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ABSTRACT

This report on young persons' access to higher education in Scotland attempts to determine whether the incidence of students' transition from S4 to voluntary participation in S5 is influenced by the transitions that occur at the end of S5. The project analyzed data from a 10% sample of the S4 cohort of 1983/84. The central question examined whether an earlier transition to higher education is associated with a higher-than-expected transition from S4 to S5. The study found that, compared to Scotland overall, there was a higher voluntary continuation rate in the Strathclyde region both before and after allowing for the individual characteristics that influenced transition. This effect, however, was apparent only for pupils with five or fewer A-C awards at O-grade in S4. The "Strathclyde effect" in voluntary continuation was reduced but remained substantial after controlling for the higher local unemployment rate and could not be explained by the effectiveness of denominational/non-denominational schools. The research left undecided the question of whether the Strathclyde effect resulted from the fact that post-compulsory courses in Strathclyde are more often terminated after 1 year. The report presents conclusions and outlines the likely consequences of any 2-year post-compulsory course for voluntary participation. (10 references) (JDD)

PARTICIPATION IN POST-COMPULSORY SCHOOLING IN SCOTLAND

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A Report commissioned by the Association of University Teachers (Scotland) and the AUT Educational Trust Fund from the Centre for Educational Sociology in the University of Edinburgh and the Department of Statistics and Modelling Science in the University of Strathclyde

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Summary

1. This is the fourth and last report of a project, funded by the Association of University Teachers (Scotland) and by the Educational Trust Fund of the Association of University Teachers, on young persons' access to higher education.

2. This report examines one feature only of access, namely pupils' transitions from S4 to voluntary participation in S5. In particular, it attempts to determine whether the incidence of this transition is influenced by the transitions that occur (and that could be anticipated by 'upcoming' S4 cohorts to occur) at the end of S5. In some schools, especially in Strathclyde region, academically successful pupils tend to enter higher education more often from fifth year than their counterparts from other schools who commonly spend two years in post-compulsory schooling before entering higher education. The central question asked by this project is whether the earlier transition to higher education characteristic of the former type of school, and characteristic of Strathclyde region, is associated with a higher-than-expected transition from S4 to S5. The assumption here is that the prospect of an 'early' but 'successful' transition from post-compulsory schooling might boost the probability that a pupil would enter post-compulsory schooling in the first place. A second possibility is that schools that characteristically provide a 1-plus-1 post-compulsory structure also boost the S4-to-S5 transition, especially for pupils of only moderate S4 attainment. Here the assumption is that such pupils are attracted by the prospect of incremental progress towards success over two years rather than one. The testing of these possibilities is designed to throw light on the effects of the fifth-year Higher on post-compulsory participation in general.

3. The project analysed data from a 10% sample of the S4 cohort of 1983/84, contacted by the Scottish Young People's Survey in 1985, 1986 and 1987. The analysis used a multilevel (two-level) design consisting of pupils (the individual level) and pupils grouped within schools (the school level). There were also direct school-level measures of school characteristics.

4. The analysis was able to replicate earlier findings that post-compulsory participation was boosted by the following pupil characteristics: female gender, high social class, high parental education and being in an age band 'conscripted' to the first term of S5 (middle and low S4 attainers only). The most important predictor of voluntary continuation was high attainment in S4.

5. The main new finding from the project was that there was a higher voluntary continuation rate in Strathclyde both before and after allowing for the individual characteristics that influenced transition. This effect, however, was apparent only for pupils with five or fewer A-C awards at O-grade in S4. Among pupils with six or more A-C awards there was no difference in rates of voluntary continuation between Strathclyde region and the rest of Scotland. The odds of a lower qualified pupil voluntarily entering post-compulsory schooling were greater in Strathclyde than in the rest of Scotland by a factor of 1.8 (95% confidence interval 1.44 to 2.23).

6. The 'Strathclyde effect' in voluntary continuation was reduced, but remained substantial, after controlling in addition for the local unemployment rate (high local unemployment boosted voluntary continuation). Nor could the Strathclyde effect be explained in terms of school denomination.

7. Three characteristics of schools were measured in an attempt to explain the Strathclyde effect. These were

   i the absolute size of the S5 pupil roll ('S5 absolute size')
   ii the size of the S5 pupil roll relative to the size of the S4 pupil roll in the same year ('the S5 relative size') (ideally the previous session's S4 roll size would be used)
   iii the size of the S6 roll relative to the size of the S5 roll in the same year ('the relative size of S6') (again, ideally, the previous session's S5 roll size would be used)

The two fifth-year variables (i and ii) are an attempt to measure the school's ability to mount a full fifth-year course. The relative size of S6 measures the propensity to leave from S5 rather than to continue. All three var ables were referenced on the academic session in which the cohort was in S4 and were constructed from population data taken from the SED school census.

8. The three school characteristics described in paragraph 7 helped to explain voluntary continuation, but they did not explain the Strathclyde effect on voluntary continuation. Voluntary continuation tended to be higher in schools where the S5 was larger and where the relative size of S5 was larger, but these effects were observed only for pupils with five or fewer S4 awards at A-C. This may indicate that the factors making for a school's success in promoting voluntary participation in one year carry over to the following year. More speculatively, this in turn might be explained in terms of the S4 pupils' perception that a viable S5 awaited them.

9. The relative size of S6 also influenced voluntary continuation from S4 to S5. Again the effects differed for pupils of differing S4 attainment. Pupils with five or fewer A-C awards in S4 were more likely to continue voluntarily in schools where the S5 to S6 transition was also high. This effect is consistent with pupils in such schools believing that the school offered them a viable 1-plus-1 structure, but it would also be consistent with pupils' being attracted by a two-year structure, with no significant exit from S5 - the research is unable to adjudicate between these two possibilities. For pupils with six or more S4 awards at A-C, the relative size of S6 had a reverse effect. Such pupils were more likely to stay to S5 in schools where S5 leaving was relatively common and where the size of S6 relative to S5 was relatively smaller.

10. In general, the most solid finding from this research is that Strathclyde region has a higher than expected voluntary continuation rate to S5 for pupils of moderate or low S4 attainment (fewer than six A-C awards). This Strathclyde effect cannot be explained in terms of the local unemployment rate or of the effectiveness of

denominational/non-denominational schools. The research leaves undecided the question of whether the Strathclyde effect results from the fact that post-compulsory courses in Strathclyde are more often terminated after one year. The pattern of effects on voluntary continuation of the school-size and relative size measures is consistent with such an explanation. However, the relative size measures are no doubt open to alternative interpretations, and they may be capturing other, unmeasured, features of the organisation of the schools. If the interpretation of the school-size measures is valid, it is a puzzle that the Strathclyde effect on voluntary continuation does not fall when account is taken of them. This would mean that the Strathclyde effect does not work in the way that the project had conjectured. But it would also mean that schools individually do indeed have the effects on voluntary continuation that had been conjectured. If the interpretation of the school-size measures is not valid, then it remains open to believe that the Strathclyde effect is indeed caused by the opportunity for an earlier completion of voluntary schooling that is a feature of the region's provision.

1. Introduction

The three previous reports under this study (Robertson 1990a,b; McPherson, Raffe and Robertson 1990) addressed the function of the fifth year of post-compulsory schooling in Scotland and its relationship to access to higher education. One of the main findings of these reports was that there was a well established route to higher education in Scotland which involved leaving school at the end of fifth year after only one year of post-compulsory schooling. This route was particularly strong in the west of Scotland in Strathclyde Region.

About 20% of direct entrants to higher education in the mid-eighties used this route. This percentage was at 20% in 1962 but in the intervening years had risen to a peak in the late seventies and early eighties. The evidence suggested that the pupils who left school at the end of fifth year and went directly to higher education were well qualified. Pupils who went at the end of sixth year had, on average, a wider spread of ability, comprising of pupils who had used sixth year to take only Sixth Year Studies papers, at one end of the spectrum, and pupils who had taken Highers for the first time or had retaken fifth-year Highers to try and obtain sufficient passes to enter higher education, at the other.

It was also seen from the study of the cohort of pupils in fourth year in 1983-84 that a wide variety of courses was taken in fifth and sixth years. These ranged from O grades through Highers to Sixth Year Studies and A Levels. The different curricula followed by different groups of pupils within the post-compulsory sector led to the conclusion that there was a mechanism in the system which encouraged incremental success in certificated examinations. It was concluded that the existence of the Higher examinations at the end of one year of post-compulsory education was, at least in part, a major reason for the relatively high participation rates in higher education in Scotland compared with England and Wales.

The flow of qualified pupils from post-compulsory schooling to higher education depends crucially on the participation rates in fifth and sixth years. If the way out of schooling to higher education at the end of fifth year for qualified pupils is closed off,

then the effect of this is likely to be detrimental to participation in higher education. It is not likely to result in the whole 20% of the cohort of direct entrants to higher education who come from fifth year opting out of higher education completely, because some, possibly the majority, will elect to stay on for the two years. There is, however, the possibility that some direct entrants to higher education from fifth year will not participate in fifth year because they do not wish to commit themselves to a further two years of secondary schooling. They may go to further education from school and stay in the education sector, or they may elect to leave education completely.

A serious consequence of the closing of the fifth year route out of school with viable certificates to higher education is that some pupils may only enter fifth year because there is the possibility of leaving at the end of it, nine months later. These pupils may not even consider going on to higher education at the end of fourth year but may be prepared to make the investment of one year of their lives in post-compulsory education. Having elected to go into fifth year and sit certificated examinations at the end of it, they may be encouraged by their success either to enter higher education directly from fifth year, if they have sufficient qualifications, or return to school for a sixth year and go onto higher education afterwards. Especially for marginally qualified pupils in fourth year, this route to higher education is likely to be important.

Well qualified fourth year pupils are likely either to be sufficiently motivated towards higher education or sufficiently confident of obtaining qualifications that the existence of a fifth year exit point to higher education may not be very important. A complication is that, in Strathclyde region, the end of fifth year represents the end of schooling for over 50% of pupils with four or more Higher passes in fifth year. In this area of Scotland, there is a tradition of leaving school at the end of fifth year, particularly for well qualified pupils. Knowing that two years of post-compulsory schooling are necessary before obtaining any qualifications may put some of these able pupils off beginning fifth year.

This paper reports work carried out on voluntary fifth-year participation rates. A pupil is considered to have taken part in post-compulsory schooling voluntarily if he or

she is at school in January of fifth year. This definition is used to remove any fifth year "conscripts" from the calculation of the voluntary participation rates. Conscripts are pupils who are not old enough to leave school by the beginning of fifth year, and who have to complete a term of fifth year before being allowed to leave. Using January of fifth year as the date at which voluntary post-compulsory schooling is assessed, removes any non-voluntary conscripts. It will however omit some true volunteers who left at Christmas of fifth year. This is not very serious because the important aspect as regards entrance to higher education is whether or not pupils had the opportunity to sit Highers or O grades in May of fifth year. Pupils who leave at Christmas of fifth year will not sit examinations at school in May.

In calculating the likely effects of a two-year certification course in post-compulsory schooling on voluntary participation rates, it is desirable to compare pupils at schools with different strategies. Ideally, this means comparing participation rates among pupils who attend schools where all post-compulsory volunteer pupils leave at the end of fifth year with rates at schools where no pupils leave at the end of fifth year and where all stay on to the end of sixth year. In the latter schools, a two-year option is effectively being exercised. Unfortunately, this cannot be done as such schools do not exist. All pupils in post-compulsory education have the right to leave at the end of fifth year if they wish to do so.

As has already been noted, pupils in Strathclyde are more likely to make use of the option of leaving at the end of fifth year. This gives a way of trying to assess the likely effects of a two-year certification course by comparing voluntary participation rates in Strathclyde with those in the rest of Scotland. If rates in Strathclyde are higher than those in the rest of Scotland, then this would suggest that the active use of a fifth year exit point is associated with an increased participation. In making this comparison it is important to make sure that like is being compared with like, and to this end the effect of many factors on participation rates will be taken into account.

This comparison is very important and must be done with care. There are three major sources of influence on a pupil's decision to enter post-compulsory schooling.

These come from the pupil, from the pupil's family background and from the pupil's school. The school effects are potentially the more important in this project because it is at this level that any evidence of the likely effects of the two-year certification courses will be revealed. The school effects arise in a number of ways, but one of the most important is in the correlation of pupils within a school. As pupils are grouped together in schools, the behaviour of pupils at the same school is likely to be more similar to each other compared to pupils at different schools. This correlation must be taken into account in the analysis and leads to the use of hierarchical models (Goldstein, 1987). A brief discussion of such models will be given in section 3.

The results of the analyses will be presented in sections 2 and 4. Section 4 contains the results of the hierarchical modelling and are the main substantive results of this paper. The results in section 2 provide background material. The main factors influencing participation in post-compulsory schooling are described and their effects at the pupil level discussed. In section 5 the conclusions of the report are presented and the likely consequences of any two-year post-compulsory course for voluntary participation are discussed.

The data used in this analysis is the cohort of pupils in fourth year in 1983-84. This is the same group of pupils analysed in Robertson (1990b), where attention was focussed on their routes to higher education and on their curricula followed while at school. Data supplied by the Scottish Education Department from the school census of 1983 is also used to provide information on the size of the schools just before the time this cohort passed through the post-compulsory sector.

2. Voluntary participation in fifth year

The first part of this section will present information on the voluntary participation rates among pupils. The percentages presented are based on the 4012 pupils who were in the cohort analysed in Robertson (1990b). The school data come from the 1983 school census which only contains data on local authority schools and as a consequence pupils who were not at such schools are omitted. In view of the small numbers of pupils involved here this is not likely to be a serious drawback.

Most of the results in section 4 are based on an unweighted analysis of the 4012 pupils. This will lead to some bias as the response rates to the surveys were not constant over the different types of pupils. For example, response was lower among males, among those who left school, and among those with poorer fourth-year qualifications. The analysis in Robertson (1990b) used sample weights to compensate for this response bias. This is not possible in section 4 because the raw data have to be used in the multi-level modelling programs. Weighted data are used in this section, and so the results can be extended to the population of school pupils in S4 in 1983-84.

In the second half of this section, data from the school census will be discussed with a view to investigating the size of the school rolls in the local authority schools in Scotland. When the two databases are merged pupils from grant aided and independent schools will be omitted. Both of these sections will provide background information for the multi-level models of sections 3 and 4.

Pupils

Overall, 57% of the pupils in the unweighted sample elected to go into post-compulsory school educatio This rate is determined from the number of pupils who were still at school in January of fifth year. This percentage is much higher than the one based on the weighted analysis which was 44%, as a result of the non-response bias. This means that any absolute figures of participation are overestimated but that comparisons of sub-groups are not likely to be affected by this bias, except where the sub-groups involve males compared to females, conscripts to non-conscripts and low compared to high O grade performances.

Voluntary participation rates are presented in Table 1 for the important pupil variables. The rates are higher for females compared to males. Conscripts also have higher voluntary staying-on rates compared to their slightly older counterparts in the sample. There is the expected social class gradient, both as regards parental schooling and paternal social class. There is also a strong relationship between attainment in fourth year and voluntary participation in fifth year, ranging from 6% for pupils with no O grades to 97% for pupils with 8 or more O grades.

In the multi-level modelling exercise of sections 3 and 4, it will be easier if binary variables are used to assess the effect of the variables with many values such as the two social class variables. The main jump in the parental schooling gradient comes between both parent's leaving school at 15 (i.e. the minimum leaving age) and at least one staying on until 16 (i.e. taking part in post-compulsory education, because the minimum school leaving age was 15 for most parents). In subsequent work, parental schooling will be treated as a binary variable with 1 representing being at school until 16 or 17 and 0 representing those parents who left school at the minimum (15) or where the response is 'Don't Know'. With paternal social class there is a large drop between classes III(1) and III(2), leading to a binary variable with 1 representing non-manual families (classes I, II, III(1)) and 0 representing manual or unclassified (III(2), IV, V, Unclassified).

Attainment in fourth year is grouped into three levels representing low, middle and well qualified pupils. In McPherson, Raffe and Robertson (1990), pupils in the middle range of O grade qualifications were picked out as those who were most likely to be affected by any changes to the post-compulsory curriculum. The important results in this paper concern between-school variation in the participation rates for this middle group. The definition of the middle attainment group is somewhat arbitrary, and 3 to 5 O Grades is used here, with 2 or less being the low group and 6 or more the high group. The reason for this choice is that the participation rates are roughly constant within these three groups. The group with the biggest variation is the middle group, and from Table 1 it can be seen that the pupils with 5 O grades could be placed in the high group. There is not such a compelling reason for including pupils with 2 O grades in the middle group because the staying on rate is only 34.7% compared to 53.6% for pupils

with 3 O grades. In an attempt to keep the sizes of the groups comparable it was decided to keep 5 O grades in the middle group. In fact, different groupings were used at different stages of the analysis with little change to the main conclusions.

Table 1
Voluntary participation rates for pupil characteristics

Gender	Males	Females
N	2041	1967
Percentage	40.3	48.1
Conscript Effect	**Volunteers**	**Conscripts**
N	2809	1199
Percentage	39.7	54.5

Parental Schooling

	Don't Know	Both 15	One at 16	One at 17+	Both 17+
N	403	2344	665	400	195
Percentage	35.9	33.3	54.0	78.4	88.1

Paternal Social Class

	I	II	III(1)	III(2)	IV	V	Unclass
N	173	766	264	1310	510	156	829
Percentage	88.0	70.7	61.8	34.8	36.5	23.8	28.1

Fourth Year Attainment: Number of O grade awards at A-C

	No Awards	DE only	1	2	3
N	980	414	455	382	283
Percentage	5.9	18.9	28.7	34.7	53.6
	4	5	6	7	8
N	273	249	281	417	275
Percentage	59.4	71.5	82.6	91.7	96.6

Schools

The participation rates from fourth year into January of fifth year are presented for some of the potentially important school level variables in Table 2. The rates over the divisions and regions of Scotland are quite variable. At first glance the rates for Strathclyde do not appear to be higher than those in the rest of Scotland, though they are when amalgamated (see Table 3). This variable will only be considered as a binary variable where 1 represents schools in Strathclyde region and 0 represents schools in the rest of Scotland.

Table 2
Voluntary participation rates over some of the school characteristics

Division/Region

	Highland	Grampian	Tayside	Fife	Lothian	
N	155	373	321	278	505	
Percentage	52.1	44.4	40.7	43.2	47.4	
	Borders	**Central**	**Dumfries**	**Orkney**	**Shetland Isles**	**Western**
N	80	233	130	14	16	40
Percentage	27.6	41.8	34.4	60.7	37.3	38.4
	Argyle & Bute	**Ayr**	**Dumbarton**	**Glasgow**	**Lanark**	**Renfrew**
N	68	296	268	526	428	276
Percentage	64.1	44.7	49.9	36.5	43.2	55.5

School Denomination

	RC	Non Denom
N	630	3378
Percentage	39.9	45.0

School Status

	Local Authority	Not LA
N	3868	140
Percentage	42.5	84.3

School History

	After 1965	Before 1918
N	2142	1866
Percentage	41.7	47.0

There are slightly higher rates among pupils attending non-denominational schools. Pupils at the grant aided and independent schools have very high rates of participation in post-compulsory schooling. These pupils will not be included in the multi-level analysis because data on the size of the schools are not available. As regards the school history there is very little difference between the two types and this will not be considered further.

A two-way table where the percentages of pupils who voluntarily participate in fifth year and sixth year are classified by their attainment in fourth year and whether or not they are at school in Strathclyde region is presented in Table 3. This table is quite revealing and shows that there is little difference in fifth year participation rates for well qualified pupils. There is a difference for such pupils as regards the percentages of the cohort who enter sixth year. This is a result of a substantial percentage of well qualified fifth year pupils leaving school in Strathclyde many of whom enter higher education (Robertson 1990b).

At the opposite end of the attainment spectrum, among pupils with fewer that 3 O grades in fourth year, there is little difference in the percentages of the cohort who enter sixth year between the two areas; both are very low at 4%. An interesting difference arises in the fifth year rates where a higher percentage of poorly qualified pupils in Strathclyde enter voluntary post-compulsory schooling. The differences is even more staggering in the middle attainment group with a 15% difference. This difference persists into sixth year for these pupils. The sample sizes in this group are smaller than in the low attainment group so the percentages are estimated with less precision.

Table 3
Voluntary participation, attainment and Strathclyde region

	S5			S6		
O Grades	0-3	3-5	6-8	0-3	3-5	6-8
Rest of Scotland						
Number	1111	459	553	1118	460	556
Percentage	15.7	54.9	91.2	3.8	22.2	58.6
Strathclyde						
Number	1088	339	410	1104	341	414
Percentage	20.6	70.5	91.6	3.9	28.7	48.8

One of the main conjectures of the report by McPherson, Raffe and Robertson (1990) was that the existence of a well used fifth year exit point could lead to an increased participation in fifth year by pupils with middling fourth year qualifications. The above table gives some support to this conjecture, because leaving from fifth year to go to higher education is much more common in Strathclyde. Much of the work in this paper will attempt to explain this difference in terms of school effects. A cautionary point is that this involves a search for a complex interaction involving a school variable and a pupil variable, possibly with other school variables. A second point is that the table does not control for other factors such as gender, social class and conscription which are known to influence participation. Also Raffe and Willms (1989) have shown that the local unemployment rate influences staying on to post-compulsory education. This effect is not controlled for in Table 4. For this reason a multi-level modelling approach is adopted to see if the Strathclyde effect persists once these factors have been taken into account.

School Census

One feature of schools which is likely to facilitate the success of their pupils in

post-compulsory education and hence in entrance to higher education is the ability to mount an effective fifth year with sufficient Higher courses. No data is available on this and it is not possible to classify schools as having a well established post-compulsory curriculum where a substantial number of pupils are expected to sit Highers at the end of fifth year. If the majority of pupils at a school are not particularly well qualified at the end of fourth year then the voluntary participation rates are not likely to be high. Few well qualified pupils are anticipated in fifth and sixth year which could lead to a relatively narrow Highers curriculum relative to a school which has a large post-compulsory sector.

In this analysis the size of the school roll in fifth year is used as a proxy measure of the ability of the school to mount a broad based Highers curriculum in post-compulsory school education. The absolute size of fifth year is used as well as the relative size of fifth year compared to fourth year. The relative size is not directly equivalent to the non-voluntary staying on rates from fourth year to fifth year but, assuming that these rates are reasonably consistent from one year to the next, they are a reasonable approximation to them.

The data on the school rolls come from the SED 1983 school census. This has the numbers of pupils in each school year for all local authority schools in Scotland. Data are available on the numbers of males and females separately for the school but these data were not used. The census gives the number of pupils in fourth year at the beginning of the session 1983-84 and the members of the cohort are in this group of pupils. The figures for fifth and sixth years give the rolls for the same year. The timing of this data is precisely correct as it gives an indication of the size of the preceding fifth year for pupils who are about to make up their minds about whether or not they are going to enter post-compulsory education at school.

In this analysis, the hypothesis that there is a 'roller-coaster' effect will be tested. This effect implies that if a school has a large post-compulsory sector which is seen to be large and viable by pupils in lower years then this, in turn, may encourage some of them to consider beginning fifth year. The contrary effect is that, if pupils in fourth year see most of their elders leaving before fifth year, then they too may tend not to

begin fifth year.

Two measures of size of fifth year are used - the absolute size and the relative size. The absolute size is just the number of pupils in fifth year, while the relative size is the number of pupils in fifth year divided by the number of pupils in fourth year. As the number of pupils in fifth year contains some conscripts who may leave school at Christmas of fifth year, the size of fifth year overestimates the number of pupils who could actively be studying Highers. Similarly the ratio of fifth to fourth year sizes is not a measure of voluntary participation. If anything it is a measure of fifth year participation, including both voluntary and conscripted participation.

One reason that the ratio is not an exact measure of participation is that the figures do not provide information on the flow of pupils - they are purely cross-sectional at a particular time period (1983). Data on the flow of pupils are not directly available because the school census data are available on a two-yearly basis. In any case, previous participation rates in a school are not really of substantive interest as far as the decision of a pupil is concerned. Such pupils can only really judge the size of fifth year as it is at the time they are making their own decisions

Histograms of the school rolls for 1983-84 are presented in Figures 1 and 2. These show that the size of fourth year ranges from about 9 to 438 pupils with a median of 200. For fifth year the sizes are about half with a range from 0 to 328 with a median of just over 100. The relative size of fifth year to fourth year (Figure 3) goes from 0 to 1.1 with a mean of 0.57 which corresponds closely to the figure for the unweighted voluntary staying on rate for the sample from the cohort. The relationship between the two measures of the size of fifth year is presented in Figure 4. This shows that there is a general trend with high relative sizes associated with high absolute size and low relative sizes with low absolute sizes. This is an expected result, though the relationship is by no means exact and there is considerable scatter. Over the range of most schools, 50 to 200 pupils in fifth year, there is virtually no relationship between the two measures of fifth year size.

Figure 1

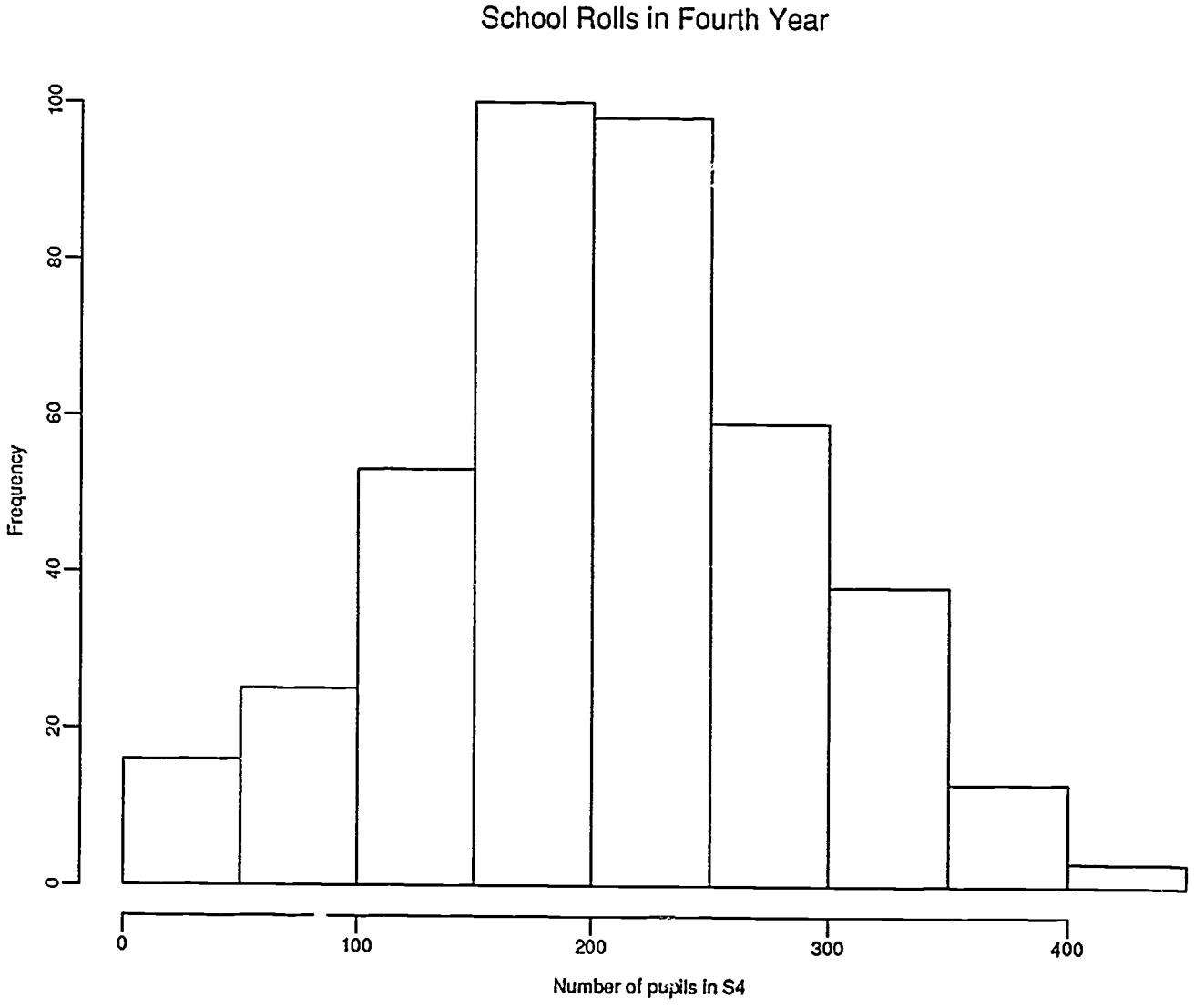

School Rolls in Fourth Year
Frequency
0
20
40
60
80
100
0
100
200
300
400
Number of pupils in S4

Figure 2

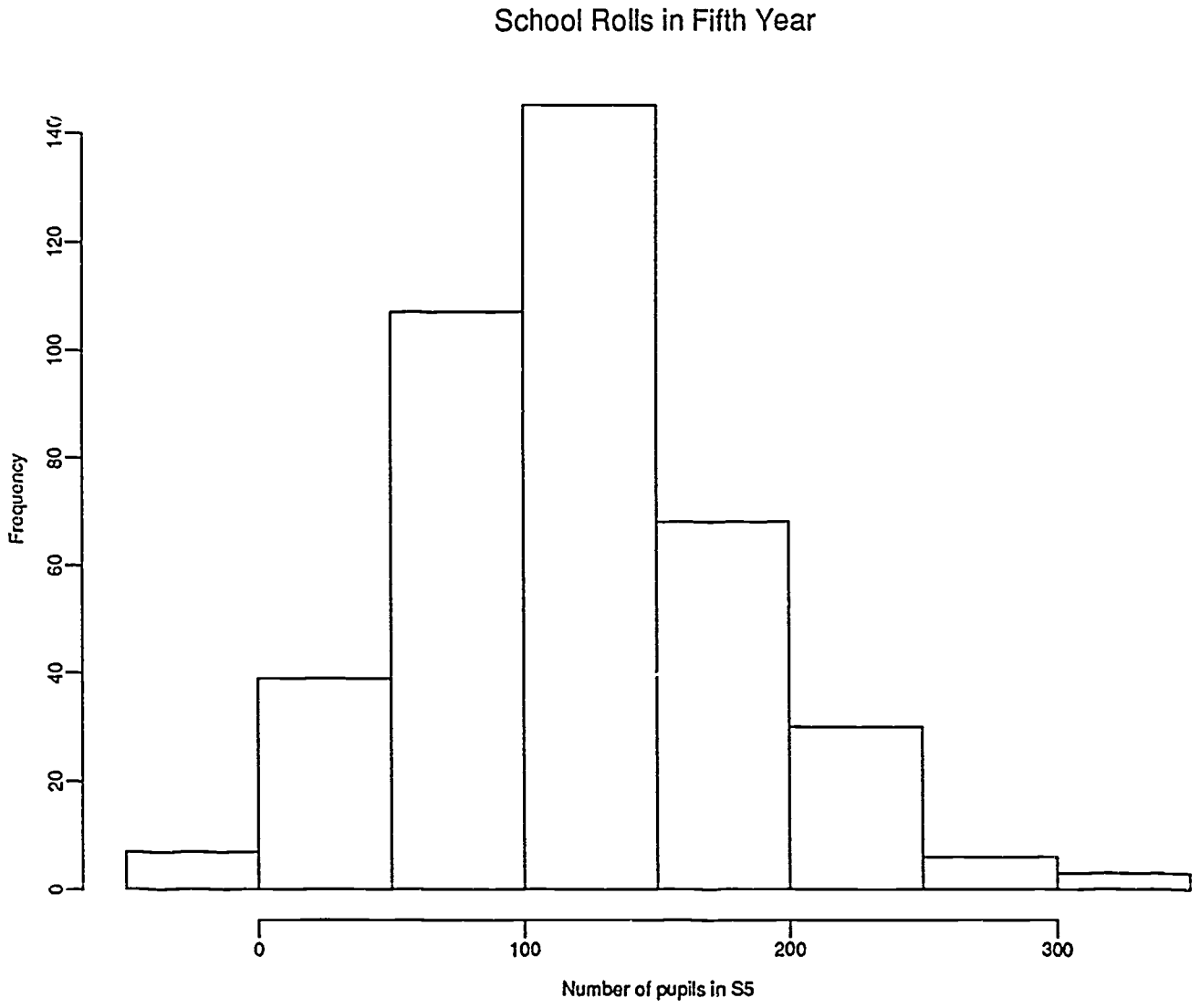

School Rolls in Fifth Year
Frequency
0
20
40
60
80
100
120
140
0
100
200
300
Number of pupils in S5

Figure 3

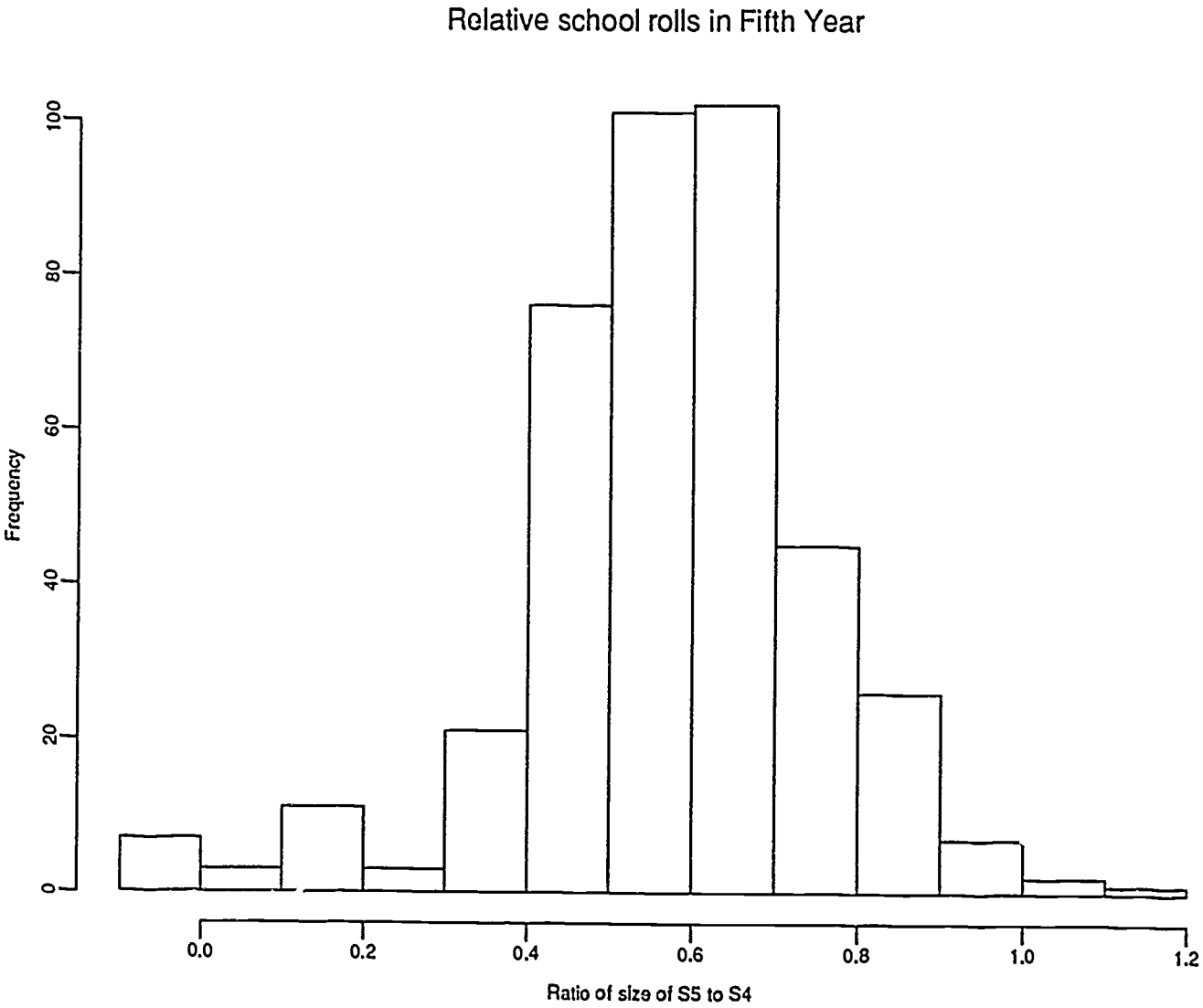
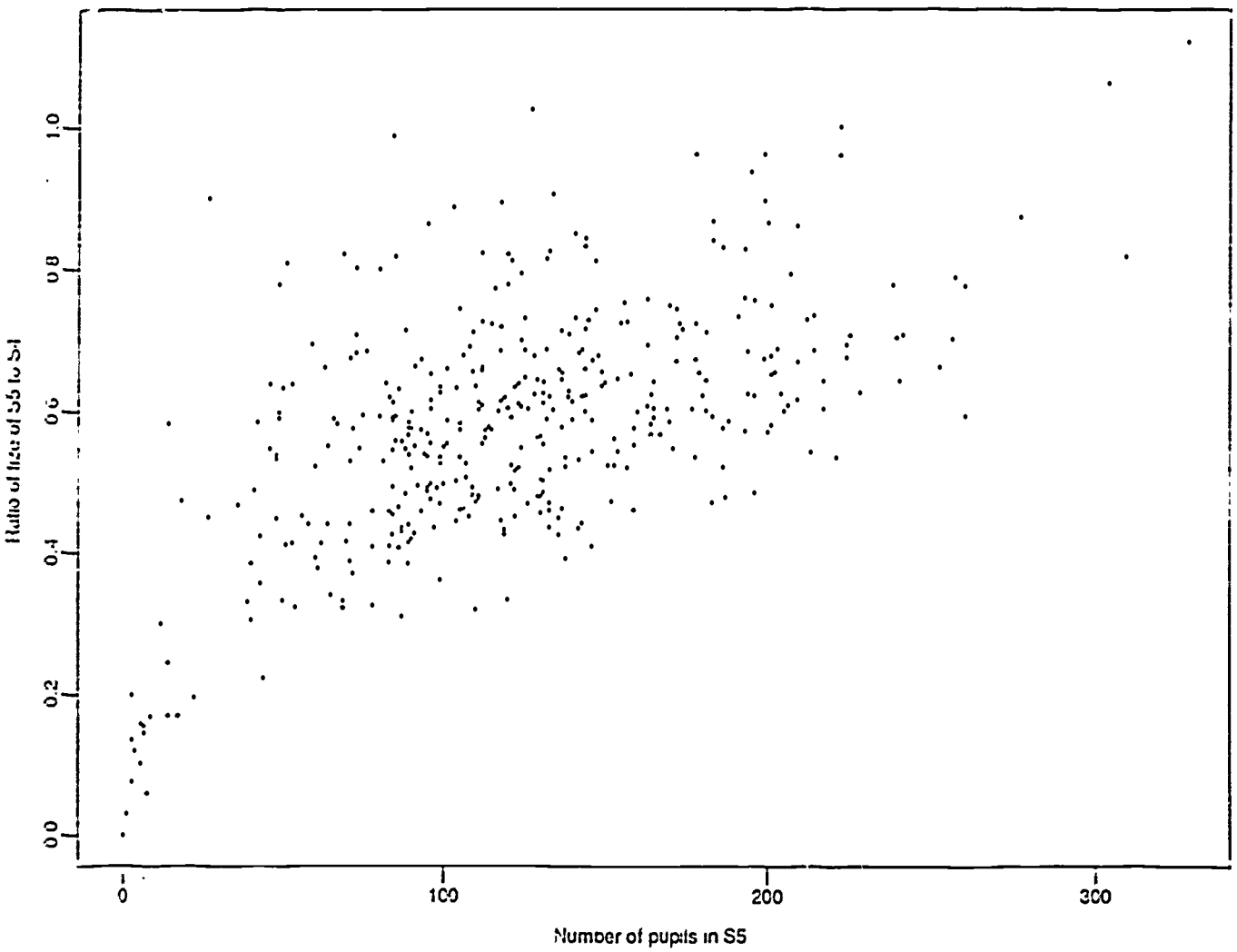

Relative school rolls in Fifth Year
Frequency
0
20
40
60
80
100
0.0
0.2
0.4
0.6
0.8
1.0
1.2
Ratio of size of S5 to S4

Figure 4



3. Hierarchical models

The dependent variables considered in this analysis are both binary. The first is concerned with entering fifth year and has the values - 1, if the pupil entered post-compulsory schooling voluntarily, and 0 otherwise. The second deals with participation in sixth year and has a value of 1 if the pupil began sixth year, otherwise the value is 0. In this section any explanation of multi-level modelling will be couched in terms of entering fifth year. In view of the binary dependent variables a logistic multi-level model will be used and VARCL (Longford, 1988) is used here. Much of the exploratory work was carried out using ML3 (Prosser, Rasbasch and Goldstein, 1990). ML3 is designed for use with normally distributed dependent variables, which is not the case with the binary one used here. However, the program is very efficient and much of the initial work was carried out using it.

In a multi-level model the hierarchical nature in which the population is organised is taken into account in the analysis. In our data which is a random sample of all pupils who were in fourth year of secondary schooling during the session 1983-84, the pupils are organised within schools. The schools, themselves, are grouped within educational districts. This could lead to there being three hierarchical levels. There are only 17 educational divisions and regions in Scotland when Strathclyde Region is split up into its six divisions, and the main comparison will be between Strathclyde and the rest of Scotland. This comparison is most easily be accommodated by considering any differences between the two areas as a school effect, as opposed to a third level effect among regions. The advantage of this is that only two hierarchical levels are required. This eases the interpretation of the model.

At the pupil level, which is the first and lowest level of the hierarchical structure, the response variable is recorded - whether or not the pupil began post-compulsory schooling voluntarily. A number of explanatory variables are also used to try and model the probability that an individual pupil will elect to begin fifth year. Some of the important variables discussed in the previous section are gender, conscription, parental schooling and the number of O grade passes obtained in fourth year. At the pupil level, an attempt is made to model the probability, p, that a pupil will choose to go into fifth year by equations of the form:

f(p) = constant + gender + conscript + parental schooling +

O grades + $error_{pupil}$.

This is not the only model considered and is used here only as an illustrative example. The function of the probability, f(), is used to denote the two possibilities for modelling the binary variable. When using VARCL f() will be a logit transformation such that

f(p) = log(p/(1-p)).

This transformation is commonly used in the analysis of proportions (Cox and Snell, 1989) and ensures that all estimated proportions will lie between 0 and 1. The quantity p/(1-p) is the odds ratio of a pupil beginning fifth year. Much of the presentation of the results will be in terms of differences in the odds ratio among certain sub-groups of pupils. The term 'logit model' will be used to described this type of model. Results which are obtained from ML3 use

f(p) = p,

which is the model used with a normal distribution. Occasionally results from this model will be discussed and the term 'normal model' will be used as an indication.

At the second level of the multi-level analysis are the schools. There are around 405 secondary schools represented in the cohort, with, on average, around 10 pupils per school. The main interest at the school level is to see if there is any residual effect of a pupil being at school in Strathclyde Region on the participation rates in post-compulsory schooling. The analysis will take into account the major factors affecting the probability of staying on into post-compulsory schooling at the pupil level and any extra effects at the school level. This will involve a model of the form:

f(p) =constant + Strathclyde + fifth year size + $error_{school}$

All pupils in the same school will have the same model at the second level and this is used, in conjunction with the pupil level model, to model the correlation between pupils

at the same school as well as explaining some of the variation in participation rates over schools. As different types of pupils may react differently in different types of school, interactions between the two levels will be considered. An example of this would be a relatively poorly qualified pupil at a small school benefiting from more intense teaching.

At each stage of the modelling process more complex models are fitted in an attempt to explain the variability among the voluntary participation rates between pupils and between schools. One of the goals is to reduce this variation as much as possible. As any of the pupil level effects can vary across schools, interest will focus on finding out which are the most susceptible to school influences. The work reported in the previous papers (Robertson 1990a,b; McPherson, Raffe and Robertson 1990), pointed to the group of pupils who were middling in their attainment in fourth year as the group who are most likely to be influenced by any decisions taken about post-compulsory schooling. The multi-level modelling analysis will pay specific attention to such pupils.

It was mentioned in section 2 that there is a problem due to response bias in that well qualified pupils are more likely to return the questionnaires. Because such pupils are also more likely to remain at school this leads to an overestimation in the participation rates. Comparisons of sub-groups are not likely to be much affected by this. Also the variables which are related to the non-response - gender and qualifications are included as explanatory variables in the models. To combat the non-response, some weighted analyses were carried out using the same weights as applied in Robertson (1990b). These weights are designed to offset the bias due to non response and ensure that the sample matches up to the population on attainment, gender and time of leaving school. Most of the results quoted in the next section will refer to an unweighted analysis, but comparison to the weighted analysis will be made as appropriate.

4. Modelling participation in post-compulsory schooling

Fifth Year

The first stage in the analysis is to look at the partition of the variability among pupils and schools. The first logit model fitted is a components of variance model, with no explanatory variables, and 22% of the total variation can be attributed to schools. With the normal model the percentage is 7.7% with a variance of 0.2287 between pupils. This variance agrees closely with the variance of a binary variable with a proportion of 0.57, i.e. (0.57)(0.43) = 0.2451, indicating that the binomial or logit model is appropriate. Unless otherwise stated all subsequent results will be based on the logit model.

The next stage is to see if the variability among schools affects all types of pupils equally or if it is differentially apportioned amongst the different qualification levels. This entails fitting a pupil level model:

$\log(p/(1-p))$ = constant + low O grades + high O grades,

and at the school level allowing the parameters of the three fixed pupil level effects to be random, resulting in the estimation of three variances at the school level and three covariances. In this model, because the explanatory variables are binary, the variable combination of (constant + low O grades) picks out pupils with fewer than 3 O grades at A to C in fourth year, and (constant + high O grade) picks out pupils with more than 5 O grades. This leaves the constant term on its own representing pupils in the middle ability range.

Table 4
Parameter estimates from a model with attainment as the only explanatory variable

Variable	Fixed Effects Estimate	Standard Error
constant	0.391	
low O grades	-1.667	0.096
high O grades	2.087	0.129

Random Effects - standard deviations, on diagonal and covariances (standard errors in brackets)

	constant	low O g	high O g
constant	0.461 (0.068)		
low O grades	0.009 (0.057)	0.437 (0.236)	
high O grades	-0.004 (0.080)	0.200 (0.137)	0.567 (0.300)

The parameter estimates for this model are presented in Table 4. The fixed effects estimate the differences in the log odds ratio of pupils with low or high O grade qualifications compared to those in the middle group.

There are substantial differences in the odds of entering fifth year voluntarily. T h e interpretation of the estimated school level standard deviations, in comparison to their standard errors, is that most of the variation is contained in the constant term. While the standard deviations of the low O grade and high O grade effects are large, they have large standard errors and are not reliably estimated as being different from zero. The standard error corresponding to the standard deviation of the constant term over schools is small. A weighted analysis produced similar conclusions except that there was slight

evidence of variability over schools in the effect of having few O grades. The fixed effect parameters yielded similar conclusions to the unweighted analysis.

In view of this, only the constant term will be permitted to vary across schools in the subsequent analysis. As the proportion of variability attributed to schools is small, relative to the amount attributed to differences between the pupils, the data will support a more complex model at the pupil level than at the school level. The models are easier to interpret if there are not too many variance terms. This is one of the main influences on the decision not to let the low O grades effect vary over schools.

All of the factors discussed in connection with Table 1 are important predictors of a pupil voluntarily going into fifth year. A substantial interaction between the conscript effect and high O grades is also present. Other interactions will be discussed later. The results for this model are presented in Table 5, where it can be seen that the effect of the interaction is to cancel out the effect of conscription for pupils who are well qualified in fourth year. For a conscript with a large number of O grade passes in fourth year, it does not matter if he or she is too young to leave school at the end of fourth year. Such a pupil would be unlikely to consider leaving in any case. Conscription is associated with an increased participation only among less well qualified pupils.

Table 5
Parameter estimates of the parsimonious pupil level model

	Estimate	Standard Error
Constant	-0.620114	
female	0.488881	0.088842
conscript	1.037402	0.103055
Parental Schooling	0.627559	0.156465
Nonmanual Social Class	0.685070	0.101909
Low O grades	-1.642639	0.117476
High O grades	2.102174	0.165318
High O grades by conscript	-0.648405	0.275884

School level variance, standard deviation and standard error

0.202249	0.449721	0.072100

The estimated fixed effects of the other factors are that female pupils have a higher voluntary staying on rate compared to males. Social class indicators have an increased participation in fifth year for pupils in non-manual households and in households where at least one parent stayed on at school past the minimum leaving age. Attainment in fourth year is the dominant effect though.

The school level variance has gone down from 0.276 in the constant model to 0.202 in this - a reduction of 27%. Some of the variability over schools in the constant term, which is associated primarily with pupils in the middle attainment range, can be explained by differences at the pupil level. Not all of the variation has been explained and further school and pupil level variables will be included.

Initially, interactions among some of the other pupil level variables were considered. None of these were of any great significance compared to the factors mentioned above. Only the general patterns to these interactions are discussed. The effect of parental schooling seemed to be most pronounced at the low end of the attainment spectrum in fourth year. The interaction between having a parent who stayed on at school past the age of 15 and having a high attainment on fourth year was negative. To an extent this cancelled out the positive benefit of having a parent who stayed on at school. A similar pattern emerges with paternal social class, in that pupils with a low fourth year attainment and who come from non-manual households are more likely to volunteer into fifth year than similar pupils in a manual household. At the high attainment level there is a much smaller effect of social class.

Both of these interactions are measuring much the same phenomenon because parents who stayed on at school past the minimum age also tend to be those who are in non-manual occupations. This explains why it is not necessary to have both interactions in the model. In most of the remaining analysis neither interaction will be used because the estimated effects were very small and were not significantly different from zero. In the interests of parsimony it is necessary to try and keep a fairly simple pupil level model. The main thrust is to try and detect complex interactions between school and pupil level variables, and inclusion of these relatively minor interactions will only serve complicate the model unnecessarily.

The first school level variable to be included is the binary variable denoting whether or not the school is in Strathclyde Region. This term had a major effect but, bearing in mind the percentages displayed in Table 3, an interaction with attainment is called for. Only a term which treats well qualified pupils in Strathclyde differently from low to middling pupils is required; there is no evidence of any major differences between low and middle qualified pupils. The parameter estimates of the pupil level fixed effects are virtually identical to those presented in Table 5 and so are not repeated. The Strathclyde effect is estimated as 0.638 (standard error 0.108) and the high O grade by Strathclyde interaction as -0.513 (0.237). The school level variance in the constant term is now 0.156, which represents a reduction of 23% of the school level variance of the model in Table 5. So, much of the variation in the staying on rates for pupils in the middle attainment groups can be explained by regional differences.

The interpretation of the Strathclyde effect is that the odds of a low to middle qualified pupil volunteering into post-compulsory schooling is greater in Strathclyde by a factor of 1.89 (95% confidence interval 1.53, 2.35) compared to the rest of Scotland. For pupils who are well qualified the interaction cancels out the main effect of Strathclyde and there is virtually no difference between the two areas of Scotland.

One of the aims of the analysis is to see if the pupil level effects are the same in the two areas. Interactions between these variables and the Strathclyde effect were included in the model. With the exception of parental schooling, no interaction was large. The gender effect, conscript effect and non-manual social class effect is the same in the two areas. Parental schooling is the more important of the social class effects as regards participation and the estimated effects are

	Estimates	Standard Error
Strathclyde	0.738	(0.122)
Parental Schooling	0.983	(0.132)
Parental Schooling by Strathclyde	-0.357	(0.198)

when this term is added to the model in Table 5 and the Strathclyde effects. The interaction effect is not large compared to its standard error but the interpretation is that the effect of parental schooling is less pronounced in Strathclyde compared to the rest of Scotland. In the rest of Scotland the effect of parental schooling is to increase the odds of going into fifth year by a factor of 2.67 (95% confidence interval 2.05, 3.48). In Strathclyde the corresponding effect is an increase of 1.87 (95% confidence interval 1.44, 2.44). The confidence intervals overlap so it is not possible to conclude that there is a significant difference, and this term is not included further.

Trying to explain the Strathclyde effect in terms of school characteristics has proved to be difficult. There are 71 Catholic schools in the sample and most of them are in Strathclyde Region. Although such schools tend to have a higher participation rate than non-denominational schools, taking into account social class, there is no significant effect of school denomination over and above the Strathclyde effect. Neither does the Catholic effect reduce the size of the Strathclyde effect. Consequently, school denomination does not explain the increased participation among low qualified pupils in Strathclyde. School status (local authority compared to grant aided or independent) could not be investigated as data was only available on local authority schools.

Both measures of the size of fifth year explained some of the variability at the school level. For the absolute size of fifth year the estimated effect was 0.00225 (0.00087), corresponding to an increase in odds ratio of 2.3% (95% confidence interval 0.5%, 4.1%) for every 10 pupils in fifth year. In schools which had a large fifth year in 1983-84, the voluntary participation rate into fifth year would be greater than in a smaller school. This is a very marginal effect, and again there is an interaction with high fourth year attainment which eliminates the effect of fifth year size for those pupils. This effect, small though it is, is only likely to influence the less well qualified pupils.

The relative size of the current fifth year to the current fourth year was a slightly more influential variable with an estimated effect of 0.941 (0.319). The interpretation this is that a rise of 0.1 in the ratio of current fifth to current fourth year sizes leads

to an effect of 0.0941 and an increase in the odds ratio of staying on of 9.8%. (95% confidence interval 3.3%, 16.9%). The estimate of the interaction between the relative size of fifth year and attainment in fourth year suggests that well qualified pupils are not greatly influenced by the relative size of fifth year. In contrast to the absolute size of fifth year, the interaction is not significant.

Of the two size of fifth year measures, the relative size is the one which is the more important statistically, though they have slightly different educational interpretations. Neither go any way towards reducing the Strathclyde effect, which persists when the size of fifth year is included in the model.

If the relatively heavy use of the fifth year exit point is an incentive to voluntary participation in post-compulsory school education for the middle fourth year qualification group, then a relationship between staying on and the relative size of sixth year compared to fifth year is expected. In schools where this ratio is large few fifth year pupils leave at the end of fifth year. Where it is small then a relatively large number do so. If those pupils tend to leave at the end of fifth year, then a negative relationship should be observed, in that voluntary participation in post-compulsory schooling is expected to be larger in schools where a substantial proportion of pupils leave at the end of fifth year.

When including this term it was found that an increase in participation from fourth year to fifth year was predicted with an increase in the relative size of sixth to fifth year. There was also an interaction between the relative size of sixth year compared to fifth year and attainment in fourth year. The estimated parameters are, with standard errors:

	Estimates	Standard Error
Relative size of S6 to S5	0.890	0.379
Relative size of S6 to S5 by High O grades	-1.483	0.821
Relative size of S5 to S4	0.721	0.338

The estimates of the pupil level fixed effects are unchanged from those presented in Table 5 and the Strathclyde effects are not substantially different from those discussed above. The interpretation of these effects is that the odds of low and moderately qualified pupils entering fifth year increase as the relative size of sixth year to fifth year. The reverse is true for well qualified fourth year pupils, though it should be noted that this effect is of marginal significance. The interaction means that well qualified pupils are more likely to remain at school in schools where a substantial number of pupils leave at the end of fifth year. This is likely to be a reflection of the Strathclyde effect noted in Table 3. Three way interactions of Strathclyde by fourth year attainment by relative size of sixth year to fifth year were included. but did not yield any significant results.

The implications of these results are that the anticipated negative relationship between the relative size of sixth year compared to fifth year and the odds of voluntary participation appears only for well qualified pupils. For low and moderately qualified pupils the odds of voluntarily beginning fifth year increase as the relative size of sixth year increases and as the relative size of fifth year increases. To an extent this is consistent with a hypothesis that such pupils tend to stay on in schools where the post-compulsory sector is relatively large and viable.

The final variable to be considered is the effect of the local unemployment rate on voluntary participation. In the middle eighties the local unemployment rate was around 16% ranging from 6.2% to 25.8% and Raffe and Willms (1989) showed that this rate influenced participation. The rate tended to be higher in Strathclyde region relative to the rest of Scotland by 5% and it is possible that much of the apparent increase in voluntary participation in Strathclyde is a result of the effects of local unemployment which would have the effect of increasing staying on rates.

Local unemployment was measured as the total unemployment rate in the area around the school in April 1985. This date was chosen because it was the closest date with available data to January 1985 which was the date when voluntary participation in post-compulsory schooling was measured. Other available dates included October 84 which is the date closest to the time when non-conscripts would be volunteering

to enter fifth year. There was a very high correlation between the rates at these two times and there is no loss in using April for both conscripts and non-conscripts.

Adding local unemployment and its interaction with fourth year attainment into the model together with the school and pupil effects resulted in a large reduction in the school level variance. In the final model fitted this is estimated as 0.113 which is a further 28% reduction on the model where the Strathclyde effect is the only school level variable. The fixed effect parameter estimates are presented in Table 6, together with their estimated standard errors.

Table 6
Parameter estimates for the final model
of voluntary participation in fifth year

	Estimate	Standard Error
Constant	-0.986	-
Female	0.534	0.090
Conscript	1.024	0.104
Parental Schooling	0.815	0.101
Non-manual Social Class	0.677	0.103
Low O Grades	-1.581	0.106
High O Grades	2.431	0.183
High O Grades by conscript	-0.640	0.277
Strathclyde	0.449	0.129
Strathclyde by High O grade	-0.539	0.291
Relative size of S6 to S5	0.925	0.376
Relative size of S6 to S5 by High O grades	-1.467	0.821
Relative size of S5 to S4	0.834	0.336
Unemployment rate	0.056	0.018
Unemployment rate by Low O Grades	-0.039	0.022
Unemployment rate by High O Grades	-0.031	0.032

As in previous cases the pupil level effects and the other school level effects are hardly changed from those previously quoted. Such interactions, as occur between unemployment and attainment suggest that the influence of the local unemployment rate is most important as regards the pupils who obtained 3 to 5 O grades in fourth year. There is an increased voluntary staying on rate into fifth year, with the odds for moderately qualified pupils in fourth year increasing by 5.7% (95% confidence interval 1.9%,9.5%) for every 1% increase in the unemployment rate. The significance of the Strathclyde effect is reduced by the inclusion of this effect as a result of an increased standard error, which is expected in view of the increase in the number of estimated parameters, and as a result of the inclusion of the unemployment variable.

At this stage of the analysis the school level model is as complex as the pupil level model. An attempt was made to look at some interactions which are suggested by the preceding discussion. There was no evidence of any interaction between the local unemployment rate and the Strathclyde effect. This suggests that the effect of the local unemployment rate is the same over both areas of Scotland. The estimate of the interaction between Strathclyde and the relative size of fifth year compared to fourth year was negative suggesting that the relationship between size and voluntary participation is not as strong in Strathclyde. However the interaction was not significantly different from zero and this suggestion is not reliable. No interaction was found between Strathclyde and the relative size of sixth year compared to fifth year.

If there is no Strathclyde effect among well qualified pupils and if these pupils are not affected by the size of the school then an interaction between area, size and fourth year attainment may be anticipated. This should show that low and moderately qualified pupils at schools in Strathclyde where the relative size of fifth year compared to fourth year is high have increased odds of participating in fifth year. This is a complex three way interaction but was not supported by the data. Similarly the three way interaction of Strathclyde, relative size of sixth year compared to fifth year and fourth year attainment was not important. The standard errors of both of these interaction effects were very large. Bearing in mind the relatively small amount of variability at this level compared to the total variability, any extension of this model look at more complex interactions is not likely to be successful.

Sixth Year

The analysis was repeated using entering sixth year as the dependent variable. The baseline for this analysis is the number of pupils who were in fourth year and not the number in fifth year. The results for the final model with no school size effects fitted are presented below in Table 7. These show that the dependence of participation on social class, parental schooling, and conscription are all much reduced compared to fifth year participation but that the effects are still important. The gender effect still reflects a positive advantage to female pupils as regards their odds of participating in sixth year but the estimated effect is small relative to the standard error. There is also no high O grades in fourth year by conscript interaction.

Table 7
Participation in sixth year

	Estimate	Standard Error
Constant	-1.819	
Female	0.113	0.088
Conscript	0.323	0.140
Parental Schooling	0.439	0.093
Non-manual Social Class	0.359	0.095
Low O Grades	-1.841	0.150
High O Grades	1.597	0.142
High O Grades by conscript	0.000	0.190
Strathclyde by High O Grade	-0.799	0.180
Strathclyde	0.315	0.157
Unemployment	0.018	0.013

Compared to the components of variance model with no fixed effect parameters at all, where the school level variance is estimated as 0.296, this model represents a 1% reduction in variability. When interactions between Strathclyde region and attainment in fourth year are considered then a slightly different pattern emerges. The negative relationship between high attainment and Strathclyde now dominates and well qualified

pupils in Strathclyde are less likely to enter sixth year compared to well qualified pupils in the rest of Scotland. This is precisely the pattern noted in Table 3, in section 2, but the advantage of this result is that the effects of the other important variables are also taken into account. There is no interaction between Strathclyde and low attainment in fourth year but the overall Strathclyde effect is still positive. This indicates that there is still a tendency for pupils in the middle range of O grade attainment in Strathclyde to enter sixth year compared to similar pupils in the rest of Scotland. No effect of local unemployment was noticed at this stage. It should be noted that the unemployment rates were measured six months prior to entry to sixth year, though the ones for October 1985 are not likely to be substantially different.

If variables reflecting the size of the school are included them both the relative size of sixth year compared to fifth year and the relative size of fifth year compared to fourth year affect staying on onto sixth year. The school level variance is estimated as 0.147 which is a 28% reduction compared to the model above. The estimated effects, and standard errors, are:

	Estimates	Standard Error
Relative size of S5 to S4	0.912	0.340
Relative size of S6 to S5	1.525	0.357

Unlike the models of voluntary participation in fifth year, there was no evidence of any interactions between these relative sizes and fourth year attainment. Both of these terms imply that the odds of entering sixth year increase with increasing size of the post-compulsory sector of the school, taking into account the background characteristics of the pupils.

5. Conclusions

1. The pupil level model with the effects of gender, conscription, parental schooling, paternal social class, attainment and the interaction between attainment and conscription, is an adequate model for beginning fifth year and has a reasonable interpretation. Fourth year attainment is the single variable which is most important in predicting the odds of beginning post-compulsory schooling. Voluntary participation in fifth year is also greater for female pupils, for pupils whose parents stayed at school past the minimum leaving age, for pupils in non-manual households and for the less well qualified conscripts. Similar models have been used in other studies of participation see, for example, McPherson and Robertson (1989), and Raffe and Willms (1989).

2. With regard to the pupil level model for participation in sixth year, the effect of the explanatory variables is less pronounced compared to the fifth year model. This is natural as the major factor involved in participation in sixth year is, in fact, fifth year attainment measured in terms of Highers and O Grades. Comparison of the two final models in Tables 6 and 7 reveals that neither the gender effect nor the conscript by attainment interaction are important in sixth year. The discrepancy between the two models suggests that conscripts overall have higher odds of entering sixth year compared to non-conscripts. Previous work by Yibas and Robertson (1988) showed that there was no difference in attainment between the conscripts and non-conscripts in fourth year.

3. On the school level, there are problems with the interpretation of the results of the models because there is a Strathclyde effect which has not yet been tied in with any school effect. The basic conclusion is that, after taking into account the background of the pupil, pupils who are at school in Strathclyde region have increased odds of volunteering into post-compulsory schooling. This has to be mediated by the fourth year qualifications of the pupil which, in fifth year, cancels out the Strathclyde effect among well qualified pupils. Well qualified Strathclyde pupils and their counterparts elsewhere in Scotland, have similar probabilities of entering fifth year. This extends the descriptive results from Robertson (1990b) as the important pupil level explanatory variables have been taken into account.

4. The Strathclyde effect proved to be reasonably robust to the inclusion of school size effects and local unemployment effects. This is slightly surprising and is somewhat contrary to the initial beliefs which were that schools where the fifth year exit point was heavily used would tend to have an increased participation in fifth year.

5. The local unemployment rate influenced the moderately well qualified fourth year pupils most. Such pupils tended to stay on at school into fifth year more readily if the school was in an area which had a high local unemployment rate. It is interesting to note that the unemployment rate had virtually no effect on the pupils with few O grades, when it might have been expected that they would be in a similar position to the moderately qualified. However, it appears that those pupils with a moderate chance of succeeding in fifth year are influenced in their decision by the employment prospects in the area. Pupils with many O grades in fourth year are not influenced by the local unemployment rate.

6. The interpretation of the school size variables is crucial to the final conclusions of this report. The two variables which proved to be the most useful are the relative size of fifth year compared to fourth year and the relative size of sixth year compared to fifth. These give an indication of the type of school to the pupils who are in fourth year. If the fifth year roll is large compared to the fourth year, then an individual fourth year pupil does not have much evidence that leaving at the end of fourth year is widespread. On the other hand, if fifth year is small compared to fourth, then the general trend in the school will be one of leaving at the end of fourth year, and a fourth year pupil electing to remain at school will be going against this trend to an extent. Schools in which sixth year is large compared to fifth year will tend to be those schools which have, in practice, a two-year post-compulsory system, or which operate a '1 year plus 1 year' system, with high proportions of staying to sixth year. Schools in which this ratio is small either operate a one-year post-compulsory system, in practice, or have virtually no post-compulsory schooling as fifth year is predominantly made up of conscripts.

7. Taking into account pupil level variables, there are increased odds of participation in fifth year for pupils who are at schools with a large post-compulsory sector. This

is common to all attainment groups, though the well qualified are not affected as much. So, two pupils with similar backgrounds but attending different schools have different odds of going into post-compulsory schooling depending on the type of school that they attend.

8. The inclusion of the school size effects do not reduce the Strathclyde effect in magnitude, though they do reduce the precision with which it is estimated. The lack of any interactions between the sizes and Strathclyde means that it is not possible to explain the increased participation in Strathclyde among lower qualified pupils solely in terms of school effects.

9. While the relative sizes were the most important, the absolute size of fifth year was also important to an extent. This effect is associated with an increased participation for low and moderately qualified pupils attending large schools. There is some correlation among the school level variables which precludes the inclusion of many interactions at this level and which also means that not all of the variables are necessary.

10. At the school level three way interactions between attainment in fourth year, region and some other school measure concerned with the size are necessary. Precise estimation of these interactions was not successful. The standard errors of the three way interaction terms increase were very large Effectively they are based on few observations (1/6th of the total) which leads to the high standard errors and the corresponding lack of any significant results.

References

Cox, D.R. and Snell, E.J. (1989). The Analysis of Binary Data, (2nd Edition). London: Chapman and Hall.

Goldstein, H. (1987) Multilevel Models in Educational and Social Research. London: Griffin.

Longford, N. (1988) Varcl3 Users Guide. Princeton: Educational Testing Service.

McPherson, A., Raffe, D. and Robertson, C. (1990) Highers and Higher Education. Edinburgh: Association Union of Teachers (Scotland).

McPherson, A. and Robertson, C. (1988) The effect of conscription in Scottish schools. Edinburgh: University of Edinburgh, Centre for Educational Sociology.

Prosser, B., Rasbasch, J. and Goldstein, I. (1990). ML3 - Software for three-level analysis. London: Institute for Education.

Raffe, D. and Willms, J.D. (1989) Schooling the discouraged worker: local-labour-market effects on educational participation. Sociology, 23, 4, pp.559-581.

Robertson, C. (1990a) Trends in the percentages of Scottish school leavers entering higher education 1962-1986. Edinburgh: University of Edinburgh, Centre for Educational Sociology.

Robertson, C. (1990b) Routes to higher education in Scotland. Edinburgh: University of Edinburgh, Centre for Educational Sociology.

Yibas, N. and Robertson C. (1988) The effects of conscription on attainment in Scottish schools. Glasgow: University of Strathclyde, Department of Statistics and Modelling Science.