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SCHOOL QUALITY AND STAYING-ON:
RESOURCES, PEER GROUPS OR ETHOS?

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Abstract

The paper examines the determinants of career choices at age 16 in Northern Ireland using a detailed micro level data set for young people who completed compulsory education in June 1993. A number of measures of school quality are studied to see if they have significant effects on career choices after controlling for family background, academic performance and environmental factors. In particular, we examine whether it is resource-related school characteristics, such as the pupil-teacher ratio, or less tangible ethos-related characteristics, such as academic emphasis, that are the more important. As far as possible, we also control for peer group effects, such as average academic ability at year-group level.

The results suggest school resources, school ethos and peer group effects all play a significant role in career choice at 16 in Northern Ireland, although not all resource variables act in the predicted way. In fact, pupil/teacher ratios act in opposite directions on entry into Further Education and on staying-on at school, which may contribute to the problems of identifying significant resource effects in binary models of career choice. A particularly strong positive influence on staying on is the presence of a 6th Form at the school in which compulsory education is completed. The results suggest that DENI should encourage more secondary schools in Northern Ireland to set up 6th Forms if they want to raise the staying on rate.

It is predicted by economists that education will be the next great global battle ground. The ability of a country to create and disseminate new knowledge and utilise existing knowledge and intellectual resources will determine the economic and social well being of a country. A nation's ability to enhance its education systems and schools will be the pathway to this well being. Knowing how this place called school enables or inhibits the learning process is an important factor in the success of any educational organisation and the future success of a country.

(Jerome Freiberg, 1999, from 'School Climate'

1: Introduction

Participation rates in post-compulsory education have increased dramatically in the UK over the last ten years and more steadily for the forty years before that. Many factors lie behind this trend, including improvements in qualification levels at 16, increased payoffs to education in later life and a lack of employment opportunities for young people (see, for example, McVicar & Rice, 1999; Whitfield & Wilson, 1991). Another factor that has attracted attention in the literature recently is school quality.

Other things being equal, attending a good (bad) school might encourage (discourage) a young person to stay on after completing compulsory education. Such effects have been found in the literature for a number of different measures of school quality (see, for example, Andrews & Bradley, 1997; Dustman et al, 1998; McVicar, 1999). Examples of such school characteristics include school type, pupil-teacher ratios, average exam success, attendance rates and the presence or otherwise of a 6th Form. It may also be the case that the opportunity to attend a good school after the age of 16 is strongly associated with staying-on because of expected future payoffs in the labour market (Card & Krueger, 1996).

The problem is that studies of staying-on generally use different sets of school characteristics and consequently find different results. In addition, many of the measures of school quality used are consistent with alternative explanations. The significance of the presence of a 6th Form, for example, in raising the probability of staying-on, might be because of peer group or role model effects or it might be because of teaching quality or funding effects that trickle down to lower forms. Similarly, the significance of average school exam success for career choice might reflect a school performance effect or a spillover/peer group effect. Also, Grant-Maintained schools might encourage staying on because they are better funded or because they have a different culture to other schools. In this paper, we try to disentangle these different effects by including indicators of all three in a set of explanatory variables in a model of career choice at 16.

Northern Ireland (NI) is a particularly interesting region for which to carry out such a study because of its highly heterogeneous system of secondary education. Around one

third of pupils in NI receive their secondary education in grammar schools, with the remainder in secondary intermediate or special schools. Grammar school places are offered largely on the basis of performance in an academic examination, sat at age 11, known as the Alternative Transfer Procedure (essentially an 11+ exam). The proportion of pupils in grammar schools in NI is far greater than the UK average (5% in 1997/98).[1]

In addition to the selective system, NI has markedly different management arrangements to those in the rest of the UK. One possible reason why NI persists with a selective system of secondary education is the importance of the church in the management of many of the Province's schools (Cormack et al, 1987). Indeed, education in NI is still largely segregated along religious lines. Secondary schools can be divided into three major categories (roughly equal in size): Controlled, Voluntary Maintained and Voluntary Grammar (formerly Voluntary Non-Maintained). Controlled schools are under the control of the Education and Library Boards (formerly LEAs) and are dominated by Protestant pupils, which can be either grammar or secondary intermediates. Voluntary schools are grant aided and usually run by a Board of Governors. Voluntary Maintained schools are usually Catholic secondary schools, with running costs met by the ELBs[2]. Voluntary grammar schools are spread between the Catholic and Protestant communities. Lastly, there are a small but growing number of grant-maintained integrated schools, catering for pupils from all parts of the community.

Despite these differences, NI has a similar exam system (GCSEs, A-Levels and GNVQs, for example) to the rest of the UK. School curricula are also broadly similar (largely based on the National Curriculum). In other words, the differences between secondary education in NI and in Great Britain are structural rather than differences in curriculum or assessment. In this respect, the results presented in this study have implications for education policy in Great Britain in addition to education policy in NI.

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[1] Source: Social Trends, 1999, HMSO.
[2] Until recently, these schools received only 85% of capital costs from public funds. See Teague (1997) for a discussion. Some, but not all, now receive 100% of capital costs.

The remainder of this paper is set out as follows. Section 2 reviews the recent literature on school quality and staying on. Section 3 presents details of the data set used in the analysis. Section 4 discusses the approach to estimation of the empirical model. Section 5 discusses the results and Section 6 concludes with broad implications for policy and for further research.

2: Literature Review

2.1: School Resources and Staying On

There can be significant cross-sectional variation in the resources available to schools of different types, with different characteristics and in different areas. In the US, there may be substantial differences between states in expenditure per pupil. In 1996/97, average expenditure per pupil in Utah, for example, was less than two thirds that of neighbouring Wyoming.[3] In the UK, there may be differences across LEAs. In 1993/94, expenditure per pupil in Wolverhampton was around half of that in Lambeth, for example.[4] In a given area in NI, Education and Library Board (ELB) Controlled schools have traditionally received higher capital funding than Voluntary Maintained schools (see Teague, 1997). Finally, local school management of budgets implies scope for variation between schools in the proportion of resources spent directly on teaching, or the average experience levels of teachers employed.

Is it the case that the more money spent on schools the better they perform in terms of outcomes for their students? More narrowly, is it the case that the staying on rate is higher for schools with more resources? There is a considerable literature concerning school resources and outcomes, particularly on the resources relationships with academic attainment and with future earnings, both for the UK and more generally (particularly the US). The relationship between school resources and staying on has received less attention, at least directly, although it is a critical aspect of the study of resources and outcomes.

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[3] Source: US Department of Education, National centre for Education Statistics.
[4] Source: CIPFA Handbook of Education Unit Costs.

The effects of school resources on academic attainment can only be summarised as ambiguous. Common resource measures are pupil/teacher ratios (PTRs), expenditure per pupil and teacher salaries. Some recent studies find positive effects of these measures on exam performance (eg: Card & Krueger, 1992; Goldhaber & Brewer, 1998).[5] Equally, a number of studies find no significant effects (eg: Bradley & Taylor, 1998; Dustman et al, 1998; Feinstein & Symons, 1999). Surveys of the empirical literature on this question can be found in Hanushek (1986), (1996b) and Card and Krueger (1996). Of course, the lack of significant effects found in some studies does not mean that there is no link between resources and attainment, just that the available data and techniques are not able to identify such relationships (Bradley & Taylor, 1998). Equally, Hanushek (1996a) points out that schools do not necessarily use resources efficiently, which might also obscure any funding/output relationship. On the other hand, apparent positive effects might be driven largely by omitted variables or aggregation bias (Hanushek et al, 1996).

Some studies have even found negative resource effects (eg: a positive relationship between PTRs and exam success). These are reviewed in Hanushek (1996b) and Card and Krueger (1996). This is likely to be a result of the endogeneity of class sizes because less able children are put in smaller classes. Aggregating PTRs to school level helps to reduce this endogeneity problem (Dustman et al, 1998). However, given the selective nature of NI's secondary education system, even school level PTRs are likely to be positively correlated with average academic ability. I return to this point in Section 3.

What of school resources and earnings? The general evidence concerning this question is reviewed by Hanushek (1996b), Betts (1996) and Card and Krueger (1996). Evidence is again mixed. Card & Krueger (1996), for example, come down loosely on the side of a positive school expenditure/earnings relationship, for given level of educational attainment (schooling grade reached). In other words, the payoff to another year of education is higher for those in resource-intensive schools. On the other hand, Betts (1996) argues there is no evidence of a consistent positive earnings/resources relationship: As with exam performance, omitted variables and

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[5] Positive in the case of teacher/pupil ratios and therefore negative in the case of pupil/teacher ratios. I use PTRs as opposed to TPRs, so positive resource effects correspond to negative PTR effects.

endogeneity of school expenditures can bias results. Heckman et al (1996) and Harmon & Walker (1997) find no significant school resource effects on earnings.

The literature discussing the joint determination of staying-on and earnings provides us with part of the existing empirical evidence on the staying-on question itself. Card & Krueger (1996) note that some students will attend school longer the higher the quality of the school. This may be because school is more pleasant, or because students know there might be a higher payoff to staying on at a high quality school.[6] They find a strong negative correlation between pupil/teacher ratios and post-compulsory years of schooling for the North/South Carolina 'natural experiment'. They also find evidence of such a relationship at aggregate-level (Card & Krueger, 1992). Direct studies of the resources/staying-on question are rare, but Dustmann et al (1998) finds a robust negative effect of pupil/teacher ratios on staying-on for a micro-level UK sample (the NCDS). Cheng (1995), on the other hand, finds no significant effect of pupil-teacher ratios on staying-on, using the Youth Cohort Study. It would be unwise to draw any firm conclusions from these few studies. Nonetheless, the *possibility* of a real-world relationship between school resources measures and staying-on is at least suggested. Further empirical research is clearly warranted.

2.2: School Peer Group Effects and Staying On

In addition to resource factors and culture factors, a school may be defined by the nature of its pupils. In other words, the characteristics of one pupil at a given school might affect another pupil's outcomes. For example, a more able student amongst a class of less able students might 'hide' his or her ability in order not to stand out. A less able student might be discouraged, or might learn faster in the company of more able students. Similarly, a student in a class with a high staying-on rate may be more likely to stay on. These effects are generally referred to as peer group effects.

Peer group effects are widely seen as significant determinants of academic attainment (eg: Reynolds & Reid, 1988; Feinstein & Symons, 1999; Bradley & Taylor, 1998). Measures of peer group factors vary considerably. Feinstein and Symons (1999), for

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[6] This assumes students stay at the *same* school.

example, use the proportion of children in class with fathers in non-manual occupations, the proportion of the class only taking GCE examinations (more academic examinations), likewise for CSE examinations (less academic) and lastly, the staying-on rate of last year's 5th Form. As such, they hope to capture the average academic ability of the class, average socio-economic make-up of the class and any role-model effects from the year above.

Peer group effects are also studied in the context of staying-on decisions, but often not explicitly. This lack of explicitness may be a result of the difficulty of isolating peer group effects from other effects. For example, measures of class exam registration such as those used by Feinstein and Symons (1997) might be capturing the accumulated effects of school quality. Measures of school average exam success can similarly be interpreted as capturing school performance effects (eg: Armstrong, 1999). Cheng (1995) finds the proportion of pupils receiving free school meals to be a significant determinant of staying-on decisions. However, the socio-economic make-up of a class or school may be strongly related to school type, which also has the potential to be confused with school culture effects (eg: McVicar, 1999). The presence of a 6th Form at a school has been found to have significant positive effects on staying-on rates (Cheng, 1995; Payne, 1998; McVicar, 1999). McVicar (1999) argues that this is consistent with role model and peer group effects. However, it may also reflect school culture or school resources effects. So, although there is a strong consensus that peer group effects affect staying-on, the problem of isolating these effects from the effects of culture and resources has made their identification difficult.

2.3: School Culture and Staying On

A whole host of factors influence the learning environment of a school. These can include resource factors and peer group characteristics as well as numerous other factors that can be loosely termed the culture of the school.[7] The previous section discusses the difficulty in separating culture factors from resource or peer group factors, where characteristics like the presence or otherwise of a Sixth Form at a

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[7] It is difficult to be specific when talking about such concepts, but a rough working definition of school culture for the purposes of the present paper is those factors that affect the learning environment of a school that are not resource or peer group related.

school can have all three types of effects. However, there are some purely cultural characteristics that might affect pupil outcomes, such as parental involvement, pupil and teacher perceptions and expectations and discipline, for example. Detailed discussion of what these culture factors are can be found in the education literature (see, for example, Finlayson, 1973; Rutter et al, 1979; Cohen and Manion, 1981; and Freiberg, 1999). A useful handle on the concept of school culture is provided by the clear definitions of a healthy and an unhealthy school contained in Hoy and Feldman (1999).

Department of Education for NI (DENI) school inspection reports are useful to highlight the existence of differences in culture across schools. A school that has an apparently positive cultural influence on its pupils gets the following description:

> 'The school is well managed. The principal provides good leadership and is well supported by the senior management team, heads of department and year heads. The ethos of the school is friendly and welcoming. Relationships at all levels are good and based on mutual respect. The pupils are polite and friendly.'

In contrast, one school is noted for its '…frequent use of sanctions (which) is unnecessary and militates against a good learning ethos.' Another inspection report notes how '…in many instances the teachers' expectations are low'.

While considering definitional matters, it is worth noting that 'culture', as generally defined in this literature, encompasses 'ethos'. In other words, the ethos of a school is just one (albeit important) aspect of school culture. Reynolds and Reid (1988) argue that, at least in Britain, a school's ethos plays a vital role in its success in terms of examination results, compared to resource factors.

The economics literature considering school culture and staying on is not large, and not always couched in the same terms as used in the present paper. However, a lot of information is contained in this literature that can illustrate the culture/staying-on relationship. McVicar (1999) discusses this literature in relation to culture differences between selective and non-selective schools in NI. Factors such as the management status of schools (eg: Education and Library Board (ELB) Controlled), single-sex or

co-ed status and entry requirements are all found to have significant effects on staying on decisions over and above identifiable peer group effects and individual and social background characteristics. McWhirter et al (1987), in a similar exercise, argues that grammar schools in NI are characterised by a more academic ethos than secondary schools, and that this encourages staying on.[8] Andrews and Bradley (1997) similarly find staying-on effects of Grant-Maintained status, selective status and co-ed status in Lancashire, again over and above measurable peer group effects such as average exam success. They also include a school size variable that they argue might capture some resource effects. Cheng (1995) and Dustman et al (1998), controlling for resource and other factors, also find some significant staying-on effects of various measures of school type (eg: LEA maintained, grammar, single sex etc.). Once again, further empirical research is clearly warranted.

2.4: Other Significant Factors in the Participation Decision

There are a large number of factors that have been found to influence staying on decisions in addition to school quality characteristics, and an extensive literature exists analysing their effects (see, for example, Rice, 1987; Micklewright et al, 1990; Andrews and Bradley, 1997). This literature generally stresses the importance of individual and background factors, such as academic ability, social class and gender and environmental factors such as local unemployment rates and expected returns to staying on in terms of earnings differentials. These factors are discussed in more detail in the following section. In addition, there are other factors particular to NI that have been found to be important determinants of transition decisions, such as religion and sub-regional geography (Armstrong, 1999).

3: The Data

The individual level data used in this study are taken from a survey of 1,492 young people in NI who became eligible to leave school for the first time in 1993.[9] The survey was carried out in June 1995, with a total of 980 responses. Information was

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[8] Grammar schools '…identify their role as preparing young people for entry into Higher Education.'
See McVicar (1999) for a discussion.
[9] The Status 0 Survey (see Armstrong et al, 1997).

collected on post school destinations, qualifications gained at 16, individual and family background characteristics and school attended (the variables used in the present analysis are discussed below). It is important to note that the sample was stratified by post-5th Form destination, giving extra weight to those young people who left school and entered employment, unemployment or vocational training.[10] As such, the sample proportions do not match population proportions, as shown in Table 1 below.[11] This also has implications for the estimation procedure, and we discuss this in the following section (Section 4).

Table 1: Career Choice at 16 Population and Sample Proportions

	Population %	Sample %
School	47	18
FE College	21	37
Vocational Training	23	26
Employment	4	15
Unemployment/Other	5	4

Notes: Population figures for 16 year olds for 1993, taken from Armstrong (1999). Our sample is reduced to 566 individuals by deleting observations for which key information is missing.

The data from the 1995 Status 0 Survey were supplemented by information at school level from a number of sources. Firstly, the type (eg: ELB Controlled/Voluntary) and selection regime (grammar/secondary) of schools is available from DENI's 1992/93 School Performance Indicators. The same source contains information on the proportion of 5th Form leavers obtaining 5 or more GCSE grades A-C and on attendance rates. The presence of a 6th Form at the school, the co-education (co-ed) or otherwise status of a school and information on number of teachers and pupils are available from DENI directly. Information on school expenditures is available from the 5 ELB's of NI.[12] All this information is not available for all schools in the sample.

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[10] These young people were the focus of the original research for which the survey was carried out (see Armstrong et al, 1997).

[11] The sample is further reduced by the deletion of observations for which school level data was not available. This attrition, however, is spread randomly across the sample.

[12] Information before 1991/92 is sketchy on many of these measures. This has implications for the present study because the individuals in the sample have been in secondary education between 1988 and 1993. For binary measures (eg: grammar school or not) the 1992/93 status is assumed to hold for the duration of secondary education. Measures of number of pupils, number of teachers and school

Consequently, our sample is reduced to 566 individuals by deletion of observations with key information missing.

The variables used to explain career choice at 16 are listed in Table 2, with sample means and standard deviations where appropriate. They can be divided into separate groups of individual and family, school and environmental factors. The school factors can be further divided into resource factors, peer group factors and culture factors. In most cases the classification of school measures into these further subdivisions is made possible by the inclusion of all the other school measures. For example, by controlling for school examination success, we can interpret the grammar school dummy as a school culture rather than a peer group effect (McVicar, 1999). Similarly, by controlling for school resource factors, the school type variable can also be interpreted as a culture effect rather than a resource effect. The classification of the attendance rate variable and the 6th Form dummy as peer group effects is somewhat arbitrary, although arguably the most natural interpretation. Of course, many of these different school characteristics are closely related in practice, which may make their statistical identification difficult.

3.1: Individual and Family Background Variables

Religion is regarded as very important in NI, both in terms of the number of people who actively go to church and in terms of the strong religious/community identification that many people feel. In addition to this, or as a result of this, schools are predominantly segregated along religious lines and there are persistent Protestant/Catholic labour market differences. For example, the adult male Catholic unemployment rate has consistently been over twice as high as that of adult male Protestants in the region for many years. Because of this latter apparent disadvantage, Catholics might be more likely to stay on at school (Armstrong, 1999). We include a binary dummy for Catholic/Non-Catholic.

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expenditures are available for 1991/92 and 1992/93 and a simple average is taken. There are a few schools for which this information is not available in 1991/92 and 1992/93, in which case the 1993/94 values are used. Expenditure figures are expressed in constant April 1992 prices.

Table 2: Sample Means of Explanatory Variables

	Variable	Sample Mean
Individual and Family	Catholic (cath)	.44
	Male	.52
	GCSEs (quals)	5.34 (3.00)
	Professional Father (Fpro)	.23
	Professional Mother (Mpro)	.09
	Number of Siblings (sibs)	2.74 (1.89)
School Resource	PTR	14.84 (1.32)
	Expenditure per Pupil (epp)	2131.34 (316.02)
	Teaching Exp. per Pupil (tepp)	1592.24 (186.24)
	Av. Teacher Costs (atc)	23425.85 (1546.43)
School Peer Group	School Exam Success (gcse5)	31.22 (23.07)
	Attendance Rate (ar)	91.24 (2.84)
	6th Form (6th)	.39
School Culture	Grammar (gra)	.10
	Controlled (cont)	.57
	Single Sex (ssex)	.32
Environmental	LGD Unemployment Rate (UR)	14.47 (2.98)
	TSN Area (tsn)	.61
	Urban	.22

Gender has been shown in numerous studies to effect choice of post-5th Form destination (refer to any of the transition studies reviewed in Section 2). Typically, young women are far more likely to remain in full-time education than young men, and this is equally true of NI as it is of the UK as a whole. Due to sample size, males and females are not treated separately but gender is included as a binary dummy (1=male).

Young people with a good portfolio of qualifications tend to stay on at school whereas those with little or no qualifications are more likely to enter training schemes or

unemployment. This may partly reflect entrance requirements for the various routes, but also young people's aspirations and their raw (academic) ability. Armstrong (1999) points out that qualifications at 16 are likely to be endogenous in transition models because destinations are often chosen before these examinations are sat and examination effort may depend on the route chosen beforehand. It is also highly likely that many of the factors affecting career choice also affect exam performance more generally. A natural solution to this endogeneity problem would be to find an exogenous variable, correlated with qualifications at 16, to use as an instrument. However, such instruments (exam success at 11 or 14, for example) are difficult to come by and we do not have any such information in our data set.[13] Our qualifications variable is the number of GCSE passes at grades A-C.

Parental employment status can be used both as a measure of social class and of family disposable income. Such measures are intended to pick up factors such as parental aspirations for their children (full-time professional workers may have more demanding academic aspirations for their children than part-time manual workers, for instance) or the family's ability to fund a young adult through years of post-compulsory education. We include a binary dummy for father employed full-time and a similar dummy for mother employed full-time. Interestingly, in a previous paper, mother's employment status was found to be more significant than father's employment status (see McVicar, 1999, for a discussion).

The number of siblings in the household is sometimes included as an explanatory variable in studies of staying on (see, for example, Micklewright, 1989; Armstrong, 1999). A large family may cut down the amount of time parents can spend with individual children, which can affect intellectual development. Equally, it may reduce family income per head.[14]

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[13] Even if we could obtain such information, it may be a poor proxy for academic ability at 16.

[14] Both Armstrong and Micklewright divide number of siblings into older and younger siblings, finding evidence that the effects vary depending on where the individual fits into the birth order. This approach is not followed here because of the proliferation of explanatory variables.

3.2: School Resource Factors

Standard measures of school resources are expenditure per pupil and pupil-teacher ratios (PTRs). Both these measures are included in the present study. In addition, school expenditure can be divided into expenditure directly on teaching and other non-teaching expenditure (eg: administrative staff costs and capital costs). Some studies also include measures proxying for the average experience level of teachers at a school (eg: Bradley and Taylor, 1998). I use teaching expenditure divided by number of teachers as a proxy for this effect. All measures are averaged over the years 1991/92 and 1992/93 in constant prices.

3.3: Peer Group Factors

The proportion of 5th Form leavers achieving 5 or more grades A-C at GCSE is included as a peer group factor to reflect the average academic ability of pupils on the school. As discussed in Section 2 in relation to performance, it is also likely that there will be a peer-group pull towards staying-on or away from staying-on depending on the nature of the peer group. Similarly, to reflect the commitment of pupils to the school, the attendance rate is categorised as a peer group effect. Both these variables could be interpreted as general measures of school quality (eg: Armstrong, 1999), but after controlling for other resource factors and culture factors, their residual effect is most likely to be through the peer group mechanism.

Pupils may be more likely to stay on at school where a 6th Form is present (see Cheng, 1995; Payne, 1998; McVicar, 1999). If a school has a 6th Form, then 5th Form pupils are more likely to know some of the teachers and many of the pupils who will be entering the 6th Form in the cohort. Therefore, both aversion to uncertainty and peer group effects might reasonably be expected to increase the likelihood of such pupils staying on at school. Similarly, the role model effects of day to day contact with existing 6th Formers might act to encourage staying on. Of course, the presence of a 6th Form is also likely to reflect an academic-orientated ethos in the school, which is more a school culture factor. Therefore, the classification of the 6th Form dummy to the peer group effects category should not be treated as clear cut. Bradley and Taylor (1998) also find schools with 6th Forms perform substantially better in exams at 16.

3.4: School Culture Factors

McVicar (1999) argues that there are significant differences in school culture between grammar schools and other secondary schools in NI. A simple way of thinking of such school culture differences is in terms of academic ethos. Following this earlier paper, a grammar school dummy variable is included to capture these effects. The inclusion of school resource factors and peer group factors to capture average academic ability allows the grammar school culture effect to be isolated from these other related effects, in theory. Of course, in practice, the school exam success and grammar school variables are likely to be closely correlated.

McVicar (1999) also argues for the presence of a school culture effect because of school type (whether ELB Controlled or otherwise). This could be due to the nature of management of the school (distant or local) and the closeness of parental involvement, for example. The religious status of a school, closely bound with its type, may also affect the degree to which parents and school share the same ethos which may be reflected in parental involvement (see Spencer, 1987).

Cheng (1995) and McVicar (1999) find that pupils from single sex schools are more likely to stay on at school beyond compulsory schooling. We control for this with a binary single sex dummy (0=co-ed). As in the case of the presence of a 6th Form, the co-ed status or otherwise of a school may have both culture effects and peer group effects, and its classification as a culture variable should not be viewed as definitive.

3.5: Environmental Factors

Unemployment rates are often found to be important determinants of staying on rates (see, for example, Rice, 1987; Micklewright et al, 1990). Two alternative hypotheses are firstly that high (local) unemployment encourages young people to stay on at school because job opportunities are limited (low opportunity cost of staying on). Secondly, unemployment might discourage young people from staying on because they believe their future job prospects will be limited which reduces the perceived benefits to staying on. This theoretical ambiguity is reflected in often contrasting empirical results. We include local unemployment rates for October 1993, based on

claimant counts, at Local Government District (LGD) level. An earlier paper found this to be a significant determinant of career choice at 16 (see McVicar, 1999).

An urban dummy is included to allow for possible effects of living in the urban areas of Belfast or Derry over and above the local labour demand effects captured by the unemployment variable. Armstrong (1999) suggests there may be social factors such as the incidence of crime or other urban cultural factors that have an effect on staying on rates.

Finally, a dummy variable is included to capture whether an individual lives in a designated Targeting Social Needs (TSN) area. This last variable is intended to capture characteristics other than unemployment rates that make up the social fabric of the local area. This variable may also act to capture some social class effects (see McVicar, 1999).

Analysis of simple pairwise correlations between the key explanatory variables and binary career choice dummies highlights a number of interesting relationships in the raw data.[15] The binary dummies for career choice are not strongly correlated with any of the explanatory variables. Nevertheless, the signs of these (weak) correlations largely support our priors. For example, staying on at school is positively correlated with the presence of a 6th Form, school exam success, grammar and the PTR. This last result is particularly interesting as it is suggestive of smaller PTRs for less able children (see Section 2.1). Staying on is negatively correlated with being male. FE displays weak positive correlations with the attendance rate, professional fathers and qualifications. Unemployment and training is positively correlated with being male and negatively correlated with attendance rate, school exam success and individual exam success. Interestingly, the Catholic dummy is uncorrelated with any of the career choice dummies, despite previous evidence of community differences in career choice in NI. McVicar (1999) finds a similar result and provides a full discussion of its possible significance.

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[15] The Table of correlation coefficients is too unwieldy to incorporate in the text. However, it is available from the author on request. Correlation coefficients discussed are Spearman coefficients.

The most significant correlations are, perhaps unsurprisingly, between the right-hand-side (RHS) variables. PTR and expenditure per pupil are highly negatively correlated (they are essentially capturing the same resource effect). PTR is also correlated positively with school size, school exam success (further evidence of smaller PTRs for less able children) and individual qualifications. Grammar schools have higher attendance rates, better examination performance and all have 6th Forms. Pupils with professional mothers are more likely to attend grammar schools. School exam performance is negatively correlated with single sex schools (boys' schools perform comparatively badly), TSN and local unemployment (perhaps capturing social class effects). The Catholic dummy is highly negatively correlated with the Controlled school dummy: Very few Catholics go to Controlled schools.

4: Estimation of the Empirical Model

Estimation of the empirical model follows the approach of McVicar (1999), Armstrong (1999) and Andrews and Bradley (1997), with multiple categories for the dependent variable (career choice at 16). This allows for the fact that decisions at 16 are more complex than a simple binary choice (education or not). The dependent variable is defined as follows:

$Y_i = 0$, if young person is at school,

$Y_i = 1$, if young person is in full-time FE,

$Y_i = 2$, if young person is employed, unemployed or on a training scheme.

The identification of these three separate states for the dependent variable is supported by Cramer-Ridder tests of pooling outcomes 0 and 1 (see Cramer and Ridder, 1991).[16]

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[16] The Cramer-Ridder test is a likelihood- ratio test comparing the log-likelihoods of the model when the dependent variable is aggregated (into 2 states) and when it is disaggregated (into 3 states). Two separate tests are performed for separation of states 0 and 1 (school and FE) and for the division of state 2 into separate states for employment and YT/unemployment. The test statistics are 272.7 and -88.3, respectively, and are distributed chi-square with 19 degrees of freedom (the number of parameter restrictions in the model). The 5% critical value is 10.12, therefore the separation of states 0 and 1 is supported, but the separation of state 2 is rejected. Therefore the dependent variable assumes the three states as defined above.

A multinomial logit model is specified as follows. Let Y_{ij} be a binary variable that takes the value one if an individual is in category j and zero otherwise, ie:

$$\sum_j Y_{ij} = \sum_j P_{ij} = 1,$$

where P_{ij} is the probability that individual i is in category j. The individual probabilities are given by:

$$P_{ij} = P(Y_i = j) = \exp(X_i'b_j)/\sum_j \exp(X_i'b_j).$$

The parameters b_j measure the effect of X_i (the set of explanatory variables) on the *relative* probability of individual i being in one of two categories. In this case, we have normalised on school, so probabilities of being in employment, for example, are expressed relative to the probability of being at school. The set of explanatory variables includes school resource variables, school peer group variables, school culture variables, individual and family background characteristics and environmental variables, as defined in Section 3.

Whilst these estimated parameters are interesting in themselves, our primary interest is in the *marginal effects* at the sample means, which we can recover from the estimated parameters in the following way:

$$\delta P_{ij}/\delta X_i = P_{ij} (b_j - \sum_k P_k b_j),$$

giving us the effect of the explanatory variables on the *absolute* probability of being in category j, where P_k is the relative probability of being in category k, as given above.[17]

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[17] Given that some of the explanatory variables are binary dummies, care needs to be taken in interpreting these marginal effects. They cannot be interpreted as individual-level marginal probabilities (there is no margin at which to change with a binary dummy; it is either 0 or 1) but only in terms of sample proportion effects.

log-likelihood is given by:

$$\ln L = \sum_i \sum_j d_{ij} \ln P (Y_i = j),$$

where $d_{ij} = 1$ if individual i chooses option j and zero otherwise.

The original sample was stratified in such a way that a predetermined number of young people were in each category. Thus the probability of being in the sample in the first place is related to the model itself, or the sample is *choice-based* (Armstrong, 1999). Fortunately, the population proportions are known (see Table 1), so the Manski-Lerman estimator applies (see Manski and Lerman, 1977) based on the following log-likelihood:

$$\ln L = \sum_i \sum_j d_{ij} w (Y_i = j) \ln P (Y_i = j),$$

where $w(Y_i=j)$ is the ratio of the population proportion to the sample proportion in category j. The variance-covariance matrix for this estimator is given by:

$$H^{-1} B H^{-1},$$

Where $H = -\delta^2 \ln L^* (\hat{b}) / \delta \hat{b} \, \delta \hat{b}\,'$,

$$B = \sum_i g_i g_i,$$

and $g_i = \delta \ln L^* (\hat{b}) / \delta \hat{b}$.

Estimation uses LIMDEP7's 'marginal effects' command.

5: Results and Discussion

The first model estimated includes all potential RHS variables and is labelled Model 1. The model is estimated on the whole sample, with a dummy variable for gender.[18] Variables for which *all* marginal effects at sample means are insignificantly different from zero at the 5% level are then dropped from the model.[19] This parsimonious model is labelled Model 2. Table 3 below presents the marginal effects for all three states for both models.

The number of siblings drops out of the model as it is nowhere significant, as does the urban area dummy for those individuals living in Belfast and Derry District Council areas. The two school-level variables that are consistently insignificant are the dummy for single-sex schools and the average expenditure per teacher (proxying for teacher salary and therefore experience). The irrelevance of the co-ed status or otherwise of secondary education for this sample is somewhat surprising, given its significance in a number of previous studies (eg: Cheng, 1995; McVicar, 1999). Previous evidence suggests that girls in single-sex schools perform better in exams than girls in co-ed schools whereas boys do not (eg: Bradley and Taylor, 1998). It may be that the labour market effects of boy's schools and girls schools balance each other out when treated together. Replacing the single sex variable with two gender-specific single-sex variables (boys school and girls school) lends some support for this explanation. The male interactive dummy is marginally significant and negative for school and significant and positive for FE. The female interactive dummy is marginally negatively significant for FE.[20] In other words, girls schools encourage staying on and discourage alternatives relative to boys schools.

Having rejected the four variables described above, all other variables prove to have marginal effects at sample means that are significantly different from zero for at least one state of the dependent variable. Assume temporarily that we accept the somewhat ambiguous classification of the school level variables into the resources, culture and

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[18] The sample is too small to estimate separately for males and females.

[19] Omission of these variables is supported by a Wald test of the restriction $\beta=0$, where β is the vector of coefficients for the siblings, urban, single sex and expenditure per pupil variables. The test statistic is 1.04 distributed chi-square against the 95% critical value of 9.49.

[20] Results of this alternative model are available from the author on request.

peer group sub-groups. If so, the simple answer to the question posed in the title of this paper is that all three school-level mechanisms (peer groups, culture and resources) appear to have an important influence on career choice at 16.

Table 3: Marginal Effects at Sample Means

	Model 1			Model 2		
	School	FE	Other	School	FE	Other
Constant	-1.60	-1.16**	2.76*	-1.47	-1.08**	2.55*
Quals	.009	.005**	-.014*	.010*	.005**	-.015*
Catholic	.121	-.063**	-.059	.115	-.064**	-.051
Male	-.210**	.043**	.167**	-.207**	.046**	.161**
Siblings	.003	-.008*	.005			
Fpro	.101**	.027	-.127**	.101**	.030*	-.131**
Mpro	.116**	-.058**	-.059	.112*	-.051**	-.060
Urban	-.026	-.005	.031			
Urate	-.005	.016**	-.011	-.003	.014**	-.011
TSN	-.126**	-.002	.128**	-.134**	-.002	.136**
GCSE5	-.003*	.002**	.001	-.002	.001**	.001
Attend	-.013	.026**	-.012	-.012	.026**	-.014
6th Form	.383**	-.117**	-.266**	.364**	-.108**	-.256**
Grammar	.068	-.102**	.033	.042	-.098**	.056
Controlled	.142*	-.140**	-.002	.146*	-.128**	-.018
Single Sex	-.061	.013	.047			
PTR	.132**	-.051**	-.081	.119**	-.073**	-.046
Exp/pupil	.0004**	-.0001	-.0003	.0004**	-.0002**	-.0002
Exp/teacher	.0000007	-.00002*	.00002			
Pseudo R²	.125			.122		

Notes: Figures give marginal effects at sample means. 'Other' denotes employment, unemployment and youth training. Significant coefficients at 10% are marked with a single asterisk and at 5% with a double asterisk.

5.1: Individual, Background and Environmental Factors

Consider each set of variables in turn. Firstly, the individual, family-background and environmental variables all enter the model with the expected signs. More academically able pupils are more likely to remain in full-time education than enter employment, training or unemployment. Catholics are more likely to stay on at school. Young women are more likely to stay on at school than young men. Professional parents encourage staying on, which is consistent with the expected effects of social class. Higher local unemployment encourages young people to remain in full-time education, although this is only significant for FE. Young people from TSN wards are less likely to stay on at school and more likely to enter employment, training or unemployment. This suggests the TSN variable is acting to capture social class effects rather than additional local labour market effects.

5.2: School Resource Factors

Secondly, consider the variables that proxy for school resource effects. Both expenditure per pupil and the PTR have marginal effects that are significantly different from zero. Consider first the marginal effects of the PTR. An increase in the PTR means that class sizes are bigger. If we believe that resources effect staying on decisions in a positive way, then we would expect a *negative* marginal effect of the PTR on the proportion staying on. The results from both models suggest precisely the opposite. In other words, increasing the PTR increases staying on (at school). This counter-intuitive result has been found before (see the review in Hanushek, 1996b) and is likely to be driven by the fact that funding is skewed towards the less academically able in NI.[21]

It is interesting that the PTR has a significant negative effect on FE entry. This is more in line with the predicted positive effect of resources on opting for continued education. It is particularly interesting in the light of the large body of literature that finds no significant overall relationship between PTRs and remaining in full-time education post-16. By splitting post-compulsory education into FE and schools the

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[21] For example, the average PTR in all NI grammar schools was 15.6 compared to 14.5 for non-grammar secondaries in 1997/98 (DENI, 1998).

model identifies two opposite effects that may be counteracting each other in binary models of career choice. Why the endogeneity of the PTR appears to affect the staying on at school decision more than it affects the entry to FE decision is not immediately clear. The most plausible explanation is that it could be capturing class size differences between grammar and secondary schools, which disproportionately effects the proportion staying on at school since very few grammar school pupils opt for anything else. This seems an interesting issue for further research.

The marginal effects of expenditure per pupil are more conventional. There is evidence of a significant positive expenditure effect on staying on at school and a corresponding negative effect for entry into FE, at least for Model 2. This supports the arguments that higher spending on schools encourages staying on both because of the expected earnings benefits from doing so and because of the nature of school as a consumption good. Dropping PTR from Model 2 causes the expenditure marginal effect on staying on to become negative, as the PTR marginal effect at the sample mean is bigger than the expenditure per pupil effect . The expenditure per teacher variable also displays a significant, but positive marginal effect on staying on in this case. Replacing the broad expenditure variable with direct expenditure on teaching per pupil makes little difference to the pattern of effects.

Splitting the sample into secondary and grammar school pupils is one possible way of increasing control over the PTR/academic ability problem. Unfortunately, the grammar school sub-sample is too small for any meaningful analysis. The secondary school sub-sample, however, is large enough. The problem is these schools include a wide range of abilities, including those with special educational needs who tend to be taught in smaller classes. It is therefore not clear that such a sample restriction will alter much. The results from this restricted sample are indeed very similar to those reported in Table 3, although the PTR effect is slightly smaller.[22] In conclusion, there is strong evidence of significant resource-related effects, but it is less clear how they act overall.

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[22] Available from the author on request.

5.3: School Culture Factors

Both the grammar school dummy and the Controlled school dummy have significant marginal effects. McVicar (1999) found a significant positive grammar school culture effect on staying on and a negative effect on entry to FE. The grammar school culture effect on staying on is again positive, although not significant at standard levels. The negative effect on entry to FE is significant in the present study, although of smaller magnitude than in the previous study. It may be that the additional school-level variables in the current model are capturing effects attributed to grammar school culture in the McVicar (1999) model. To test this possibility, I estimate the McVicar (1999) model on the current sample. The marginal effects of the grammar variable are remarkably robust to this specification change, suggesting the weakness of the grammar school culture effect on staying on at school is a characteristic of the sample rather than the specific model. Nevertheless, given that the negative grammar school culture effect on entry to FE is common to both papers, the evidence of a significant school culture difference between grammar schools and secondary schools as suggested by McVicar (1999) is further supported.

The Controlled school dummy displays quite large, significant marginal effects on career choice at 16. Pupils from Controlled schools are more likely to stay on and less likely to enter FE. This suggests either there is something about the nature of the pupils that are educated in these schools, or something about the schools themselves that influences outcomes. Given the level of control for individual, background and peer group characteristics, the effect is likely to be capturing a school culture effect. Interestingly, there is a direct contrast with the Catholic dummy variable, which suggests Protestants (by far the majority of Controlled school pupils) are less likely to stay on.[23] The results imply that ELBs are getting something right in the management of schools that is not reflected in the Voluntary sector that encourages pupils to stay on. Overall, the results suggest the existence of significant school culture effects.

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[23] Until recently, Catholic schools only received 85% of capital costs from public funds as opposed to 100% for Controlled schools. Having controlled for individual religious community differences in

5.4: Peer Group Factors

All three school-level measures classified as peer-group measures play significant roles in career choice at 16 in NI. The most striking factor is the presence or otherwise of a 6th Form at a given school. Pupils attending schools with 6th Forms are much more likely to stay on at school, and much less likely to enter FE, employment, training or unemployment. The size of these marginal effects is considerable. For example, Model 2 predicts a 1 per cent increase in the number of schools with their own 6th Forms would raise staying on rates by 0.36 per cent. This evidence is consistent with the peer group and role model effects suggested by McVicar (1999)[24], but could also be reflecting school culture effects, such as academic ethos. Given that all NI grammar schools have 6th Forms whereas many secondary schools do not, it is also possible that this variable is picking up some school type or academic ability effects, even though these are controlled for with the grammar dummy and the qualifications variable. Restricting the sample to secondary school pupils only, however, makes little difference to the estimated marginal effects. Further control over academic ability is not possible with the existing data set.

The proportion of the 1993 school 5th Form gaining 5 or more GCSEs grades A-C and the attendance rate are intended to proxy for the average academic ability of the peer group and the average commitment and contentment at school of this peer group. Both variables display a similar and very interesting pattern of marginal effects. An increase in the average ability level or the attendance rate of the peer group leads to an increase in the number of young people choosing to enter FE These variables seem to have no significant effects on staying on rates or entry into the labour market. One possible interpretation of this result is that these peer group effects are most strong for those young people on the margins of choosing FE or entry into the labour market, whereas other factors are more important for those at either extreme of the academic ability range. Restricting the sample to those individuals with between 1 and 5

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staying on rates with the Catholic dummy, it may be this effect that is being picked up by the Controlled variable.

[24] Pupils at schools with 6th Forms will be exposed to current 6th Formers as role models. Also, they will know many of the pupils that will be staying on and also some of the 6th Form teachers. McVicar (1999) argues that these factors are likely to encourage staying on.

GCSEs, who one would imagine are the most likely to fall into this group, makes the marginal effects only slightly stronger, so perhaps another explanation is needed.

6: Summary and Concluding Remarks

The paper reviews the literature on the effects of school level factors on career choice at 16. The general consensus of this literature is that such effects play a significant role in the decision to stay on at school, enter FE or enter the labour market. A number of studies find resource-related measures, such as PTRs or expenditure per pupil to be significant (although not always with the expected sign). Many studies also find non-resource related school characteristics to be significant, and these are variably put down to school culture or peer group effects. This ambiguity as to what school characteristics are acting through school culture or through peer group effects is one of the hurdles yet to be satisfactorily overcome in this literature. Another problem with this literature is that the set of school-level variables considered varies quite considerably across studies. Given the degree of correlation between many of these measures, estimated relationships are likely to be quite sensitive to model specification changes.

The current paper sets out with the intention of separating resource-related school-level effects from non-resource-related effects for a sample of NI 1993 5th Form leavers. In doing so it builds specifically on earlier papers by Armstrong (1999) and McVicar (1999). I argue that their estimates of school culture effects in NI's secondary education system are potentially fragile to the inclusion of further school characteristics. The current paper also attempts to separate school culture from peer group effects, as far as possible with the available data, in order to clarify the interpretations of estimated effects. The paper asks whether it is resource factors, peer group factors or school culture factors that are most important in career choice at 16, after controlling for the usual set of individual, background and environmental characteristics. The tentative answer is that all three types of factors have an influence, although ranking them goes beyond the capabilities of the loose categorisation adopted.

Pupil Teacher Ratios are positively correlated with staying on at school for the sample. In other words, pupils from larger classes are more likely to stay on at school. This is not an isolated result in the literature, and is likely to be picking up the tendency for class sizes to be smaller for less able children. There is evidence, however, of a significant positive expenditure per pupil effect on staying on. Interestingly, PTRs are negatively correlated with entry to FE. I argue that treating post-compulsory education as a single choice might act to obscure these counteracting effects, which could contribute to the pattern of insignificant PTR effects often found in the literature. This seems an interesting issue for further research.

Evidence of the role played by school culture comes from the estimated effects of the grammar school and ELB-Controlled school dummy variables. I argue that these variables proxy for academic ethos and management characteristics of schools, once the other characteristics have been accounted for. The average academic ability and attendance rate of school years also affect career choice at 16, which I argue provides evidence of peer group effects. Lastly, the consistently most important school-level characteristic is the presence or otherwise of a 6th Form. This is perhaps the most difficult measure to classify, as it may reflect academic ethos, for example, or it may capture certain peer group and role model effects, as suggested by McVicar (1999). Nevertheless, schools with 6th Forms encourage staying on to a far greater extent than those without.

In conclusion, policy makers should be cautious when evaluating the real-world effects of different aspects of school quality. A great deal more research is needed into these matters, with more sophisticated data sets, before we can truly understand the mechanisms through which schools affect career choices at 16. That said, the current paper highlights the importance of 6th Forms in encouraging pupils to stay on at school. By establishing 6th Forms more widely in secondary schools across NI, more young people outside the grammar school sector would be likely to stay on.

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