Education Economics

ISSN: 0964-5292 (Print) 1469-5782 (Online) Journal homepage: http://www.tandfonline.com/loi/cede20

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To cite this article: PETER DOLTON , GERALD MAKEPEACE & OSCAR D. MARCENARO-GUTIERREZ (2005) Career progression: Getting-on, getting-by and going nowhere, Education Economics, 13:2, 237-255, DOI: 10.1080/09645290500031447

To link to this article: https://doi.org/10.1080/09645290500031447

Education Economics
Vol. 13, No. 2, 237–255, June 2005

Career Progression: Getting-on, Getting-by and Going Nowhere

PETER DOLTON*,**, GERALD MAKEPEACE† and
OSCAR D. MARCENARO-GUTIERREZ†

**University of Newcastle, UK, **Centre for Economic Performance, LSE, UK, †University of Cardiff, UK*

ABSTRACT *This research examines the 'career progression' of individuals by studying how an individual's ranking within their cohort changes over their lifetime. We compare the relative position of individuals using educational test scores at ages 11 and 16 and earnings at ages 33 and 42. Our goal is to establish the contribution of early ability, educational achievement and labour market experience to the relative movements of individuals within their cohort. We use the National Child Development Study to assess this intra-cohort career progress employing descriptive and fixed effect regression methods to describe the process. We report how career progression differs for men and women.*

KEY WORDS: Career progression; ability; earnings; cohort effects

Introduction

This study examines what determines the 'career progression' of an individual over their lifetime, including pre-labour market indicators of success in the analysis. We seek to explain why some individuals improve relative to their peers as they grow older and, conversely, why others fail to do so. We focus on intra-cohort changes within a birth cohort. Of necessity, this will require different outcome measures at different ages and we use educational performance as a child and labour market earnings as an adult. The British National Child Development Study (NCDS) provides the good longitudinal data necessary for this type of study (See Ferri *et al.*, 2003), enabling us to compare individuals at ages 11 and 16, respectively, on the basis of early test scores and public examination success, and at ages 33 and 42 in terms of their earnings.

Economists typically analyse career progression in terms of investment in human capital and its impact over the lifecycle on earnings. Comprehensive models of lifecycle earnings such as Rosen (1976) built on the insights offered by the pioneering human capital models of Mincer (1958) and Becker (1964). The initial starting point in the labour market is determined by the quantity and quality

Correspondence Address: Professor Peter Dolton, Department of Economics, University of Newcastle, Newcastle-upon-Tyne NE1 7RU, UK. Fax: +44 191 222 6548; Email: Peter.Dolton@ncl.ac.uk

0964-5292 print/1469-5782 online/05/020237-19 © 2005 Taylor & Francis Group Ltd
DOI: 10.1080/09645290500031447

of full-time education, and progress thereafter by the accumulation of human capital through on-the-job training. The stock of human capital and its growth rate at each point in time results from an individual's optimisation decision. This decision depends on the individual's objectives and constraints, including their ability and access to funds to finance training. These models typically incorporate a production function showing that additions to human capital depend on the amount already accumulated. Human capital models underpin the familiar earnings equation that is widely used to measure labour market success.

There have been many recent studies of the lifetime pattern of earnings and how these are influenced by job mobility and career advancement (see Blau and Duncan, 1967; Topel and Ward, 1992; Mincer, 1997; Neal, 1998, 1999), which have been surveyed by Neal and Rosen (2000). However, the empirical analysis in these studies usually assumes that the data available to the economist relate to a cross-section of all individuals at different stages in their lives. By contrast, we focus on a cohort of people and examine movements within that cohort. The papers by Connolly *et al.* (1992) and Harper and Haq (1997) examine the determinants of occupational earnings in earlier sweeps of NCDS. This paper adds to their findings by using the latest data available. Economists have not always focused on earnings outcomes. Thurow (1969, 1975) measures a person's progress according to where they were in the distribution of various outcomes through their lives. Our work also considers alternative measures of career progression and reflects that of Kerckhoff (1993) who uses the NCDS data to consider the 'pathways' followed by the cohort members up to the age of 23.

The present analysis differs from previous literature by looking at the same people at the same points in their lifecycle rather than different individuals at different points in their lifecycle and by using broader definitions of success. Our results suggest that higher values for age 11 performance, schooling, age 16 educational achievement, National Vocational Qualifications (NVQs), work experience and job tenure all influence the career progress an individual will make, although important differences arise for men and women over the lifecycle.

The next section examines how the concept of 'career progression' can be empirically measured. It graphs the distribution of these outcome measures at ages 11, 16, 33 and 42 and describes their joint distribution. In the third section we analyse the determinants of this progression by estimating fixed-effects models of the changes in these distributions over time. Fixed-effects models have the advantage that they net out for individual specific unobserved heterogeneity and allow us to focus only on the effect of educational and labour market experience changes on differences in the outcomes variables. The final section summarises the key conclusions.

Measuring Career Progression

The NCDS provides our data. The NCDS began with a survey of all individuals born in the United Kingdom during one week in March 1958. The individuals have been surveyed at regular intervals since then, providing a picture of what they have achieved and experienced over time. We use labour market data from the last two NCDS surveys undertaken in 1991 and 2000 when the sample members were, respectively, 33 and 42 years old. Since we are interested in career progression over time, we restrict our analysis to individuals who were full-time employees in both surveys. This means that we can make 'like-for-like'

comparisons by studying the behaviour of the same individuals over time.[1] The different sweeps of the NCDS contain a wealth of information on the individuals involved, and the analysis incorporates this where appropriate. Throughout this research, we distinguish men from women to control for their different labour market histories.

We would ideally like some index of the individual's initial position measured before any educational, institutional or labour market process had acted upon them, but no variable has these ideal characteristics. However, the NCDS is very unusual in having scores from reading and mathematics tests at age 11. These proxy academic outcomes before formal secondary education and some authors have interpreted them as measures of ability.[2] We use the first principal component of the reading test and mathematics test scores at age 11 as a measure of ability in our regression analysis.[3] Our second outcome variable measures performance in public examinations at age 16. O-levels were the main schooling qualifications in the United Kingdom for our cohort. They were available to all students and were typically taken in the final year of compulsory secondary education when the pupils were 16. We measure the respondent's overall performance as the sum of the scores obtained in each subject (mathematicss, English, geography, etc.) that they took. Our index aggregates the grades in each examination using the metric that A* in any subject is worth seven points, A six points, B five points, C four points, D three points, E two points, and F one point.

We measure labour market success by earnings. Following the previous literature,[4] our regression analysis uses occupational earnings. This has certain advantages. It will net out for unobserved heterogeneity in wages based on employment conditions that are specific to the individual—like particular hours of work, benefits in kind or additional payments. It reduces any measurement or reporting error that may be involved in the use of the reported earnings. Most importantly, it overcomes any missing values due to non-reporting. Finally, the use of mean occupational earnings may be a better proxy for lifetime earnings in a given occupation than actual individual earnings.

To calculate occupational earnings we compute the mean earnings for each three-digit occupation in the New Earnings Surveys for 1989–1994 and 1996–2000 including all individuals aged between 30–36 and 39–45, respectively.[5] More precisely, we take the gross weekly earnings (2000 prices, including overtime and bonuses) for each individual in a particular occupation. To allow for the number of hours worked, each value is multiplied by the ratio of the average working hours for everyone in that occupation to the actual working hours observed for each individual. This gives a 'full-time equivalent wage for each three-digit occupation' that allows us to make comparisons between workers who devote a different amount of time to work. In particular, we can use this index for each observation without differentiating between part-time and full-time workers.

Each outcome measures a different dimension of success. By current standards, the underlying data are reliable. The age 11 tests were administered through schools and the age 16 results were also obtained directly from schools. Measures of occupation based on self-reporting are widely used in empirical work. However, they each provide different measures of success that cannot be compared directly. For this reason, we have transformed each into a ranking so an individual's position in, say, the age 11 distribution can be compared with their position in the age 42 distribution despite the change in variable. There are changes in the shape of the underlying distributions that are discussed later but,

as the subsequent discussion suggest, the results do not appear to be sensitive to the choice of age 11 or age 16 score.

We restrict our sample to those who are ever present in the different sweeps of the data. This means that data may not provide us with a random sample of men and women. Specifically, the women may not be a random sample as they were working at age 33 and 42. We do not correct for this bias beyond netting out for fixed effects. Our principal objective is to compare the population of men and women who are most alike and have been working continuously in the labour market for this part of their lives. This is an interesting comparison as it reveals the source of the differences in the lifecycle progress of comparable men and women without addressing the more complex question of how non-working women might have faired if they had participated in the labour market.

Summarising Progression

Figures 1 and 2 report, by gender, the distributions of three measures of career progression: reading score at age 11, academic achievement at 16 and earnings at age 42. For the same group of individuals, they indicate the extent of inequality in: initial endowments prior to secondary schooling, achievement after compulsory secondary education and the distribution of outcomes or rewards in the labour market after some years of work. We can thus see the effects of secondary education and labour market experience on the initial ability distribution. For clarity, only three outcome measures are displayed. The conclusions are similar if the mathematics score and earnings at 33 are employed.

The initial distributions at age 11 are approximately normal. The effect of the secondary educational system is to produce a highly skewed measure of academic success. Indeed, approximately 27% of young people had no formal O-level

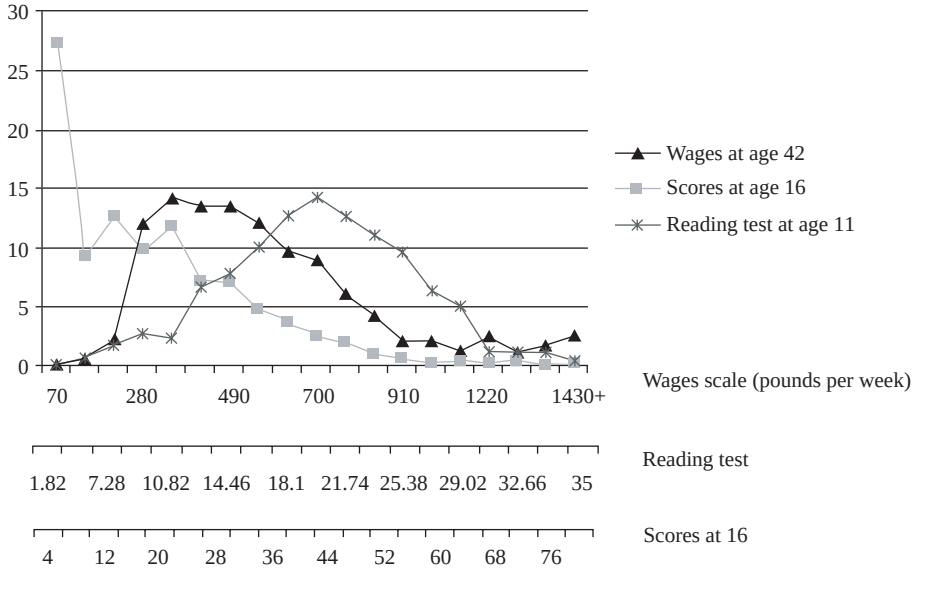

Figure 1. Distribution of wages and ability proxies in NCDS, men (%)

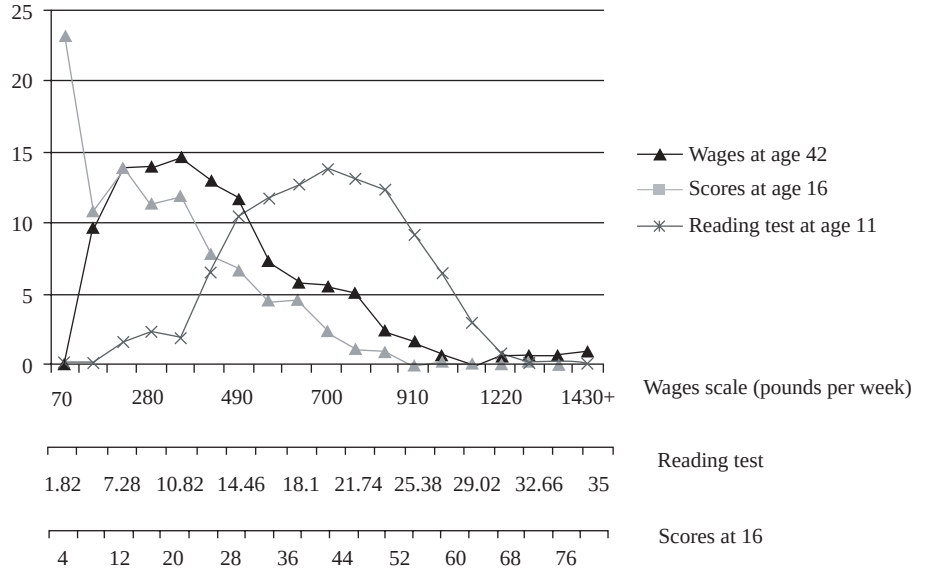

Figure 2. Distribution of wages and ability proxies in NCDS, women (%)

educational achievement at all at age 16. Given the underlying normality of the age 11 test scores, this begs the question of whether this is the best signal of potential that the educational system could produce. The labour market apparently perpetuates this inequality by producing an uneven distribution of remuneration well into adulthood. In fact, the distribution of earnings goes on getting more unequal as the cohort members get older. This is illustrated by the densities for actual weekly earnings shown in Figures 3 and 4.

Table 1 explores the relationship between the pre-labour market outcome measures by summarising the joint distribution of age 11 and age 16 scores. To simplify the presentation, each individual is allocated to their quintile in the relevant distribution by gender. The table records the numbers of individuals in each

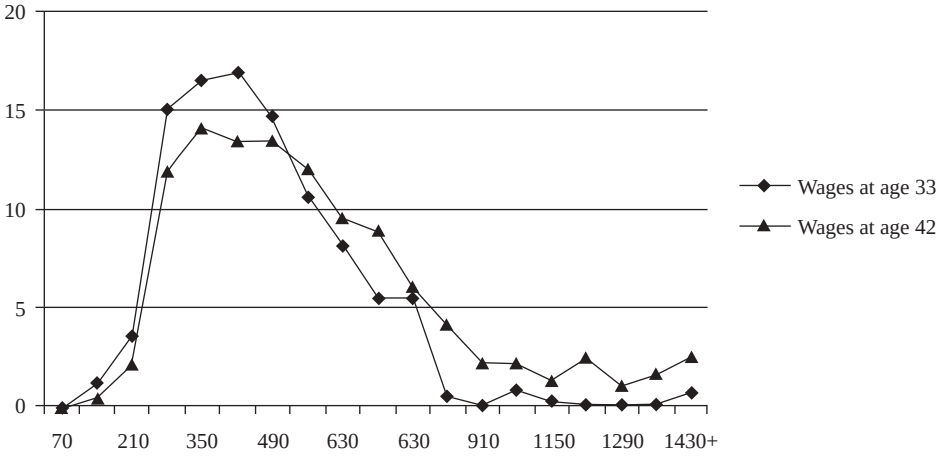

Figure 3. Distribution of wages in NCDS, men (%)

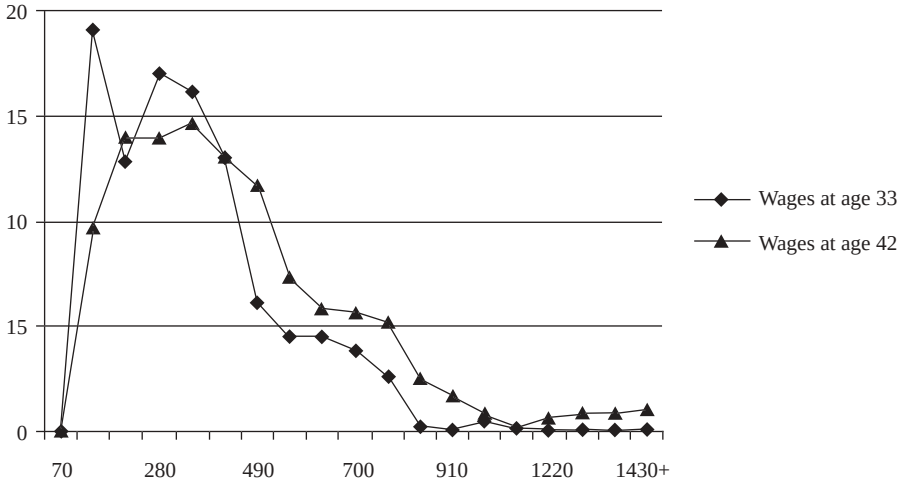

Figure 4. Distribution of wages in NCDS, women (%)

quintile combination and the row percentages in brackets. For example, 496 men (representing 19.5% of them) were in the first quintile of the test score at age 11, 231 (46.6%) of these men were in the first quintile of the O-level score at age 16.[6] There is great persistence in these two scores. For both men and women, most individuals remain in the same quintile or only move one quintile. Nonetheless, about 20% of people have moved more than one quintile between the ages 11 and 16 so significant transformations in individual outcomes are possible. Similar conclusions can be drawn from the age 16 and age 33, and age 33 and age 42 transitions presented in Tables 2 and 3.

Table 4 summarises the amount of career progression in our data by presenting the joint distribution of age 11 test scores and age 42 earnings. There is some evidence of stability in the table. Thirty-one per cent of the men and 29% of the women are in the same quintile at both ages. A substantial proportion do move; 36% of the men and 38% of the women move down one quintile, and 23% of the men and 20% move up one quintile. Nonetheless, only 10% of the men and 14% of the women move more than one quintile. These figures suggest that the progression is similar for men and women within their own distributions and the comparison can be extended. For example, 39% of men and 41% of women who were in the bottom quintile in the age 11 ability scores are in the bottom quintile in the age 42 wage distribution. Similarly, 38% of men and 41% of the women in the top quintile at age 11 are in the top quintile in age 42 earnings. These joint distributions show how upward mobility for men (compared with other men) is very similar to women (compared with other women).

Modelling Progression

Model

Our underlying model of the transitions already described is that relative achievement, as measured by the individual's percentile in the distribution of an

Table 1. Test age 11 and scores age 16 quintile distributions (row percentages)

Men, test age 11	Scores age 16						Women, test age 11	Scores age 16					
	First	Second	Third	Fourth	Fifth	Total		First	Second	Third	Fourth	Fifth	Total
First	231 (46.6)	158 (31.8)	83 (16.7)	20 (4.0)	4 (0.8)	496 (19.5)	First	190 (42.5)	156 (34.9)	79 (17.7)	19 (4.2)	3 (0.7)	447 (20.5)
Second	150 (30.9)	97 (20.0)	145 (29.8)	80 (16.5)	14 (2.9)	486 (19.1)	Second	114 (24.6)	112 (24.2)	143 (30.9)	78 (16.8)	16 (3.5)	463 (21.3)
Third	133 (27.2)	55 (11.2)	131 (26.8)	123 (25.1)	47 (9.6)	489 (19.3)	Third	104 (22.7)	54 (11.8)	130 (28.5)	117 (25.6)	52 (11.4)	457 (21.0)
Fourth	91 (18.0)	23 (4.6)	91 (18.0)	156 (30.9)	144 (28.5)	505 (20.0)	Fourth	80 (18.4)	14 (3.2)	76 (17.5)	129 (29.7)	135 (31.1)	434 (20.0)
Fifth	86 (15.3)	8 (1.4)	47 (8.3)	125 (22.2)	297 (52.7)	563 (22.2)	Fifth	43 (11.5)	5 (1.3)	27 (7.2)	77 (20.5)	223 (59.5)	375 (17.2)
Total	691 (27.2)	341 (13.4)	497 (19.6)	504 (19.8)	506 (19.9)	2539 (100)	Total	531 (24.4)	341 (15.7)	455 (20.9)	420 (19.3)	429 (19.7)	2176 (100)

Table 2. Scores age 16 and occupational wages 1991 (aged 33) quintile distributions (row percentages)

Men, scores age 16	Occupational wages 1991						Women, scores age 16	Occupational wages 1991					
	First	Second	Third	Fourth	Fifth	Total		First	Second	Third	Fourth	Fifth	Total
First	228 (28.3)	179 (22.2)	157 (19.5)	147 (18.3)	94 (11.7)	805 (27.6)	First	193 (30.8)	122 (19.5)	155 (24.7)	70 (11.2)	87 (13.9)	627 (25.0)
Second	120 (30.0)	127 (31.8)	83 (20.8)	46 (11.5)	24 (6.0)	400 (13.7)	Second	(62 (40.9)	82 (20.7)	87 (22.0)	45 (11.4)	20 (5.1)	396 (15.8)
Third	128 (22.5)	138 (24.3)	143 (25.2)	85 (15.0)	74 (13.0)	568 (19.5)	Third	109 (21.4)	126 (24.8)	126 (24.8)	90 (17.8)	58 (11.4)	509 (20.3)
Fourth	79 (13.6)	89 (15.3)	103 (17.7)	155 (26.6)	156 (26.8)	582 (20.0)	Fourth	64 (13.0)	88 (17.9)	126 (25.6)	103 (20.9)	112 (22.7)	493 (19.6)
Fifth	36 (6.4)	61 (10.8)	83 (14.7)	159 (28.2)	224 (39.8)	563 (19.3)	Fifth	23 (4.7)	56 (11.6)	79 (16.3)	105 (21.7)	222 (45.8)	485 (19.3)
Total	591 (20.3)	594 (20.4)	569 (19.5)	592 (20.3)	572 (19.6)	2918 (100)	Total	551 (22.0)	474 (18.9)	573 (22.8)	413 (16.5)	499 (19.9)	2510 (100)

Table 3. Occupational wages 1991 and occupational wages 2000 (aged 42) quintile distributions (row percentages)

Men, occupational wages 1991	Occupational wages 2000						Women, occupational wages 1991	Occupational wages 2000					
	First	Second	Third	Fourth	Fifth	Total		First	Second	Third	Fourth	Fifth	Total
First	347	122	59	41	22	591	First	317	102	70	49	13	551
	(58.7)	(20.6)	(10.0)	(7.0)	(3.7)	(20.3)		(57.5)	(18.5)	(12.7)	(8.9)	(2.4)	(22.0)
Second	97	270	112	81	34	594	Second	78	192	91	64	49	474
	(16.3)	(45.5)	(18.9)	(13.6)	(5.7)	(20.4)		(16.5)	(40.5)	(19.2)	(13.5)	(10.3)	(18.9)
Third	69	108	242	98	52	569	Third	59	138	239	70	67	573
	(12.1)	(19.0)	(42.5)	(17.2)	(9.1)	(19.5)		(10.3)	(24.1)	(41.7)	(12.2)	(11.7)	(22.8)
Fourth	58	50	139	192	153	592	Fourth	30	31	45	242	65	413
	(9.8)	(8.5)	(23.5)	(32.4)	(25.8)	(20.3)		(7.3)	(7.5)	(10.9)	(58.6)	(15.7)	(16.5)
Fifth	25	24	36	208	279	572	Fifth	18	43	54	102	282	499
	(4.4)	(4.2)	(6.3)	(36.4)	(48.8)	(19.6)		(3.6)	(8.6)	(10.8)	(20.4)	(56.5)	(19.9)
Total	596	574	588	620	540	2918	Total	502	506	499	527	476	2510
	(20.4)	(19.7)	(20.1)	(21.2)	(18.8)	(100)		(20.0)	(20.2)	(19.9)	(21.0)	(19.0)	(100)

Table 4. Test age 11 and occupational wages 2000 (aged 42) quintile distributions (row percentages)

Men, test age 11	Occupational wages 2000						Women, test age 11	Occupational wages 2000					
	First	Second	Third	Fourth	Fifth	Total		First	Second	Third	Fourth	Fifth	Total
First	200	157	92	48	15	512	First	179	110	67	68	12	436
	(39.1)	(30.7)	(18.0)	(9.4)	(2.9)	(20.2)		(41.1)	(25.2)	(15.4)	(15.6)	(2.8)	(20.0)
Second	117	129	145	77	41	509	Second	112	93	96	90	45	436
	(23.0)	(25.3)	(28.5)	(15.1)	(8.1)	(20.2)		(25.7)	(21.3)	(22.0)	(20.6)	(10.3)	(20.0)
Third	93	94	113	127	76	503	Third	78	98	93	100	65	434
	(18.5)	(18.7)	(22.5)	(25.3)	(15.1)	(19.8)		(18.0)	(22.6)	(21.4)	(23.0)	(15.0)	(19.9)
Fourth	56	73	86	144	149	508	Fourth	38	92	94	95	122	441
	(11.0)	(14.4)	(16.9)	(28.4)	(29.3)	(20.0)		(8.6)	(20.9)	(21.3)	(21.5)	(27.7)	(20.2)
Fifth	56	39	71	148	193	507	Fifth	25	51	83	97	173	429
	(11.1)	(7.7)	(14.0)	(29.2)	(38.1)	(20.0)		(5.8)	(11.9)	(19.4)	(22.6)	(40.3)	(19.7)
Total	522	492	507	544	474	2539	Total	432	444	433	450	417	2176
	(20.6)	(19.4)	(20.0)	(21.4)	(18.7)	(100)		(19.9)	(20.4)	(19.9)	(20.7)	(19.2)	(100)

outcome measure, depends on individual heterogeneity (α), the quantity of human capital and other factors. Indexing individuals by i and time by t:

$$P_{it} = \alpha_i + H_{it}\beta_t + X_{it}\gamma_t + u_{it} \quad (1)$$

where P is the percentile, H is a vector of human capital variables and X is a vector of control variables.

We utilise the familiar fixed-effects transformation to eliminate individual specific heterogeneity (α) although we also include levels of the regressors to allow for the possibility that the parameters are not constant over time. We report results for ages 16 and 33 and for ages 33 and 42 to show the detailed career progression. We start from age 16 because this is the traditional early school-leaving date in the United Kingdom and the age 16 data are readily available to labour market participants. We also report results for ages 11 and 42 to show the 'total' amount of progression over the longest period spanned by our data. The comparisons for age 11 and age 33 and for age 16 and age 42 produce similar results and are omitted for brevity.[7]

Our human capital variables include years of schooling after the age of 16 and a measure of the highest academic or vocational qualification achieved. This is given by the NVQ level. We merge the top two levels so our NVQ level takes five ordered values from 0 (no qualification) to NVQ 4/5 (degree and postgraduate level qualifications). We supplement these by the standard measures of on-the-job training given by years of work experience and tenure with the current employer. The control variables are merely variables that are available in the data and that have often been used in other studies. They include dummies measuring union membership, marital status, parental status, race, health, occupation, industry, firm size and region.

Ideally the relative position of individuals should depend on the early test scores. This raises difficulties, however, when one investigates the change in relative position because of the non-linearity in the measurement of the change. Any large changes in the measured relative position are constrained by the minimum and maximum values for the percentile. To give practical, if crude, examples, the only way is up when you are at the bottom of the distribution and the only way is down when you are at the top. We obtain perverse results when we include the test scores in regressions involving the early test scores and have resolved the problem pragmatically by including dummies for the initial quintiles in those regressions. This phenomenon does not apply to the more familiar equations involving changes in wages, and we have included the early test scores in these equations.

The estimation of these types of equation raises the familiar questions of endogeneity in the regressors. We have solved these problems if a fixed effect in the error term is the source of the endogeneity. If the individuals' levels of commitment and innate ability remain fixed over the period examined, then these effects on the regressors are removed. We do not take account of heterogeneity in the coefficients of the regressors and any resulting selection bias. For example, there may be differences in the return that individuals obtain from union membership and the individuals who are union members may be a selected subset with higher returns that are not available to the general population. Although there are panel models that address this issue, they are very complex and, as far as the authors are aware, only address the endogeneity issue for one regressor. Our approach is

an improvement on many studies but, like most, may fail to resolve the problem posed by endogeneity.

Results

Table 5 presents fixed-effects estimates for the change in the individual's percentile comparing their position in the age 33 earnings distribution and the age 16 educational achievement distribution.[8] Post-compulsory education has positive

Table 5. Change in percentiles: occupational wages 1991 (aged 33) – scores at age 16

	Total		Men		Women	
	Specification (1)	Specification (2)	Specification (1)	Specification (2)	Specification (1)	Specification (2)
Sex (female = 1)	–6.934 (7.73)***	–7.294 (8.17)***				
Years of schooling 1991	1.572 (6.30)***		1.429 (3.83)***		1.505 (5.06)***	
NVQ4 or NVQ5 in 1991		7.973 (5.29)***		6.932 (3.32)***		5.343 (2.93)***
NVQ3 in 1991		5.684 (3.82)***		4.703 (2.31)**		3.701 (2.01)**
NVQ2 in 1991		4.172 (3.16)***		3.958 (2.08)**		0.467 (0.31)
NVQ1 in 1991		1.533 (1.09)		2.796 (1.35)		–0.319 (0.20)
Years of experience	1.123 (2.90)***	1.395 (3.67)***	–0.082 (0.09)	0.267 (0.28)	0.901 (2.40)**	1.003 (2.67)***
Experience squared	–0.022 (1.17)	–0.047 (2.65)***	0.019 (0.47)	–0.014 (0.37)	–0.034 (1.71)*	–0.046 (2.36)**
Tenure 1991	0.066 (0.97)	0.108 (1.60)	0.080 (0.95)	0.115 (1.37)	0.020 (0.21)	0.068 (0.74)
Working hours 1991	0.192 (5.77)***	0.220 (6.64)***	0.146 (2.77)***	0.155 (2.94)***	0.047 (1.20)	0.059 (1.50)
Union member in 1991	–0.860 (1.19)	–0.825 (1.14)	–1.171 (1.22)	–1.043 (1.08)	–0.990 (1.08)	–1.237 (1.35)
Married 1991	1.466 (1.57)	1.412 (1.51)	0.732 (0.53)	0.729 (0.53)	0.795 (0.77)	0.710 (0.68)
Parent 1991	2.004 (2.48)**	1.524 (1.90)*	0.650 (0.61)	0.651 (0.61)	1.066 (0.93)	0.381 (0.34)
Race (non white = 1)	7.944 (2.22)**	7.789 (2.17)**	9.608 (2.28)**	9.188 (2.17)**	0.479 (0.09)	1.162 (0.21)
Disabled 1991	–1.487 (0.94)	–1.797 (1.13)	0.389 (0.18)	–0.016 (0.01)	–0.397 (0.21)	–0.587 (0.30)
Second quintile score age 16	–20.987 (26.93)***	–21.977 (26.77)***	–20.728 (19.46)***	–21.436 (19.30)***	–22.854 (24.65)***	–23.033 (23.30)***
Third quintile score age 16	–37.937 (40.26)***	–38.420 (39.57)***	–37.955 (29.94)***	–38.215 (29.38)***	–39.920 (34.94)***	–39.857 (33.47)***
Fourth quintile score age 16	–57.983 (42.28)***	–57.365 (42.48)***	–59.416 (30.69)***	–58.842 (30.72)***	–60.197 (38.08)***	–59.331 (37.96)***
Fifth quintile score age 16	–77.401 (32.61)***	–75.824 (32.58)***	–77.357 (23.55)***	–76.378 (23.45)***	–79.084 (28.02)***	–76.605 (28.03)***
Constant	–14.004 (3.63)***	–0.295 (0.10)	–12.521 (1.63)	1.352 (0.21)	–5.506 (1.29)	10.055 (3.19)***
Observations	3263	3263	1772	1772	1491	1491
R-squared	0.70	0.70	0.64	0.64	0.78	0.78

Note: Dependent variable: percentile at occupational wages age 33 distribution – percentile scores at age 16 distribution. Sample of employees with no missing values for any of the variables. Other controls: occupation, industry, firm size and region of residence.
Absolute value of *t* statistics in parentheses: *significant at 10%; **significant at 5%; ***significant at 1%.

and significant effects on advancement, improving one's position in the distribution, whether measured in terms of qualifications or years of schooling. A man with a degree or five years of post-16 full-time education will move up about seven points. Similar results apply for women. Rather surprisingly, the traditional measures of human capital acquired through work have no effect for men, perhaps because there is relatively little variation in their values in this sample. Work experience has a non-linear effect on progression for women. The remaining control variables shown tend to be insignificant, although males from the ethnic minorities have moved up in the earnings distribution relative to their position in the age 16 educational achievement distribution. Likewise men who work longer hours are more likely to move up the distribution.

Table 6 reports fixed-effects estimates for occupational earnings changes between the age of 33 and 42. They confirm the important role of human capital in explaining changes in occupational earnings. Increases in work experience, tenure and either schooling or changes in NVQ lead to increases in the growth of occupational earnings. The robust estimate for test scores shows that the impact of test scores on occupational earnings increased over time. The lack of a gender intercept effect on the change in occupational earnings (in the combined estimation) suggests the interesting result that gender differentials exist in the levels of occupational earnings but not in the percentage changes at least for individuals in their thirties.

However, important differences between men and women are apparent from the separate regressions by gender. Most notably the return on test scores at age 11 and O-level scores at age 16 is positively significant for men. There is weaker evidence that 11 year olds' scores are important for women, but they exert approximately one-half of the impact in terms of the size of the coefficient. In contrast, changing years of schooling, NVQ qualifications and working hours strongly influence women's earnings but not men's. This would suggest that men's career progression is heavily influenced by their natural ability and early educational achievement. In contrast, women's earnings advancement is conditioned more by achieving higher final educational qualifications or simply staying in education longer. In addition, the effect of work experience on earnings is around twice as big for men as women. Typically men gain 2–2.4% in earnings for each year of experience whereas women gain only 1% for each year of extra experience. It is also clear from Table 7 that a woman's earnings growth depends greatly on how many hours she works—this is not true for men.

Table 7 presents estimates for the individual's change in their percentile from where they are in the age 42 earnings distribution relative to where they were in the age 11 ability distribution. Like our estimations in Table 5, these estimations are conditional on where you are in the first distribution at age 11 for the same reasons. The results show the effect of the regressors on the individual's career progress from age 11 to age 42. This progress is affected mainly by the stock of human capital achieved by age 42 and the related occupational sector. Sex differences are significant when the schooling history is represented by years of study; however, this effect disappears when level of education is taken into account.

These regressions should be examined with the Figures 1 and 2 in mind as the interpretation of the size and sign of the coefficients needs some care. First, remember that relative to their position at age 11 in the test scores' distribution, many people move down in the age 42 earnings distribution. The results show us that the ethnic minorities have moved up in the earnings distribution relative to their position in the age 11 test scores distribution. Likewise those who work

Table 6. Differences in occupational wages (1991–2000)

	Total		Men		Women	
	Specification (1)	Specification (2)	Specification (1)	Specification (1)	Specification (2)	Specification (1)
Sex (female = 1)	–0.011	–0.014				
	(0.75)	(0.97)				
Change in years of schooling	0.061		0.030		0.073	
	(4.20)***		(1.16)		(4.09)***	
Change in NVQ		0.049		0.005		0.087
		(2.59)***		(0.17)		(3.28)***
Change in years of experience	0.011	0.011	0.024	0.021	0.011	0.010
	(4.99)***	(4.62)***	(2.48)**	(2.23)**	(4.55)***	(4.22)***
Change in years of tenure	0.003	0.003	0.003	0.003	0.003	0.003
	(3.38)***	(3.10)***	(2.31)**	(2.29)**	(2.23)**	(1.98)**
Change in working hours	0.003	0.003	0.000	0.000	0.005	0.005
	(6.22)***	(6.33)***	(0.46)	(0.42)	(6.38)***	(6.68)***
Union member in 2000 but not in 1991	–0.010	–0.008	–0.038	–0.037	0.002	0.003
	(0.52)	(0.44)	(1.25)	(1.23)	(0.07)	(0.14)
Union member in 1991 but not in 2000	–0.031	–0.034	0.009	0.009	–0.057	–0.060
	(1.60)	(1.71)*	(0.34)	(0.34)	(1.91)*	(2.02)**
Principal component mathematics and reading test age 11	0.028	0.029	0.034	0.034	0.017	0.018
	(4.93)***	(5.09)***	(4.58)***	(4.60)***	(1.83)*	(2.01)**
Scores at age 16	0.001	0.001	0.001	0.001	0.001	0.001
	(1.73)*	(1.80)*	(2.01)**	(2.07)**	(0.76)	(0.79)
Married in 2000 but not in 1991	–0.011	–0.009	–0.016	–0.016	0.004	0.009
	(0.50)	(0.38)	(0.49)	(0.50)	(0.12)	(0.28)
Married in 1991 but not in 2000	–0.012	–0.013	0.015	0.015	–0.024	–0.028
	(0.54)	(0.57)	(0.43)	(0.43)	(0.76)	(0.88)
Become parent in 2000	–0.017	–0.017	0.010	0.011	–0.034	–0.033
	(0.90)	(0.89)	(0.42)	(0.45)	(1.00)	(0.98)
Become disabled in 2000	0.011	0.008	0.007	0.006	0.012	0.011
	(0.53)	(0.42)	(0.23)	(0.20)	(0.45)	(0.40)
Change occupation	0.088	0.088	0.044	0.045	0.144	0.141
	(6.95)***	(6.92)***	(2.65)***	(2.68)***	(7.50)***	(7.30)***
Change industry	0.004	0.005	0.027	0.028	–0.031	–0.033
	(0.33)	(0.38)	(1.53)	(1.56)	(1.57)	(1.65)*
Working in 2000 in a smaller firm	–0.023	–0.023	–0.000	–0.001	–0.057	–0.054
	(1.53)	(1.56)	(0.02)	(0.04)	(2.49)**	(2.38)**
Working in 2000 in a bigger firm	–0.006	–0.006	0.001	0.001	–0.024	–0.025
	(0.43)	(0.44)	(0.04)	(0.07)	(1.09)	(1.13)
Move to a different region in 2000	0.011	0.010	–0.009	–0.010	0.038	0.035
	(0.57)	(0.48)	(0.36)	(0.37)	(1.26)	(1.15)
Constant	0.006	0.012	–0.116	–0.084	0.001	0.001
	(0.24)	(0.46)	(1.31)	(1.00)	(0.03)	(0.02)
Observations	3263	3263	1772	1772	1491	1491
R-squared	0.07	0.06	0.04	0.04	0.12	0.12

Note: Dependent variable: mean occupational wages at age 42 – mean occupational wages at age 33. Sample of employees with no missing values for any of the variables.
Absolute value of *t* statistics in parentheses: *significant at 10%; **significant at 5%; ***significant at 1%.

longer hours are more likely to move up the distribution. The negative linear effects of such experience (coupled with the positive non-linear effect) and the negative effect of schooling years are likely to be due to the fact that in a cohort dataset all the individuals are the same age, then maybe those who earn most will stay in education longer and will have less work experience.

Conclusions

This paper has focused on the progress of individuals through the educational system and into maturity in the labour market. The distinguishing feature of our

Table 7. Change in percentiles: occupational wages 2000 at age 42 – test at age 11

	Total		Men		Women	
	Specification (1)	Specification (2)	Specification (1)	Specification (1)	Specification (2)	Specification (1)
Sex (female = 1)	–5.523	–5.852				
	(6.87)***	(7.37)***				
Years of schooling 2000	0.775		0.640		0.933	
	(3.90)***		(2.11)**		(3.55)***	
NVQ4 or NVQ5 in 2000		3.187		4.020		1.090
		(2.30)**		(2.09)**		(0.61)
NVQ3 in 2000		3.971		4.915		0.759
		(2.86)***		(2.58)**		(0.41)
NVQ2 in 2000		1.937		2.813		–0.971
		(1.53)		(1.55)		(0.62)
NVQ1 in 2000		–0.312		4.028		–4.521
		(0.23)		(2.06)**		(2.70)***
Years of experience 2000	0.347	0.531	–0.142	0.215	0.261	0.321
	(1.45)	(2.28)**	(0.16)	(0.25)	(1.05)	(1.28)
Experience squared 2000	0.004	–0.005	0.016	0.001	–0.000	–0.004
	(0.47)	(0.66)	(0.69)	(0.05)	(0.03)	(0.45)
Tenure 2000	0.087	0.099	0.115	0.130	–0.011	0.000
	(2.20)**	(2.51)**	(2.36)**	(2.67)***	(0.18)	(0.00)
Working hours 2000	0.117	0.127	0.076	0.078	0.082	0.089
	(3.86)***	(4.21)***	(1.76)*	(1.80)*	(2.12)**	(2.29)**
Union member in 2000	–0.228	–0.321	–0.553	–0.583	0.828	0.732
	(0.36)	(0.51)	(0.65)	(0.69)	(0.99)	(0.87)
Married in 2000	0.403	0.359	–0.766	–0.876	0.499	0.427
	(0.50)	(0.44)	(0.61)	(0.70)	(0.52)	(0.45)
Parent in 2000	2.670	2.449	1.670	1.740	2.583	2.242
	(3.72)***	(3.43)***	(1.66)*	(1.73)*	(2.59)***	(2.27)**
Race (non white = 1)	–2.549	–3.065	–0.668	–1.005	–10.419	–10.609
	(0.81)	(0.97)	(0.18)	(0.27)	(1.97)**	(2.01)**
Disabled 2000	–0.994	–1.112	–0.446	–0.528	–1.988	–2.310
	(0.98)	(1.09)	(0.30)	(0.36)	(1.62)	(1.87)*
Second quintile score age 11	–14.159	–14.587	–15.997	–16.268	–14.269	–14.393
	(16.80)***	(16.93)***	(14.02)***	(14.11)***	(12.98)***	(12.63)***
Third quintile score age 11	–31.663	–32.285	–32.323	–32.565	–34.119	–34.508
	(34.80)***	(34.04)***	(26.00)***	(25.56)***	(28.90)***	(27.55)***
Fourth quintile score age 11	–49.521	–49.886	–50.242	–50.272	–52.097	–52.213
	(51.63)***	(50.23)***	(38.59)***	(37.68)***	(41.66)***	(39.73)***
Fifth quintile score age 11	–67.335	–66.950	–67.641	–67.271	–68.975	–68.223
	(57.88)***	(58.10)***	(45.27)***	(44.97)***	(42.26)***	(42.29)***
Constant	–24.004	–17.541	–21.490	–18.120	–22.690	–11.426
	(7.37)***	(6.34)***	(2.33)**	(2.01)**	(5.78)***	(3.84)***
Observations	3263	3263	1772	1772	1491	1491
R-squared	0.77	0.77	0.73	0.74	0.81	0.82

Note: Dependent variable: percentile at occupational wages age 42 distribution – percentile principal component tests at age 11 distribution. Sample of employees with no missing values for any of the variables. Other controls: occupation, industry, firm size and region of residence.
Absolute value of *t* statistics in parentheses: *significant at 10%; **significant at 5%; ***significant at 1%.

analysis was to track the same individuals and examine what determined their movement within their own cohort. We used four measures of career progression based on where individuals ranked in their cohort at age 11, age 16, age 33 and age 42. A basic graphical analysis was used to motivate our investigation.

The normal distribution of ability at age 11 became a much skewed distribution of educational achievement at age 16. This, in turn, was transformed into a classic log-normal shaped distribution of earnings at age 33 and age 42. We sought to explain how individuals fared in this process by the use of fixed-effects regression methods. Our results are consistent with human capital theory but we investigated the link more closely using measures of academic and vocational training in the determination of outcomes at age 33 and age 42. Our results suggested that higher values for age 11 performance, schooling, age 16 educational achievement, NVQs, work experience and job tenure all influence the career progress an individual will make. In other words, the process of being successful is conditioned by early ability, educational attainment, and labour market experience.

An important part of our analysis is the differential assessment of what happens to men and women over the lifecycle. However, the overall gender effect on occupational earnings was insignificant. We found that women fare worse relative to men with identical characteristics, if we measure this in terms of changes in the percentiles of the relevant distributional variables. These results hide important subtleties. Work experience seems to matter more for women in the early labour market years up to age 33. Education, in terms of years of schooling or changing NVQ levels, matters more for women in explaining wage increases between age 33 and age 42. On the other hand, looking at the overall difference between men and women from age 11 to age 42, qualifications matter much less for women than men and working hours matter more. This pattern of results tells that the women who retain their ranking in the cohort and do well relative to their peers are those who do acquire more work experience when young and attain more educational qualifications between age 33 and age 42. These results reveal important insights about the process of career progression and the relative position of women in their cohort.

Acknowledgements

The authors gratefully acknowledge the financial support of the European Commission under Education and Wage Inequality (EDWIN) project and HM Treasury under Evidence Based Policy Fund Tranche 3.

Notes

1. There is some potential loss of information since slightly different groups of individuals responded to each survey, but we still have relatively large sample sizes.
2. Connolly *et al.* (1992), Harper and Haq (1997) and Nickell and Quintini (2002) have variously used these as indicators of ability.
3. The first principal component is the linear combination of the original test scores that maximises the total explained variance in those scores.
4. See, for instance, Connolly *et al.* (1992) and Harper and Haq (1997).
5. Aggregation by age is necessary to generate a mapping from occupation to earnings based on sufficient observations.
6. The numbers in each quintile are not exactly the same because the quintiles were defined relative the distribution for the whole of the NCDS cohort not the sample analysed here.
7. The comparison of age 11 and age 16 is not interesting because we do not observe any changes in the regressors.
8. Most of the regressors represent characteristics acquired since age 16 so we interpret them as changes rather then levels.

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Appendix 1:Definition of NVQ Levels

NVQ Level 5	Higher degree
NVQ Level 4	First degree Other degree Diploma in higher education HNC, HND, higher BTEC Teaching—further education Teaching—secondary Teaching—primary Teaching—level not stated Nursing or other medical qualification Other higher qualification below degree level RSA higher diploma
NVQ Level 3	GNVQ—advanced level A-level or equivalent (two or more) RSA advanced diploma BTEC National/ONC/OND, etc. City and Guilds Advanced Craft Scottish certificate of sixth-year studies (Scottish CSYS) SCE higher or equivalent (3+) AS-level or equivalent (4+) Trade apprenticeships
NVQ Level 2	GNVQ—intermediate RSA diploma City and Guilds—Craft BTEC, STOVEC, etc. first or general diploma O-level, GCSE A–C and equivalents (5+) A-level (one only) AS-level (two or three) Scottish CSYS SCE higher or equivalent Other qualification
NVQ Level 1	GCSE below grade C, CSE below grade 1 BTEC, SCOTVEC, etc. first or general certificate GNVQ, GSVQ foundation level YT/YTP certificate RSA other City and Guilds, other O-level, GCSE etc. (less than five) AS-level (one only) Other qualifications
No level	SCOTVEC modules No qualification

Table A1. Descriptive statistics

	Males		Females		Total	
	Mean	Standard error	Mean	Standard error	Mean	Standard error
1991						
Ln(mean typical wages)	5.99	0.31	5.73	0.37	5.87	0.36
Ln(median typical wages)	5.89	0.29	5.64	0.39	5.78	0.36
Sex	–	–	–	–	0.46	0.50
Years of schooling	11.34	2.13	11.27	1.96	11.31	2.05
NVQ						
NVQ4 or NVQ5	0.33	0.47	0.30	0.46	0.31	0.46
NVQ3	0.19	0.39	0.13	0.33	0.16	0.37
NVQ2	0.29	0.45	0.34	0.48	0.32	0.46
NVQ1	0.11	0.31	0.14	0.34	0.12	0.33
Years of experience	14.50	2.98	9.94	4.69	12.40	4.48
Experience squared	219.25	75.00	120.82	93.46	173.86	97.29
Tenure	6.68	5.60	4.62	4.90	5.73	5.39
Working hours	43.76	8.90	28.25	12.52	36.62	13.22
Union member	0.41	0.49	0.29	0.45	0.35	0.48
Principal component mathematics and reading at age 11	0.06	1.35	–0.07	1.25	0.00	1.31
Scores at age 16	17.56	16.96	18.04	16.55	17.78	16.77
Married	0.84	0.37	0.81	0.39	0.82	0.38
Parent	0.64	0.48	0.69	0.46	0.66	0.47
Race (non white = 1)	0.02	0.14	0.01	0.12	0.02	0.13
Disabled	0.04	0.19	0.04	0.20	0.04	0.20
2000						
Ln(mean typical wages)	6.16	0.40	5.83	0.45	6.01	0.45
Ln(median typical wages)	6.05	0.37	5.75	0.44	5.91	0.43
Sex	–	–	–	–	0.46	0.50
Years of schooling	11.38	2.17	11.33	2.02	11.36	2.10
NVQ						
NVQ4 or NVQ5	0.38	0.48	0.35	0.48	0.37	0.48
NVQ3	0.19	0.39	0.13	0.33	0.16	0.37
NVQ2	0.27	0.45	0.32	0.47	0.30	0.46
NVQ1	0.10	0.30	0.12	0.32	0.11	0.31
Years of experience	22.99	3.21	15.08	6.89	19.34	6.56
Experience squared	538.84	132.21	274.95	206.00	417.14	215.15
Tenure	11.74	8.45	8.06	6.97	10.05	8.01
Working hours	43.45	9.09	31.81	10.78	38.08	11.48
Union member	0.37	0.48	0.33	0.47	0.35	0.48
Principal component mathematics and reading at age 11	0.06	1.35	–0.07	1.25	0.00	1.31
Scores at age 16	17.56	16.96	18.04	16.55	17.78	16.77
Married	0.85	0.36	0.81	0.40	0.83	0.38
Parent	0.74	0.44	0.75	0.44	0.74	0.44
Race (non white = 1)	0.02	0.14	0.01	0.12	0.02	0.13
Disabled	0.07	0.26	0.09	0.29	0.08	0.27