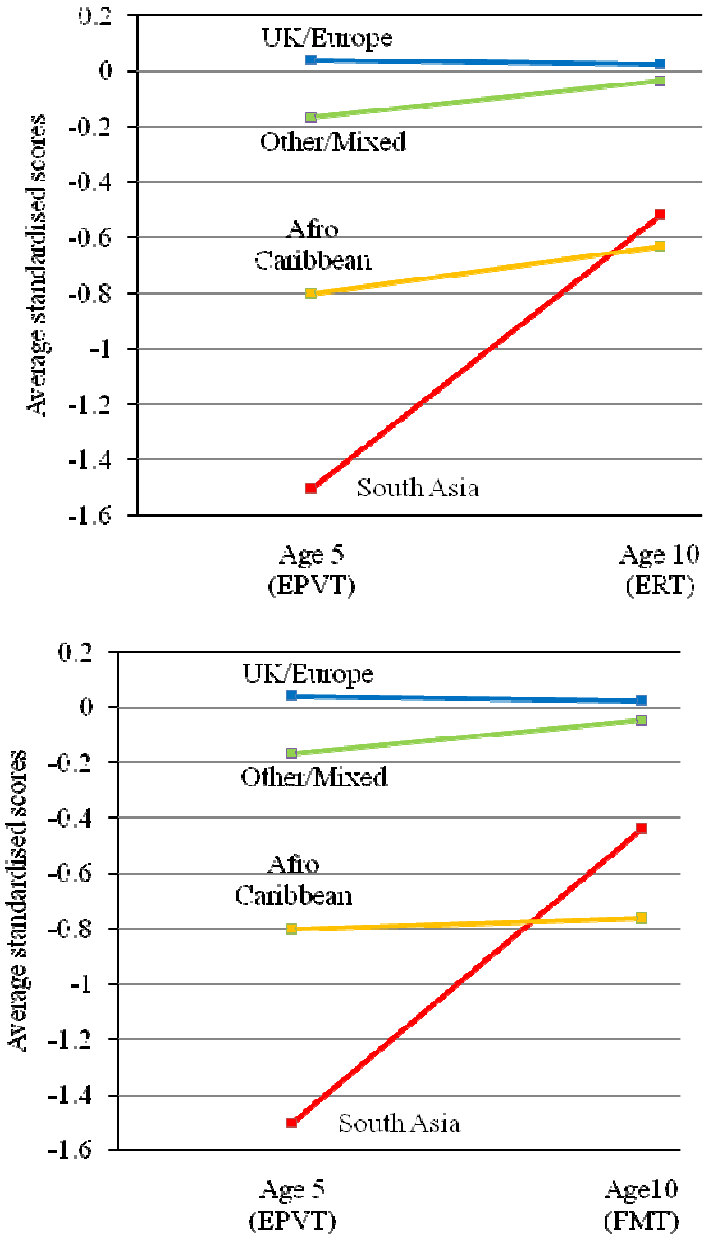
not controlling for aspects of the children's primary schooling. To the extent that children from South Asian and Afro-Caribbean parentage attend inferior quality schools, we may be over stating the effect of migrant status. However, since access to poor quality schooling is one mechanism by which migrant status is likely to impact on cognitive achievement, we do not believe this undermines the usefulness of our results.

5. Progression in literacy and numeracy between age 5 and 10

Figure 4 presents average standardised test scores at age 5 and 10 by ethnic groups. At age 5, we can see that children in the Afro Caribbean and South Asia categories perform worse than these with UK/European born parents. The most disadvantaged children are those with both parents born in South Asia who perform about 2 standard deviations less than children with both parents born in UK/Europe. Interestingly, this difference among ethnic groups tends to decrease considerably between age 5 and 10 suggesting some narrowing of the migrant gap in cognitive skill as children progress through primary schooling. The catch up appears particularly steep for South Asian pupils.

We explore this progression using regression analysis. The specification in equation (2) allows a flexible relationship between prior age 5 achievement and age 10 achievement. We also test a value added model where we regress the change in test score percentile achieved between age 10 and age 5 against the same range of background variables.

Figure 4. Average standardized scores at age 5 and 10 by ethnic groups



Data Sources: 1970 BCS Age 0 survey, 1975 BCS Age 5 survey and 1980 BCS Age 10 survey.
Notes: sample sizes are 10733 children at age 5 for *English Picture Vocabulary Test* (EPVT), 10683 at age 10 for *Edinburgh Reading Test* (ERT) and 10696 at age 10 for *Friendly Maths Test* (FMT).

Tables 5 and 6 present the quintile distribution of children's test scores between age 5 and 10. If each child stays in his quintile of origin, everybody should be on the diagonal. As we can see, this is not the case which means that a majority of children move up or down the distribution between age 5 and 10. Besides, generally the pattern of movement in the quintile distribution from age 5 to 10 is very similar regardless of whether we focus on the ERT or the FMT test.

Table 5. EPVT age 5 and ERT age 10 quintile distributions (row percentages)

EPVT at age 5	ERT at age 10					
	First	Second	Third	Fourth	Fifth	Total
First	752	458	265	182	99	1756
	(42.82)	(26.08)	(15.09)	(10.36)	(5.64)	(20.39)
Second	513	472	391	291	181	1848
	(27.76)	(25.54)	(21.16)	(15.75)	(9.79)	(21.46)
Third	283	405	424	428	331	1871
	(15.13)	(21.65)	(22.66)	(22.88)	(17.69)	(21.72)
Fourth	175	249	344	373	420	1561
	(11.21)	(15.95)	(22.04)	(23.89)	(26.91)	(18.12)
Fifth	110	175	275	359	658	1577
	(6.98)	(11.10)	(17.44)	(22.76)	(41.72)	(18.31)
Total	1833	1759	1699	1633	1689	8613
	(21.28)	(20.42)	(19.73)	(18.96)	(19.61)	(100)

Data Sources: 1970 BCS Age 0 survey, 1975 BCS Age 5 survey and 1980 BCS Age 10 survey.

Table 6. EPVT age 5 and FMT age 10 quintile distributions (row percentages)

EPVT at age 5	FMT at age 10					
	First	Second	Third	Fourth	Fifth	Total
First	742	389	304	197	124	1756
	(42.26)	(22.15)	(17.31)	(11.22)	(7.06)	(20.39)
Second	475	443	395	316	219	1848
	(25.70)	(23.97)	(21.37)	(17.10)	(11.85)	(21.46)
Third	288	410	491	376	306	1871
	(15.39)	(21.91)	(26.24)	(20.10)	(16.35)	(21.72)
Fourth	189	244	368	353	407	1561
	(12.11)	(15.63)	(23.57)	(22.61)	(26.07)	(18.12)
Fifth	115	198	306	396	562	1577
	(7.29)	(12.56)	(19.40)	(25.11)	(35.64)	(18.31)
Total	1809	1684	1864	1638	1618	8613
	(21.00)	(19.55)	(21.64)	(19.02)	(18.79)	(100)

Data Sources: 1970 BCS Age 0 survey, 1975 BCS Age 5 survey and 1980 BCS Age 10 survey.

The first two columns (1a/b and 2a/b) in table 7 show equivalent results to those presented in columns 3 and 4 of tables 3 and 4 but the estimated coefficients are now based on a restricted sample for whom we have full test information at ages 5 and 10. As we want to look at progress between these ages, it is essential we have test information at both age 5 and 10. Using this restricted sample, the impact of ethnic origin remains negatively significant for South Asian and Afro-Caribbean pupils. Once we control for individual characteristics and family background, only the dummy for Afro-Caribbean parentage is negatively significant. In other words we obtain similar results with our restricted sample to those obtained with the full sample. Having re-assured ourselves that the composition of the restricted sample is not

substantially different, we now move on to focus on the progression of pupils between ages 5 and 10.

In column (3a/b), we estimate a form of value added model, whereby we model age 10 cognitive achievement controlling for prior achievement at age 5 (e.g. standardized English Picture Vocabulary Test (EPVT) score at age 5). Children who obtain good scores in EPVT at age 5 obtain better scores in the Edinburg Reading Test (ERT) at age 10. Controlling for prior achievement at age 5, ethnic origin is significant and positive for pupils of South Asian background and negative but not significant for children with Afro Caribbean parents. This implies that children with South Asian parents "catch up" to between ages 5 and 10, whilst the gap between children with Afro-Caribbean parents and UK born parents actually remains unchanged during primary school. In other words, children with Afro-Caribbean parents do not catch up with children who have UK born parents, at least not during primary school. Indeed, if we do not control for regions (Local educational authorities) as in col. 3a and 4a , we find evidence that Afro-Caribbean children tend to make less progress than Whites, implying that they go further down the distribution from 5 to 10. This decrease is not observed within LEA's (col. 3b and 4b), which implies that the fall is due to different educational policies in the LEA.

In column (4a/b), we model the value added relationship differently. In this specification, the dependant variable is the difference between the quantile scores in the ERT at age 10 and the quantile scores in the EPVT at age 5. Due to the limited sample size, we use 50 quantiles. We try to see how ethnic origin affects a move up or down the test score distributions between ages 5 and 10, controlling for where each child starts in the distribution at age 5 (quantile EPVT score at 5). Clearly it is not possible to move down the distribution if you start at the first quantile and you are much more likely to move up the distribution. We control for this by including the age 5 position.

Table 7. The impact of ethnic origin on progression in cognitive test scores between the ages of 5 and 10

	ERT (age 10)		ERT (age 10)		ERT (age 10)		Quantile change between 5 and 10 (ERT-EPVT)	
	(1a)	(1b)	(2a)	(2b)	(3a)	(3b)	(4a)	(4b)
UK/Europe	ref.	ref.	ref.	ref.	ref.	ref.	ref.	ref.
South Asia	-0.2906**	-0.2016	0.0038	0.0669	0.2795**	0.3322***	2.3858	3.1452*
	(0.1246)	(0.1270)	(0.1253)	(0.1279)	(0.1191)	(0.1213)	(1.7233)	(1.7573)
Afro Caribbean	-0.7548***	-0.6201***	-0.3438***	-0.2252**	-0.2009**	-0.0970	-2.7424**	-1.3820
	(0.1022)	(0.1060)	(0.0903)	(0.0938)	(0.0857)	(0.0889)	(1.2419)	(1.2895)
Other/Mixed	-0.0397	-0.0405	-0.0030	0.0106	0.0268	0.0395	0.3199	0.4904
	(0.0565)	(0.0567)	(0.0501)	(0.0505)	(0.0475)	(0.0478)	(0.6885)	(0.6928)
Individual characteristics			✓	✓	✓	✓	✓	✓
Family background			✓	✓	✓	✓	✓	✓
LEAs fixed-effects		✓		✓		✓		✓
EPVT score at 5					0.3105***	0.3150***		
					(0.0099)	(0.0100)		
Quantile EPVT score at 5							-0.6913***	-0.6866***
							(0.0099)	(0.0100)
Constant	0.0485***	0.0464***	-2.8656***	-2.8240***	-2.8709***	-2.8611***	-24.5814***	-24.6478***
	(0.0109)	(0.0109)	(0.4434)	(0.5167)	(0.4201)	(0.4889)	(6.0794)	(7.0978)
Obs.	8613	8613	8613	8613	8613	8613	8613	8613
Adjusted R^2	0.0066	0.0190	0.2502	0.2544	0.3269	0.3326	0.3995	0.4036

Data Sources: 1970 BCS Age 0 survey, 1975 BCS Age 5 survey, 1980 BCS Age 10 survey. Notes: dependant variables are standardised test scores (ERT) at age 10 for the six first columns and the difference between quantile at age 10 and quantile at age 5 in the last two columns. Standard errors are in parentheses. ***: significant at 1%, **: significant at 5%, *: significant at 10%.

The mean value of the quantile scores in the EPVT at age 5 for the restricted sample is 24.8 and the mean value of the quantile scores in ERT at age 10 is 24.9. There are important differences in the rate of progression between those of different ethnic origin (see table 8). We can see that pupils with South Asian parents move up the distribution, on average, between age 5 and age 10. On the other hand, children with Afro Caribbean parents do not tend to move up the distribution between ages 5 and 10.

Table 8. Mean value of quantile scores in EPVT at age 5 and in ERT at age 10

Parental region of birth	Age 5	Age 10	N
UK/Europe	25.1	25.1	8140
South Asia	7.4	20.7	63
Afro Caribbean	13.2	14.5	94
Other/Mixed	22.4	24.5	316
Total	24.7	24.9	8613

Data Sources: 1970 BCS Age 0 survey, 1975 BCS Age 5 survey, 1980 BCS Age 10 survey.

Those results are largely confirmed when the analysis is repeated using the Numeracy tests (Table 9). The only notable difference is that pupils with parents of Afro-Caribbean origin tend to decrease their relative performance between 5 and 10 compared to the reference group (those with UK/European born parents).

Table 9. The impact of ethnic origin on progression in cognitive test scores between the ages of 5 and 10

	FMT (age 10)		FMT (age 10)		FMT (age 10)		Quantile change between 5 and 10 (FMT-EPVT)	
UK/Europe	ref.	ref.	ref.	ref.	ref.	ref.	ref.	ref.
South Asia	-0.2040	-0.0955	-0.0428	0.0428	0.1917	0.2667**	1.1606	2.3027
	(0.1241)	(0.1260)	(0.1269)	(0.1289)	(0.1226)	(0.1244)	(1.7975)	(1.8244)
Afro Caribbean	-0.8479***	-0.6854***	-0.4730***	-0.3250***	-0.3514***	-0.2168**	-5.4742***	-3.4413**
	(0.1018)	(0.1052)	(0.0914)	(0.0946)	(0.0882)	(0.0911)	(1.2954)	(1.3387)
Other/Mixed	-0.0300	-0.0217	0.0315	0.0517	0.0569	0.0762	0.9702	1.2667*
	(0.0563)	(0.0562)	(0.0508)	(0.0509)	(0.0489)	(0.0490)	(0.7182)	(0.7193)
Individual characteristics			✓	✓	✓	✓	✓	✓
Family background			✓	✓	✓	✓	✓	✓
LEAs fixed-effects		✓		✓		✓		✓
EPVT score at 5					0.2641***	0.2658***		
					(0.0102)	(0.0103)		
Quantile EPVT score at 5							-0.7499***	-0.7480***
							(0.0103)	(0.0103)
Constant	0.0462***	0.0433***	-3.6543***	-3.5761***	-3.6588***	-3.6074***	-35.8927***	-35.6132***
	(0.0109)	(0.0108)	(0.4490)	(0.5208)	(0.4325)	(0.5013)	(6.3569)	(7.3685)
Obs	8613	8613	8613	8613	8613	8613	8613	8613
Adjusted R^2	0.0079	0.0277	0.2265	0.2379	0.2823	0.2939	0.4041	0.4138

Data Sources: 1970 BCS Age 0 survey, 1975 BCS Age 5 survey, 1980 BCS Age 10 survey. Notes: dependant variables are standardised test scores (FMT) at age 10 for the six first column and the difference between quantile at age 10 and quantile at age 5 in the last two columns. Standard errors are in parentheses. ***: significant at 1%, **: significant at 5%, *: significant at 10%.

6. Conclusions

In this paper we consider the relative academic achievement in primary school of second generation immigrant children in the UK. We use data for a cohort born in 1970 and find that children born to South Asian or Afro-Caribbean parents have significantly lower levels of cognitive achievement in both mathematics and language in primary school. However, much of this difference is attributable to other characteristics of these second generation immigrant children, such as their socio-economic background. Once we account for these other differences, the negative effect of being from a South Asian or Caribbean ethnic origin on cognitive skill is markedly reduced. We then investigated the progression of ethnic minority children in primary school i.e. between age 5 and 10. This analysis indicates that the negative impact from being born to South Asian parents decreases during primary school and the negative effect from being born to Afro-Caribbean parents remains approximately stable.

Our results, though they date from the 1970s, are an additional piece in the puzzle about the relative academic achievement of ethnic minority children in the UK. Evidence from the current education system (Wilson et al. 2009) suggests that although ethnic minority children have relatively low achievement on exit from primary school, they also experience considerable catch up and indeed overtake their White counterparts during secondary school. Our evidence shows that even as long ago as the late 1970s, some groups of ethnic minority pupils, namely those from South Asia, were showing signs of ‘catch up’ in primary school. This implies that the “catch up” phenomenon is part of a longer term trend rather than directly attributable to recent government policy. Another important conclusion from this analysis is that the catch-up did not happen for Afro-Caribbean pupils in the late 1970s.

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Notes

1. First-generation immigrants (e.g. children who have immigrated after 1970) represent a small sample and unfortunately those migrant children have not been tested at age 10.
2. "Indian subcontinent" and "West Indies" are the original labels used in BCS 1970 to define people born in those regions. In this paper we will use "Caribbean" instead of "West Indians" and "South Asia" rather than "Indian subcontinent".
3. We don't use BCS86 Sixteen-year Follow-up for two reasons. The first one is a question of sample size. Only 6009 children were tested at age 16 and of this 6009, only 4505 were also tested at age 10. Furthermore, there are only 33 Caribbean children and 70 South Asian children in this 4505 sample. The second reason for not using the age 16 test scores concerns the tests themselves. A strike took place during the sixteen-year follow-up. This meant some children in the BCS70 data were not able to sit the tests. We might hypothesise that strike action didn't take place randomly and some types of schools would have been more prone to strike action than others. This would lead to sample selection problems with the age 16 test scores and this indeed may explain why we have only 33 Afro Caribbean in the sample.
4. User Guide part I, BCS Ten-year Follow-up.
5. This test was piloted on 400 British ten year olds, after which item analyses was carried out. A final, shortened, version on the form of a test booklet covered vocabulary, sequence and sentence comprehension.
6. This is a test of cognitive attainment measuring something akin to IQ (Elliot et al., 1978).
7. Another aspect of the decision to rely on these particular tests is the need to avoid tests which required considerable qualitative judgments about children and therefore potentially leading to variability across coders (e.g. the Word Definitions and the Similarities Tests of the *British Ability Scales* (*BAS*) required the test administrator to decide what was an acceptable response, as did the handwriting TEST (User Guide part II).
8. Full descriptive statistics are available in the appendix to this paper available at http://campus.hesge.ch/meunierm/doc/AppendixMeunier.pdf
9. Full regression results are available at http://campus.hesge.ch/meunierm/doc/AppendixMeunier.pdf
10. The inclusion of regional controls (by introducing a dummy variable for each LEA) tends to reduce the values of the ethnicity coefficients, implying that ethnic minorities are situated in LEAs with lower average performance.
11. See http://campus.hesge.ch/meunierm/doc/AppendixMeunier.pdf for full results.
12. We also introduced age at testing in months in our regressions as the length of the fieldwork (up to 14 months at age 5) implied some pupils were tested younger than others. And we know that those differences matters at such young age (see Crawford et al., 2007).
13. Results available at http://campus.hesge.ch/meunierm/doc/AppendixMeunier.pdf
14. The importance of the effect is about 7.8% (0.0757/0.0097 (the mean of the standardised EPVT)).