

*The
Economic and Social
Research Institute*

SUBJECT AVAILABILITY AND
STUDENT PERFORMANCE IN THE
SENIOR CYCLE OF
IRISH POST-PRIMARY SCHOOLS

RICHARD BREEN

THE ECONOMIC AND SOCIAL RESEARCH INSTITUTE
COUNCIL, 1985-1986

- *T. K. WHITAKER, M.SC. (ECON.), D.ECON., SC., LL.D., *President of the Institute.*
- *P. I. LYNCH, M.A., M.R.I.A., *Chairman of the Council.*
- D. J. BUCKLEY, *Vice President and General Manager, Merck, Sharp and Dohme (Ireland) Ltd., Co. Tipperary.*
- L. CONNELLAN, B.E., C.ENG., M.I.E.I., *Director General, Confederation of Irish Industry.*
- *SEAN CROMIEN, B.E., *Second Secretary, Department of Finance.*
- G. DEAN, M.D., F.R.C.P., *Medico-Social Research Board.*
- N. J. GIBSON, B.SC.(ECON.), PH.D., *Professor, Department of Economics, University of Ulster, Coleraine.*
- PATRICK A. HALL, B.E., M.S., DIP.STAT., *Director of Research Institute of Public Administration.*
- *W. A. HONOHAN, M.A., F.I.A.
- MICHAEL F. KEEGAN, B.A., B.COMM., D.P.A., F.I.P.M., *Secretary, Department of Labour.*
- *KIERAN A. KENNEDY, M.ECON.SC., B.PHIL., PH.D., *Director of the Institute.*
- T. P. LINEHAN, B.E., B.SC., *Director, Central Statistics Office.*
- *D. F. McALEESE, B.COMM., M.A., M.ECON.SC., PH.D., *Whately Professor of Political Economy, Trinity College, Dublin.*
- *EUGENE McCARTHY, M.SC.(ECON.), D.ECON.SC., *Director, Federated Union of Employers.*
- JOHN J. McKAY, B.SC., D.P.A., B.COMM., M.ECON.SC., *Chief Executive Officer, Co. Cavan Vocational Education Committee.*
- *J. F. MEENAN, M.A., B.L.
- *D. NEVIN, *General Secretary, Irish Congress of Trade Unions.*
- *TOMÁS F. Ó COFAIGH, *Governor, Central Bank.*
- JOYCE O'CONNOR, B.SOC.SC., M.SOC.SC., PH.D., *Director, Social Research Centre, College of Humanities, National Institute for Higher Education, Limerick.*
- D. P. O'MAHONY, M.A., PH.D., B.L., *Professor, Department of Economics, University College, Cork.*
- LABHRAS Ó NUALLAIN, D.ECON.SC.
- B. PATTERSON, B.A., M.I.I.E., A.I.P.M., *Director General, Irish Management Institute.*
- S. SHEEHY, B.AGR.SC., PH.D., *Professor, Department of Applied Agricultural Economics, University College, Dublin.*
- J. SPENCER, B.SC.(ECON.), *Professor, Department of Economics, The Queen's University of Belfast.*
- T. C. TONER, B.COMM., M.B.A., *Managing Director, BWG Ltd.*
- *B. M. WALSH, B.A., M.A., PH.D., *Professor, National Economics of Ireland and Applied Economics, University College, Dublin.*
- T. WALSH, M.AGR.SC., PH.D., D.SC., M.R.I.A.
- *REV. C. K. WARD, B.A., S.T.L., PH.D., *Professor, Department of Social Science, University College, Dublin.*
- P. A. WHITE, B.COMM., D.P.A., *Managing Director, Industrial Development Authority, Dublin.*

*Members of Executive Committee.

**SUBJECT AVAILABILITY AND STUDENT
PERFORMANCE IN THE SENIOR CYCLE OF
IRISH POST-PRIMARY SCHOOLS**

*Copies of this paper may be obtained from The Economic and Social Research Institute
(Limited Company No. 18269). Registered Office: 4 Burlington Road, Dublin 4.*

Price IR£6.00

(Special rate for students IR£3.00)

Richard Breen is a Senior Research Officer at The Economic and Social Research Institute. The paper has been accepted for publication by the Institute which is not responsible for either the content or the views expressed therein.

*SUBJECT AVAILABILITY AND STUDENT
PERFORMANCE IN THE SENIOR CYCLE
OF IRISH POST-PRIMARY SCHOOLS*

RICHARD BREEN

© THE ECONOMIC AND SOCIAL RESEARCH INSTITUTE

DUBLIN, 1986

ISBN 0 7070 0082 3

Acknowledgements

I am grateful to the Department of Education for giving me access to the examination data used in this study, and I particularly wish to thank Dr. Martin Newell and the staff of the Central Applications Office, Galway, who, with exemplary efficiency, provided me with these data.

Useful comments on earlier drafts of this paper were received from my Institute colleagues Denis Conniffe and David B. Rottman, and from the Department of Education, the Teachers' Union of Ireland, the Irish Vocational Education Association, Terry Corcoran of the Youth Employment Agency, and from an external referee. I have also had useful discussions with Gary Keogh of the ESRI concerning the statistical issues raised in Chapter 3 of this study, and June Ryan provided invaluable programming assistance. To all these individuals and organisations I would like to extend my thanks; they, of course, are not responsible for any of the conclusions or views advanced in this paper.

Finally, I would like to record my appreciation of a grant from the Department of Education's Research Committee which defrayed some of the costs of this project.

CONTENTS

| | |
|---|------------------|
| General Summary | <i>Page</i> 1 |
| <i>Chapter</i> | |
| 1 Introduction | 7 |
| 2 Differences in the Availability and Take-up of Leaving Certificate Subjects | 22 |
| 3 Senior Cycle Performance | 57 |
| 4 Summary and Conclusions | 90 |
| References | 98 |
| <i>Appendices</i> | |
| 1 Mis-specification and Sample Selection Bias | 101 |
| 2 Indirect School Effects | 109 |
| 3 Indirect Effects Associated with Class Origins | 112 |
| 4 Alternative Models of School Effectiveness | 114 |

LIST OF TABLES

| <i>Table</i> | | <i>Page</i> |
|--------------|---|-------------|
| 1.1 | Educational Level Attained Among Cohorts of Post-Primary Leavers According to Father's Occupational Group, 1980-82 Weighted Aggregate Results (percentages) | 10 |
| 1.2 | Level of Education Attained According to Pupil Sex and Father's Occupational Group (percentages) | 11 |
| 1.3 | Level of Education Attained According to School Type Weighted Aggregate Results 1980-82 (percentages) | 13 |
| 1.4 | Percentage Distribution of Second-Level Pupils According to Sex by School Type 1982-83 | 13 |
| 1.5 | The Percentage Composition, at Inter Cert, of the Three Different School Types, According to Occupational Background, Among Each Sex | 15 |
| 1.6 | Number of Schools of Each Type in Sample and Distribution of Pupils Across Each School Type | 21 |
| 2.1 | Subjects Making Up Each Subject Group at Intermediate and Leaving Certificate Level | 26 |
| 2.2 | Percentages of Male and Female Leaving Certificate Candidates Taking Various Subjects According to Class Origins | 28 |
| 2.3 | Provision, Allocation and Choice Factors in Take-up of Higher Maths | 30 |
| 2.4 | Provision, Allocation and Choice Factors in Take-up of Physics | 31 |
| 2.5 | Provision, Allocation and Choice Factors in Take-up of Chemistry | 32 |
| 2.6 | Provision, Allocation and Choice Factors in Take-up of Biology | 33 |
| 2.7 | Provision, Allocation and Choice Factors in Take-up of Technical Drawing | 34 |

| | | |
|-------|---|----|
| 2.8 | Provision, Allocation and Choice Factors in Take-up of Home Economics (Social and Scientific) | 35 |
| 2.9 | Provision, Allocation and Choice Factors in Take-up of French | 36 |
| 2.10 | Social Class Differences in Effects of Three Exclusionary Factors | 38 |
| 2.11 | Percentage Change in X^2_{LR} Associated with Class Effects on Take-up Rates Controlling for Provision and Allocation (P) and Qualification (Q) | 43 |
| 2.12 | Mean Number of Subjects in Four Areas Taught in Schools, According to Sex and Parental Occupational Group | 45 |
| 2.13 | Mean Number of Leaving Certificate Subjects in Each Area Taught According to School Type | 46 |
| 2.14a | Mean Number of Subjects in Four Areas Taught in Schools According to Pupil Sex and Parental Occupational Group within Each School Type (Boys) | 47 |
| 2.14b | Mean Number of Subjects in Four Areas Taught in Schools According to Pupil Sex and Parental Occupation within Each School Type (Girls) | 48 |
| 2.15 | Mean Number of Subjects in Four Areas Taken According to Sex and Occupational Background | 50 |
| 2.16 | Correlations, Partial Correlations and Associated Significance Levels and Standardised Partial Regression Coefficients of SOCLASS on the Number of Subjects Taken by Pupils in Each Subject Area | 51 |
| 2.17 | Percentage of Social Class Difference in Mean Number of Subjects Taken in Each Curricular Area Attributable to the Effects of (i) Provision; (ii) Performance in Relevant Inter Cert Area; and (iii) Pupil Choice | 53 |
| 3.1 | Allocation of Points to Subject Grades | 59 |

| | | |
|-----|---|----|
| 3.2 | Mean Performance at Intermediate and Leaving Certificate According to Grade Point Average, Boys and Girls | 59 |
| 3.3 | Percentage Frequency Distribution of Number of LC Passes According to Pupil Sex | 61 |
| 3.4 | Percentage Frequency Distribution of LC Passes According to School Type and According to Occupational Group | 61 |
| 3.5 | Correlation Matrix, Exam Performance and Class, Sex and School Type | 62 |
| 3.6 | Regression Model Predicting Leaving Certificate Performance | 65 |
| 3.7 | Regression Results, Senior Cycle Performance, Boys and Girls | 84 |
| 3.8 | Maximum and Minimum Direct, Indirect and Total Effects of SOCLASS and Cultural Capital | 87 |

APPENDIX TABLES

| <i>Appendix Table</i> | <i>Page</i> | |
|-----------------------|--|-----|
| A1 | Parameter Estimated for Prohibit Models of Probability of Attending a Vocational School and a Community/Comprehensive School | 106 |
| A2 | Unadjusted (Col. (1) and Adjusted (Col. (2)), Using Heckman's Method, Regression of Level of Job Aspirations | 110 |
| A3 | Minimum and Maximum Estimates of Direct, Indirect and Total Effects of School Type on Senior Cycle Performance | 111 |
| A4 | Standardised Coefficients (Unadjusted) Used in Computing Direct and Indirect Effects of SOCLASS and Cultural Capital | 113 |
| A5 | Estimated LCGPA for Average Pupil in Each School Type, using Results of Equation (1) | 115 |

LIST OF FIGURES

| <i>Figure</i> | | <i>Page</i> |
|---------------|---|-------------|
| 2.1 | Diagrammatic Representation of Model of Provision, Allocation and Choice Applied to One Subject | 25 |
| 3.1 | Relationship Between Performance and the Intermediate and Leaving Certificate | 63 |
| 3.2 | Path Diagram of Effects on Outcome Measure | 68 |
| 3.3 | Model of Intermediate Certificate Performance | 75 |
| 3.4 | Model of Leaving Certificate Performance | 75 |
| 3.5 | Models of Intermediate and Leaving Certificate Performance | 78 |

General Summary

This report focuses on senior cycle education in Irish post-primary schools and, specifically, examines two issues:

- (i) the availability of various subjects and groups of subjects to pupils in the senior cycle and the level of subject take-up by pupils;
- (ii) pupil academic performance within the senior cycle.

At present, approximately 60 per cent of entrants to post-primary education remain in school to sit for the Leaving Certificate. Thus, the majority of Irish children will experience senior cycle education and for most of them this will represent the culmination of their academic career. As a result the qualifications that most pupils obtain in the senior cycle and the skills that they acquire there, will constitute the credentials they take with them into the labour market when they look for work. And, of course, for those who seek to continue to third level, Leaving Certificate performance is crucial if they are to achieve this.

Data

The data used in this study consist of the replies to a questionnaire administered to a sample of just less than 4,000 Leaving Certificate pupils in the period between January and April of 1981 together with the results they obtained in the Leaving Certificate examination in 1981. The questionnaire data were originally gathered as part of an earlier project dealing with sex differences in post-primary education (subsequently published as *Schooling and Sex Roles: Sex Differences in Subject Provision and Student Choice in Irish Post-Primary Schools* by D. Hannan, R. Breen, *et al.*, 1983). As a result, many of the analyses and results of the present report are directly comparable with those of the earlier study.

Subject Availability and Take-Up

Given that there are 32 recognised Leaving Certificate subjects and that schools teach, on average, between 13 and 15 senior cycle subjects, there is

scope for variation both in the particular subjects provided and offered to students by schools, and in the subjects young people study. In Chapter 2 of this report we look at this variation, and in particular we examine, first, the extent to which boys and girls of different social class backgrounds study different sets of senior cycle subjects, and, secondly, how far this is due to variations in the availability of subjects to pupils of different social classes and how far to pupils' own choices. In other words, we ask to what degree can social class differences in subject take-up be explained in terms of class specific patterns of subject choice and to what degree in terms of class specific patterns of subject *availability*?

We find that higher proportions of middle class than of working class senior cycle pupils take subjects such as Higher Maths, Physics and French, while Technical Drawing (TD) and Home Economics are taken disproportionately by working class pupils. More generally, the science subjects and modern languages are more popular among middle class pupils, while the technical subjects and, among girls, commerce subjects, tend to be taken by greater percentages of working class pupils. Furthermore, levels of subject provision show variations according to pupils' social class origins. So, for example, while 87 per cent of male senior cycle pupils of upper non-manual (professional and managerial) backgrounds are in schools teaching Physics, only 54 per cent of male senior cycle pupils of lower manual backgrounds are in this position.

In our investigation of class differences in the take-up of certain individual subjects we find that the importance of school influences and pupils' choice vary, depending upon which particular subject we are examining. So, in French, Higher Maths (among boys) and Chemistry (girls only) pupils' own choices are crucial: clear differences in the take-up of these subjects arise mainly because of class specific patterns of *choice*. On the other hand, in Physics, Chemistry and TD among boys and Higher Maths among girls, patterns of choice play little or no part in accounting for class differences in rates of take-up. Instead, school provision factors and the way that schools allocate subjects to pupils are crucial. In other words, if we look only at those pupils who are given the opportunity of taking, say, Physics, then we find relatively little difference between social class origins in the proportions who avail of this opportunity. On the other hand, there are somewhat larger differences between social classes in the percentages of pupils actually given the option of Physics in the first place.

At the aggregate level the picture is much clearer: that is to say, if we look at the number of subjects of each type taken by pupils (e.g., the number of Sciences or Modern Languages) we find that class differences in take-up are almost wholly accounted for by differences in schools' provision of these subjects and in the ways in which schools make subjects available to pupils

(e.g., the level of previous performance they require before they will allow a pupil to take a particular Leaving Certificate subject) and the ability of pupils of different social class origins to meet these requirements. At this level (i.e., the level of groups of subjects) pupil choice explains little of the variation in take-up between social classes.

Provision levels in particular subject areas seem to be a significant source of social class differences in subject take-up and we show that they come about in two ways. First, the distribution of pupils over the Secondary/Vocational/Community and Comprehensive sectors is strongly related to sex and class origins: as a result the curricular characteristics of these different school types become, to some extent, the curricular characteristics of social classes. For example, because working class boys are more likely than any others to enter Vocational schools, so the mix of senior cycle subjects available to them depends very heavily (though not exclusively) on the nature of the curriculum in Vocational schools. But secondly, among those pupils in the Secondary sector, similar social class differences in subject availability persist, suggesting that, to a significant extent, the curricula of particular Secondary schools are related to the social class composition of their pupil body.

Senior Cycle Performance

In Chapter 3 we look at senior cycle academic performance, which is defined as the change in a pupil's exam performance between the Intermediate and Leaving Certificate exams. We adopt this measure for the following reason: among pupils who remain at school to sit for the Leaving Certificate, their Inter Cert results may be seen as a measure of performance at the commencement of the senior cycle, while their Leaving Certificate results are a measure of performance at its conclusion. Thus, the difference, or change, between Inter and Leaving Certificate performance, is a measure of, among other things, the effect of senior cycle schooling.

Intermediate and Leaving Certificate performance are closely related, indicating that both exams are measuring much the same kind of thing and that, in practice, pupils who, for example, do well at the Inter Cert generally will do well at the Leaving Certificate. In our analyses we are particularly concerned with the effects, on senior cycle performance, of pupils' social class origins and the type of school they attend (Secondary/Vocational/Community-Comprehensive). A cursory look at the exam results would show that pupils in Vocational schools perform more poorly than those in other types of school. However, the question at issue in the present study is whether, when we allow for all possible differences between the kinds of pupils in the different school types, we still detect systematic variations in the average level of performance attained by pupils in these school types. Put differently, we ask is there

a source of differences in exam performance that can be attributed to the type of school attended, *per se* (rather than to the characteristics of pupils within them) and which would therefore persist, despite changes in the kinds of pupils coming into these schools?

It is important to note that the comparisons we draw in this respect in Chapter 3 are between the three school types taken on average, and not between individual schools. However, we feel that such a comparative study is valuable for a number of reasons, but particularly because it sheds light on arguments concerning the best means of organising a system of educational provision – an issue which has come to the fore in the proposals concerning Local Education Councils in the Department of Education's recent Green Paper *Partners in Education*. Each of the three Irish post-primary sectors is differently organised: if we believe that any one of these structures or sets of organisational arrangements is better than any other, then it would seem natural to try to support the preference by showing that schools in that particular sector are, in some sense, better or more effective than schools in differently organised sectors. One useful index of this (but, obviously, not the only useful index) would be differences in the level of senior cycle effectiveness.

The conclusion we reach in Chapter 3 is that the majority of the differences in average senior cycle performance between pupils in the different types of school arises because of differences in the pupils in them rather than because of any features of the school types themselves. Once we allow for these pupil differences, the type of school attended has little influence on senior cycle performance. Among boys there are no statistically significant variations as between performance in each of the three types. Among girls, there is one significant result: Vocational schools appear to depress senior cycle performance among girls, though, in substantive terms, this effect is quite small. Additional analyses carried out using a somewhat different methodology (reported in Appendix 4) give the same result.

In the case of the social class effect on senior cycle performance, our results suggest that the aspect of class background that is most significant in influencing performance is the "cultural capital" of the family, by which we mean the "skills and socially conditioned attitudes" possessed, differentially, by families in different locations in the class structure. There is some evidence in our data that these influences are of greater importance for girls than for boys. In other words, at the senior cycle, differences between families in income, in ownership of resources and so on, appear to be of much less direct importance in influencing senior cycle performance than does the possession of particular competencies, social skills and attitudes.

Implications of Findings

The implications of our results for educational policy and for educational research are set out in Chapter 4.

The finding of little significant or substantive difference between school types in their senior cycle effectiveness does not necessarily mean that schools do not make a difference. Individual schools, of whatever type, may be particularly effective or ineffective, and perhaps the best way of improving the standards of schools generally would be to investigate and learn from such particular cases. What our findings do point to, however, is that no one of the three sectors (Secondary, Vocational, Community/Comprehensive) provides a *form* or *model* of post-primary schooling that is unequivocally or substantially better than another. In other words the different organisational or other distinctive and distinguishing features of the sectors do not appear to make them either more or less effective – at any rate when we measure effectiveness in terms of senior cycle examination results.

On the other hand, if our results concerning quantitative school effects in the senior cycle suggest that there is little to choose between the three sectors or models of organisation, our results regarding qualitative effects in regard to the nature of the curricula of these schools show that there are important differences in this respect. On average, Community/Comprehensive schools teach the largest number of senior cycle subjects and have better levels of provision in all of the four subject areas we identified (Sciences, Commerce subjects, Technical subjects and Modern Languages) than do Vocational or Secondary schools (except in Modern Languages where Secondary schools do best). Conversely, Vocational schools have the smallest curricula and the poorest levels of subject area provision in all areas except Technical subjects.

Such differences between the curricula of Secondary, Vocational and Community/Comprehensive schools are to be expected not alone because they have, to some degree, different educational aims, but also because of differences in their size, Community/Comprehensive schools being somewhat larger, on average, than others. However, because attendance at one type of school rather than another is class and gender related, these school differences in provision translate into gender and class differences in subject availability.

The net result is that these school differences in provision help to give rise to the situation identified in Chapter 2 whereby patterns of subject take-up are such that “working class subjects” – in the sense of subjects which are orientated towards manual work (TD and probably also Engineering Workshop and Building Construction) – are almost exclusively taken by male working class pupils. Similarly, Home Economics which is linked to the female/homemaker role, is taken mainly by female working class pupils. Likewise commerce subjects are also more likely to be taken by female working class, rather than

middle class, pupils. Conversely, subjects associated with third-level entry and with professional and technical jobs – notably the sciences and languages – are much more likely to be taken by pupils from middle class backgrounds.

It would, of course, be naïve to suggest that differences in subject provision levels are wholly responsible for this state of affairs. Nevertheless, differential provision levels are an important – possibly the single most important – factor leading to this, and thus may contribute to an early narrowing of young people's occupational horizons. The Department of Education has, for many years, sought to encourage schools in particular localities to co-operate in subject provision and, with varying degrees of success, has pursued a policy of amalgamating small local schools into a single Community school, so as to provide a wider range of subjects and to avoid unnecessary duplication of provision. The results obtained in this report suggest that, if we are to seek the optimum personal fulfilment of each child, through the provision of the widest range of subjects possible, then some such change in the organisational arrangements existing between and within schools will be necessary.

Chapter 1

INTRODUCTION

This paper is concerned with senior cycle education in Irish post-primary schools and, specifically, examines two issues:

- (i) the availability of various subjects and groups of subjects to pupils in the senior cycle and the level of subject take-up by pupils;
- (ii) pupil academic performance within the senior cycle.

At present, approximately 60 per cent of entrants to post-primary education remain in school to sit for the Leaving Certificate (Breen, 1984a)¹. Thus, the majority of Irish children will experience senior cycle education and for most of them this will represent the culmination of their academic careers (given that only about 37 per cent of those who sit for the Leaving Certificate go on to third-level education). As a result the qualifications that most pupils obtain in the senior cycle and the skills that they acquire there, will constitute the credentials they take with them into the labour market when they look for work. And, of course, for those who seek to continue to third level, Leaving Certificate performance is crucial if they are to achieve this.

Given that there are 32 recognised Leaving Certificate subjects, and that most pupils are actually examined in only about seven, there is obviously scope for wide variation in the particular subjects young people study. Furthermore, given that schools teach on average between 13 and 15 senior cycle subjects (Hannan, Breen, *et al*, 1983, p.171) there is also scope for variation in the particular subjects provided and offered to students. In Chapter 2 of this report we shall look at some of the variation in these issues. In particular we want to

¹The Leaving Certificate is the terminal examination within the Irish post-primary system and is taken at the end of the senior cycle which lasts usually two, or sometimes three, years. The junior cycle, which usually lasts three years, ends with the Intermediate Certificate exam, although some pupils terminate their education with the junior cycle Group Certificate which is a more vocationally orientated examination than either the Intermediate or Leaving Certificate. The average age of Leaving Certificate candidates is 17 and the annual number of candidates is over 40,000 (43,858 in 1983. Dept. of Education *Statistical Report 1982-83*, p. 102) with a ratio of female to male candidates of roughly 5:4.

look at the degree to which boys and girls of different social class background study different sets of senior cycle subjects and how far this is due to variations in the availability of subjects to different social classes and how far to pupils' own choices. In other words, if we find that, say, working class and middle class pupils sit for different subjects at the Leaving Certificate, to what degree can this be explained in terms of class specific patterns of subject *choice* and to what degree in terms of class specific patterns of subject *availability*?

In approaching our second aim – the investigation of pupil academic performance in senior cycle – our particular interest lies in determining how far such performance is responsive to three main influences. These are, first, pupils' sex; second, pupils' socio-economic background (social class for short); and, third, the kind of school the pupils attend.

While much research has been carried out on sex and social class effects in education there are relatively few Irish studies which deal with the way in which schools and schooling may exert an influence on educational attainment. The chief exception to this is the work of Kellaghan and his associates (Kellaghan, Madaus, Rakow, 1979; Madaus, Kellaghan, Rakow and King, 1979; see also Gray, 1981, for a critique of some of this material). In addition there is a virtual absence of published research into the Leaving Certificate examination itself.² On the other hand few people would dispute either that the Leaving Certificate exam is important in determining the labour market prospects of the majority of Irish school leavers, or that the kind of school a pupil attends will have important consequences for her or his educational performance.

In this paper we seek to answer some quite basic, but hitherto largely ignored, questions about factors influencing performance. For example: do girls perform better or worse than boys? Do Secondary school pupils obtain better results, on average, than those in Vocational or Community schools? Is the education a pupil receives in one type of school better or worse than that available in another?

However, rather than simply looking at Leaving Certificate performance, the data we have (which are described later in this chapter) enable us to look at the

²There are some pieces of published research into the Leaving Certificate, but for the most part they address questions not directly relevant to the purpose of this paper. For example, Greaney and Kellaghan (1977) is a largely descriptive account of the Leaving Certificate with some discussion of the predictive validity of the exam for third-level performance. Similarly, Moran and Crowley (1978/79) looked at the relationship between leaving Certificate performance, as indexed by different points scoring systems, and first year university performance. Many of the papers in Coolahan (1979) address similar questions. Finally, Madaus and MacNamara (1970) concentrate on issues such as marker reliability and the question of the kinds of knowledge that the Leaving Certificate tests.

Much of the research concerning the Leaving Certificate has looked at the consequences or predictive validity of the exam rather than its antecedents – in other words, the factors influencing pupils' performance, although Greaney and Kellaghan (1984, pp. 166-187) have examined some of these.

effects of senior cycle schooling, in the following sense. The Intermediate Certificate results of pupils who then go on to sit for the Leaving Certificate can be taken as a measure of performance at the start of senior cycle. Equally, the Leaving Certificate measures performance at the end of the senior cycle. It follows, therefore, that the difference between the two is a measure of the change in performance over the period of (generally) two years spent in the senior cycle and is, therefore, a measure of the effects of senior cycle schooling.

The analyses of senior cycle schooling using this measure are undertaken in Chapter 3, where our central aims will be to compare average pupil performance over the three school types (Secondary, Vocational and Community/Comprehensive) and to assess the effect of the different types of school (rather than of individual schools) on performance. In Chapter 4 we summarise our findings and discuss what policy conclusions they point towards.

In the remainder of the present chapter we seek to do three things. First, we want briefly to review what is already known about sex, socio-economic background and school type effects on educational attainment in Ireland. We shall find that most research has in fact dealt with differences in participation rates rather than in examination performance. Secondly, we shall discuss some of the conceptual and, particularly, the methodological issues surrounding the measurement of the effects of schooling on pupils (or, as it is sometimes termed, the "school effectiveness debate"). Thirdly, we want to address the question of why we should expect sex, socio-economic group and school type to influence exam performance; and, lastly, we describe the data used in this study.

Sex, Socio-Economic Background and School Type

What we already know of the effects of sex, socio-economic background and school type can be summarised quite simply:

Educational participation levels vary by pupils' sex, social class origins and according to school type. Males and females have different levels of participation in the post-primary system with a higher percentage of each female entry cohort remaining to sit for the Leaving Certificate. For example, estimates by Breen (1984a, p.105) show that among the 1976-77 entry cohort to post-primary education, 69 per cent of females and 50 per cent of males remained at school to sit for the Leaving Certificate. This greater participation of girls at senior cycle has been a feature of the post-primary system since the mid-1960s.

The level of educational participation varies according to social class origins, with those of working class origins being much more likely to leave school early than those of the middle class. For example, Table 1.1 taken from Breen (1984b) shows that, among recent cohorts of post-primary school leavers, working class school leavers are much less likely to have reached the Leaving Certificate and are much more likely to be totally unqualified than are middle

class school leavers.³ This table shows that, on average, over the cohorts who left post-primary school in the years 1978-79 to 1980-81, virtually all those leavers whose father was in an upper non-manual (i.e., professional, executive or managerial) job left after having sat the Leaving Certificate. At the other extreme, among pupils whose father was a semi-skilled or unskilled labourer, only a minority (38 per cent) left having sat for the Leaving Certificate, and almost a fifth (18 per cent) left having sat for no exam whatsoever.

Table 1.1: *Educational Level attained among cohorts of post-primary leavers according to father's occupational group, 1980-82*
weighted aggregate results (percentages)

| | <i>Occupational Group</i> | | | | |
|--------------------|-----------------------------|-----------------------------|---------------------------|----------------------------------|----------------|
| | <i>Upper Non-Manual</i> | <i>Lower Non-Manual</i> | <i>Skilled Manual</i> | <i>Semi/Unskilled Manual</i> | <i>Farmers</i> |
| Educational Level: | | | | | |
| Leaving Cert | 93.0 | 74.5 | 53.2 | 37.6 | 67.5 |
| Inter Cert | 5.3 | 16.7 | 25.8 | 28.1 | 20.5 |
| Group Cert | 1.0 | 4.4 | 11.1 | 16.4 | 6.5 |
| None | 0.7 | 4.4 | 10.0 | 17.9 | 5.5 |
| | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 |
| N | 794 | 2036 | 1656 | 1771 | 1433 |

Source: Breen 1984b, Table 3.4, from National Manpower Service Surveys of School Leavers 1978-79, 1979-80 and 1980-81

However, the effects of sex and social class on the level of educational participation interact so that working class girls are much more likely to stay at school longer than working class boys. This can be seen in Table 1.2 which is a further elaborated version of Table 1.1. Among all of the occupational groups

³ Tables 1.1, 1.2 and 1.3 are based on data collected by the National Manpower Service's annual survey of school leavers 1980, 1981 and 1982. Each year in May/June a sample of a little over 2,000 young people who left post-primary school in the previous academic year are interviewed. These young people have left school at all stages of their post-primary career, and while most are in the labour market at the time of the interview, about a quarter are in third-level or other post-school full-time education. The samples are, therefore, representative of the annual outflow from the post-primary system. The figures presented in these three tables are aggregated from the first three surveys and have been weighted so as to give equal weight to each survey.

identified there, females are more likely than males to leave school after rather than before the Leaving Certificate and this is especially marked in the case of farmers where females are over 1½ times as likely to leave school after the Leaving Certificate as are males. A higher percentage of males leave school at all levels before Leaving Certificate but particularly after the Group Certificate which is of less importance as a specifically terminal exam among females: indeed a higher percentage of girls leave with no qualification than leave after the Group Certificate.

Table 1.2: *Level of education attained according to pupil sex and father's occupational group (percentages)*

| | | <i>Leaving Certificate</i> | <i>Intermediate Certificate</i> | <i>Group Certificate</i> | <i>No Exam</i> | <i>N</i> |
|----------------|---|--------------------------------|-------------------------------------|------------------------------|--------------------|----------|
| Higher | M | 89.8 | 7.6 | 1.9 | 0.6 | 380 |
| Non-manual | F | 95.8 | 3.3 | 0.1 | 0.8 | 414 |
| Lower | M | 68.0 | 20.3 | 6.8 | 4.9 | 1,075 |
| Non-manual | F | 81.8 | 12.7 | 1.7 | 3.8 | 962 |
| Skilled | M | 43.8 | 30.0 | 15.0 | 11.3 | 894 |
| Manual | F | 64.5 | 20.5 | 6.4 | 8.5 | 763 |
| Semi/Unskilled | M | 29.2 | 30.1 | 23.5 | 17.2 | 936 |
| Manual | F | 47.0 | 25.9 | 8.6 | 18.5 | 835 |
| Farmers | M | 54.3 | 27.3 | 10.4 | 8.0 | 721 |
| | F | 80.8 | 13.7 | 2.4 | 3.1 | 712 |

Source: Re-analysis of NMS school leaver surveys 1980-82, weighted to give equal weight to each survey.

School type is also related to participation levels with fewer entrants to Vocational schools in particular going on to sit for the Leaving Certificate compared with a very high percentage of Secondary school entrants. Evidence for this is given in Table 1.3 (again taken from Breen, 1984b) which shows that among recent cohorts of post-primary school leavers, those who leave before the Leaving Certificate are drawn largely from the Vocational and Community/Comprehensive sectors while those who have sat for the Leaving Certificate are heavily concentrated in the Secondary sector. So, for example, although on average 57 per cent of all post-primary school leavers in a given year come from Secondary schools, these schools contribute 72 per cent of those school leavers

who have sat for the Leaving Certificate. Conversely, Vocational school leavers account for 33 per cent of the total, but only 20 per cent of those with the Leaving Certificate and 62 per cent of those who sat for no exam. At least two reasons for this pattern can be pointed to. First, the different sectors of the post-primary system traditionally have different orientations, despite some recent convergence in their curricula and goals. A Vocational education for males, for example, has been associated with entry into manual work possibly via an apprenticeship taken up after the Group or Intermediate Certificate. On the other hand, Secondary education has been viewed as more academic leading to a non-manual job or to post second-level education.

Secondly, but not unrelatedly, the kinds of pupils found in schools in the different sectors are quite dissimilar. The distribution of pupils across the three major types of post-primary school is strongly influenced by sex and social class origin. In 1981/82, as Table 1.4 shows, almost three-quarters of girls in post-primary education were in Secondary schools with only about one in six in Vocational schools. Among boys, Vocational schools were more popular accounting for almost 30 per cent of male pupils, the Secondary schools being correspondingly less popular. Community and Comprehensive schools were approximately equally popular with both sexes.

Pupils are differentially distributed across the three school types according to social class. Working class and small farm pupils are concentrated in Vocational schools while children of middle class families are more likely to attend Secondary school (Rottman and Hanna, *et al.* 1982, 1981; Hannan, 1968, p.345; Greaney, 1973, p.74; Greaney and Kellaghan, 1984; Hannan and Breen, *et al.* 1983; Breen 1984b). Table 1.5 is taken from Hannan and Breen *et al.* (1983, p.90) and shows the composition of the school types according to pupils' occupational background among those in the 1981 Intermediate Certificate classes. This, of course, understates the degree of differentiation within cohorts entering post-primary education because by the Inter Cert year up to 25 per cent of males and 15 per cent of females in the original cohort of entrants to post-primary school will have already left and such early school leaving is heavily concentrated among children of the working class and of small farm origins. Nevertheless, Table 1.5 gives an approximate though understated picture of the social class distinctions involved. It can be seen that the Community/Comprehensive schools have an intake which to a limited extent is disproportionately made up of working class pupils. Much more marked is the over-representation of working class pupils and the under-representation of middle class pupils in Vocational schools, and the opposite pattern in Secondary schools.

Table 1.3: *Level of education attained according to school type weighted aggregate results 1980-82 (percentages)*

| <i>School Type</i> | <i>Level of Education</i> | | | | |
|--------------------|---------------------------|----------------------------|---------------------------------|--------------------------|-------------|
| | <i>All Levels</i> | <i>Leaving Certificate</i> | <i>Intermediate Certificate</i> | <i>Group Certificate</i> | <i>None</i> |
| Secondary | 56.9 | 71.7 | 44.9 | 11.0 | 26.2 |
| Vocational | 32.9 | 19.6 | 41.6 | 78.2 | 62.2 |
| Community | 10.2 | 8.7 | 13.6 | 10.9 | 11.6 |
| Total | 100.0 | 100.0 | 100.1 | 100.1 | 100.0 |
| N | | 4,779 | 1,631 | 670 | 666 |

Source: Breen 1984b, p.101 Table 6.2

Table 1.4: *Percentage distribution of second-level pupils according to sex by school type, 1982-83*

| | <i>Male</i> | <i>Female</i> | <i>All</i> |
|-----------------------------|-------------|---------------|------------|
| Secondary and Secondary Top | 58.8 | 72.5 | 65.9 |
| Vocational | 29.7 | 18.3 | 23.9 |
| Community/Comprehensive | 11.5 | 9.1 | 10.3 |
| Total | 100.0 | 99.9 | 100.1 |
| N | 152,363 | 161,253 | 313,616 |

Source: Department of Education Statistical Report 1982-83, p.101, Table 17.

Closer inspection of Table 1.5, however, shows that these class differentials are more marked among males than females. By Inter Cert the total cohort of males in post-primary education contains a higher percentage of middle class pupils than does the female cohort because of the sex and class specific nature

of early school leaving. However, even allowing for this, middle class boys are over-represented (and working class boys under-represented) in Secondary schools to a much greater extent than are middle class girls.

We have already pointed out that males and working class pupils are more likely to leave school early and the cohorts entering Vocational schools have a disproportionately high share of such pupils. Furthermore, entrants to these schools are generally of lower perceived ability as a number of studies have shown (Greaney, 1973; Hannan and Breen, *et al.*, 1983, Chapter 4).

Previous research, then, has shown that sex, social class origins and the type of school attended, are all associated with level of educational attainment. It follows from this that in examining Leaving Certificate or senior cycle performance among any cohort of pupils we are dealing with a sub-section of the post-primary school population who have been quite stringently selected. Thus, those who sit for the Leaving Certificate are disproportionately (when compared with the overall post-primary population) female, middle class and Secondary educated. In examining sex, class and school effects on Leaving Certificate performance we are putting aside from consideration the effects that these three factors have in determining who gets as far as the Leaving Certificate in the first place. For these reasons then – that is because these variables will have had such marked influences long before the senior cycle – we might expect that their effects on performance at this level would be relatively modest.

Effects on Academic Performance

As part of their study *Equality of Opportunity in Irish Schools* Greaney and Kellaghan (1984, pp.175-181) report no significant correlations between Leaving Certificate performance, and, respectively, sex, school type (Vocational or Secondary) or their measure of socio-economic status. This is somewhat surprising on *a priori* grounds, which lead us to hypothesise that, for example, working class pupils will tend to perform more poorly than will young people of middle class origins. Of course, among males especially, a high percentage of working class entrants to second-level education will have left school without ever reaching the Leaving Certificate. Thus, those working class male pupils who do get to the Leaving Certificate should be a more highly selected group than, say, their middle class counterparts. On this basis we should expect that class differentials in performance at this level, although present, would be less than they would be if all pupils who entered the post-primary system eventually sat for the Leaving Certificate.

We should also expect to find that performance will vary according to sex, for the simple reason that a greater proportion of female entrants to second level remain at school to sit for the Leaving Certificate. Thus, male Leaving Certificate candidates will have been more highly selected and even if the criteria on

Table 1.5: *The percentage composition, at Inter Cert, of the three different school types, according to occupational background, among each sex*

| Occupational Background of Pupils* | Secondary | | Vocational | | Community | | Total | |
|--|-----------|--------|------------|--------|-----------|--------|--------|--------|
| | F % | M % | F % | M % | F % | M % | F % | M % |
| 1. Upper Middle | 18 | 32 | 8 | 9 | 13 | 15 | 16 | 25 |
| 2. Lower Middle | 38 | 40 | 22 | 28 | 31 | 33 | 35 | 36 |
| 3. Upr. Working | 26 | 18 | 31 | 32 | 31 | 27 | 27 | 22 |
| 4. Lr. Working | 19 | 11 | 39 | 31 | 26 | 26 | 21 | 17 |
| Total % | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| Number | 2,223 | 2,015 | 250 | 587 | 282 | 431 | 2,755 | 3,033 |

- *(1) Professionally qualified, managerial or executive positions and farmers with over 100 acres;
 (2) Senior supervisory, intermediate non-manual workers, and farmers 50-100 acres;
 (3) Skilled manual workers; and farmers 30-50 acres;
 (4) Semi- and unskilled manual workers, and farmers under 30 acres.

Source: Hannan and Breen *et al.*, 1983, p. 90, based on responses of a 1981 national sample of pupils in Inter Cert classes.

which this selection is made (such as class origins) are not entirely related to ability, nevertheless, the overall level of performance among the smaller group of male candidates should be a little higher than among the larger group of female candidates.

When we turn to the effects of school type on exam performance the situation becomes more complex and we will try to deal with some of these complexities below. However, given that the kinds of pupils attending the different types of post-primary school differ widely in class origin, perceived ability and sex, and so on, then we should expect that school types would vary in their examination results because of this. Thus, a simple correlation between school type and performance should, we would anticipate, yield a statistically significant result.

As we shall see in Chapter 3, in our data, sex, school type and social class origins do enjoy a significant relationship with Leaving Certificate performance, at least as the bivariate (i.e., simple correlation) level.⁴ However, as we

⁴Two possible reasons for the discrepancy between our results and those of Greaney and Kellaghan are that, first, Greaney and Kellaghan's exam data relate to 1972 whereas ours refer to 1981 and, secondly, they use a different measure of socio-economic background from the Hall-Jones scale adopted here.

pointed out earlier, our concern in Chapter 3 will be less with Leaving Certificate performance *per se* than with senior cycle performance: i.e., the change in performance attributable to the period spent in the senior cycle. Since this is a *difference* measure, the effects of variables such as sex on senior cycle performance will themselves be measures of the difference between the effect of sex on the later (Leaving Certificate) exam and its effect on performance in the earlier (Inter Cert) exam. This technical issue will be clarified in Chapter 3: the point we wish to make here is that while we should expect, and indeed do, find that our variables have clear effects on Leaving Certificate performance, their influence on senior cycle performance will be much weaker and may even be absent.

School Effectiveness

Additional complications and difficulties arise when we try to determine whether or not the kind of school a pupil attends exerts an independent influence on her or his academic performance (or, indeed, on any other measure of schooling "outcome"). In the context of this study by "kind of school" we mean Secondary, Vocational and Community/Comprehensive and when we discuss "school effectiveness" we refer to differences in the "effectiveness" of school types taken on average rather than to individual schools taken singly. Of course there is no reason why subsequent research should not focus on the relative effectiveness of different sorts of school types – e.g., fee charging as against Free Scheme schools, or schools run by the various religious denominations. At present we are concerned with the sectoral comparison for a number of reasons, which are discussed in Chapter 3. However, it is important to note at the outset that we do not seek to draw comparisons between *specific* Vocational, Community and Secondary schools; rather we are examining differences in the effectiveness of these school types taken *on average*.

To do this, however, we must first tackle some methodological problems. The issue of school effectiveness is one of the most debated topics in the sociology of education. Put crudely, the point at issue is whether, and to what extent, and by what means, individual schools, or types of schools, exert an influence on the performance of pupils within them. In studies of school effectiveness, performance can be measured in a variety of ways – by results in public examinations (Rutter, *et al*, 1979; Madaus, Kellaghan, Rakow and King, 1979), by performance in standardised tests (Coleman, *et al*, 1966; Jencks, 1972; Bidwell and Kasarda, 1975), by the attainment by pupils of a particular level of education (Hout and Raftery, 1985) or, more diffusely, in terms of indices such as delinquency levels and forms of employment obtained by school leavers (Rutter, *et al.*, 1979, pp. 47-49).

The origins of the recent debate on school effectiveness can usefully be traced back to the work of Coleman, *et al*, 1966, and Jencks (1972). These studies

appeared to show that "schools bring little influence to bear on a child's achievement that is independent of his background and general social context" (Coleman *et al.*, 1966, p.325). In the late 1970s and early 1980s, however, prominence was given to research which attributed greater importance to the process of schooling (Coleman, Hoffer and Kilgore, 1982; Madaus, Airasian and Kellaghan, 1980). As Rutter, *et al.*, (1979, p.1) put it:

Schools do . . . have an important impact on children's development and it does matter which school a child attends.

In the United States, the later Coleman study sparked a good deal of debate (e.g., *Harvard Educational Review*, Vol. 51, No. 4, 1981) centering around Coleman, *et al.*'s (1982, pp. 179-181) conclusion that private schools provide a better education than public schools, or, in other words, that private schools have an independent positive effect on performance when compared with public schools. In Britain, Rutter, *et al.*'s (1979) conclusions with regard to school effectiveness have been challenged (Heath and Clifford, 1980; 1981), but a wider controversy has surrounded the report *Standards in English Schools* (Marks, Cox, Pomian-Szednicki, 1981). Among other findings, this report claims that selective schools have positive effects on pupil performance while non-selective (i.e., comprehensive) schools lead to pupil under-achievement (Marks, *et al.*, 1983, p.116). The ensuing debate was widespread (see, for example *Journal of the Royal Statistical Society Series A*, Vol. 147, Part 4, 1984) and in some cases has broadened into a more general discussion of the methodology of inter-school comparisons (*Oxford Review of Education*, Vol. 10, No. 4, November 1984).⁵

At least two critical issues have arisen in these long-standing debates. First, even that research which claims to have isolated a school effect often produces measures of this effect that suggest it is quite weak, and, indeed, as Murphy (1985, p.113) has pointed out, some supporters of school effectiveness (e.g., Maughan, *et al.*, 1980) have found school effects that differ very little in magnitude from those isolated by researchers who argue against any school effectiveness. For example, Rutter's corrected data suggest that about 8 per cent of between school variance in attainment is attributable specifically to school effects, while Jencks (1972), arguing against school effects, puts it at 2 per cent. Thus it is important to distinguish between the existence of a school effect (perhaps judged on statistical criteria) and the magnitude of this effect.

Second, and related to the first point, although there is ample evidence that schools differ in, for example, the average levels of attainment among their pupils, uncertainty surrounds the question of whether and to what degree this

⁵A survey and critique of several school effectiveness studies will be found in Gray (1981). Cuttance (1985) presents a useful overview of a number of the methodological difficulties encountered in such analyses.

is due to characteristics of schools and their schooling process *per se*, or to the characteristics of the pupils in them. Thus the adjective "independent" in our earlier quotation is crucial. If we are to argue for a school effect we must be able to show that it is independent of the characteristics of schools' pupils. In their study of the Irish post-primary system Greaney and Kellaghan (1984, p.255) make this point succinctly:

It is difficult to distinguish between the effects of attendance at a school as such and the effects of the characteristics of students who attend different kinds of schools. For example, the particular advantages associated with attendance at a private primary school may be the higher ability and socio-economic status of the students who go to such a school rather than to the education provided by the school.

The most commonly utilised means of controlling for pupil differences in the estimation of school effects simply involves entering into the analysis a number of background variables characteristic of pupils (or, in studies at a school or higher level of aggregation, measures of pupil composition) such as ability at entry to school, social class background, etc., (e.g., Coleman, *et al.*, 1981, Ch. 6). Attempts to utilise control variables in this manner show surprisingly different levels of thoroughness: for example, Coleman, *et al.*, (1981, pp.235-243), analysing data at the individual level, use 17 control variables, whereas Marks, *et al.*, (1983, p.45) using data at Local Education Authority (LEA) level, include only 4 such variables in their regression analyses.

This method of controlling for background variables, however extensive, is unlikely to prove completely satisfactory because of the existence of variables unmeasured by the researcher which influence both the outcome variable and the type of school the pupil attends. To give a simple example: as Heath and Clifford (1981, p.33) note in their discussion of Rutter, *et al* (1979) work, the latter controlled for parental occupation and the pupil's verbal reasoning score on entry to the school, but they did not take into account differences between pupils in parental interest, a factor which is related both to outcome measures and to the school attended.

Applying this argument to the Secondary/Vocational/Community and Comprehensive comparison, it implies that, while we may be able to control for the effects of a number of variables in making such a comparison, there will, nevertheless, remain crucial differences between schools in their pupil composition for which we cannot control. For example, a majority of parents choose the type of post-primary schools to which they send their children. Thus a major distinction between say, Secondary and Vocational schools, is that the pupils in one have parents who choose to send them to a Secondary school, while pupils in the other have parents who choose to send them to a Vocational

school, and those same factors which influence choice of school may also be expected to influence examination performance. This problem – technically referred to as self selection – means that it is very difficult to disentangle educational effects on pupils due to a particular kind of school from effects which are attributable to those factors of the pupils' home background which are associated with the choice of that kind of school in the first place (Murnane, 1981, p.485; Barnow, Cain and Goldberger, 1980, pp.43-59).

The difficulties of making estimates of school effects – which is part of a more general problem termed “sample selection bias” (Heckman, 1976, 1979) – will be discussed more fully in Chapter 3. Our present discussion, however, should alert us to the dangers of drawing incautious conclusions on the basis of differences in the average level of exam performance between schools and types of schools.

Data and Variables

The data used in this study consist of the replies to a questionnaire administered to a sample of just less than 4,000 Leaving Certificate pupils in the period between January and April of 1981 together with the results they obtained in the Leaving Certificate examination in 1981.

The questionnaire data were originally gathered as part of an earlier project dealing with sex differences in post-primary education (subsequently published as *Schooling and Sex Roles: Sex Differences in Subject Provision and Student Choice in Irish Post-Primary Schools* by D. Hannan, R. Breen, *et al.*, 1983). As part of this project a sample was drawn of 102 Irish schools in which questionnaires were to be administered to all senior cycle pupils scheduled to sit for the Leaving Certificate in 1981. This sample of schools was stratified by religion, whether fee-paying or not, size and sex mix of the pupil body, to be representative of all 850 post-primary schools in the Irish Republic (except in the case of Community/Comprehensive schools which were over sampled, having twice their representation in the sample as in the population). Details of the sampling procedure can be found in Hannan and Breen, *et al.*, (1983, pp. 23-29).

Of these 102 schools, two had closed in the previous year and five refused us access, leaving a sample of 95 schools of which one refused access to the Leaving Certificate pupils while another seven had no Leaving Certificate class in the year 1980/81.

The questionnaire administered to the Leaving Certificate pupils in the remaining 87 schools was reproduced as Appendix 1 of Hannan and Breen, *et al.*, (1983, pp. 331-352). It contained items relating to background information about the pupil and his/her family circumstances; his or her previous educational record (including Intermediate Certificate results); aspirations in the area of work and further education; expectations regarding adult roles; and a

large number of items dealing with the pupils' own attitudes towards school and towards aspects of the schooling process. The final sample size was 3,967.

In 1983 the Leaving Certificate results for each of the pupils to whom a questionnaire had been administered were added to the questionnaire data. These examination results were obtained from the Central Applications Office in Galway with the permission of the Department of Education. The matching of Leaving Certificate results with the questionnaire data led to a loss of 17 cases, the majority of whom had no leaving Certificate record, from which we assume that they did not sit for the examination. The final sample size for the present study, therefore, is 3,950.

The sample has also been weighted to counter the over-representation of pupils in Community and Comprehensive schools, giving a weighted sample size of 3,680 made up of 1,715 males and 1,965 females. Table 1.6 shows the distribution of males and females across the three school types in the sample. The vast majority of pupils were in Secondary schools (82.4 per cent of the sample) although boys were clearly less heavily concentrated in Secondary education (79 per cent in Secondary schools) than girls (85 per cent).

In addition to describing the data on which this study is based, we shall take this opportunity to describe the measure of social class or socio-economic background, which we use in this study. As in the previous publication using these data (Hannan and Breen, *et al.*, 1983) we adopt the Hall-Jones scale (Hall and Jones, 1950). Strictly speaking the Hall-Jones scale has been advanced as measuring occupational status or prestige: however, here we follow Whelan (1980, p. 22) who argues that it is better viewed as an occupational classification.

The categories of the full 8-point Hall-Jones scale are as shown below. The allocation of farmers to the categories has been made to suit Irish circumstances. The full sets of occupations making up each category may be found in Oppenheim (1966, pp. 276-284).

1. Professionally qualified and Higher Administrative, plus farmers with more than 100 acres.
2. Managerial and Executive;
3. Inspectional, Supervisory and other Non-Manual (Higher grade) plus farmers with 50-100 acres;
4. Inspectional, Supervisory and Other Non-Manual (Lower grade);
5. Routine non-manual;
6. Skilled manual plus farmers with 30-50 acres;
7. Semi-skilled manual plus farmers with less than 30 acres;
8. Unskilled manual.

It follows that the Hall-Jones categories are probably not, in a strict sense, classes as this word is used by authors such as Giddens (1973) and Goldthorpe (1980). Therefore, we use the word "class" to refer to the manual/non-manual distinction between Hall-Jones groups 6, 7 and 8 on the one hand, and 1 to 5 on the other. This simple two class model thus postulates a middle-class (non-manual) and a working class (manual).

The middle classes, then, will have low scores on this scale, the working classes high scores. In our analyses in Chapters 2 and 3 we use the Hall-Jones scores as a scale, rather than as forming separate categories. Thus we assume that our dependent variables are linearly related to the scale scores and we make no allowance for non-linearities.

Table 1.6: *Number of schools of each type in sample and distribution of pupils across school types*

| | <i>School Type</i> | | |
|---------------|--------------------|-------------------|--------------------------------|
| | <i>Secondary</i> | <i>Vocational</i> | <i>Community/Comprehensive</i> |
| Schools | 56 | 23 | 8 |
| Male Pupils | 1351 | 223 | 141 |
| Female Pupils | 1680 | 155 | 130 |
| Total Pupils | 3031 | 378 | 271 |

Note: All tables presented weighted figures unless otherwise stated.

In some of our tabular analyses we group the Hall-Jones categories into four, largely for the sake of ease of interpretation. These are (with the constituent Hall-Jones categories in parentheses).

1. Upper non-manual or upper middle class (1 and 2);
2. Lower non-manual or lower middle class (3, 4, 5);
3. Skilled manual or upper working class (6);
4. Semi-skilled and unskilled manual or lower working class (7 and 8).

Outline of the Paper

In this chapter we have set out the chief aims of the study and described the data we shall analyse. Chapter 2 looks at differences in the availability to pupils of certain individual and groups of Leaving Certificate subjects and at variations in their take-up. Chapter 3 comprises an analysis of Leaving Certificate performance and of the effects of senior cycle education. Chapter 4 is made up of summaries of the findings, conclusions and policy recommendations.

Chapter 2

DIFFERENCES IN THE AVAILABILITY AND TAKE-UP OF LEAVING CERTIFICATE SUBJECTS

In this chapter we look at differences in subject take-up in the senior cycle and we seek to account for these differences in terms of a model of provision, allocation and choice, which is described below. We first focus on the availability and take-up of seven individual subjects, then we move on to look at groups of subjects. Our particular concern is with the extent to which subject availability and take-up show consistent variation among pupils from different social class origins and the degree to which, as a result, senior cycle education shows qualitative differences according to pupils' social class background.

Subject Availability and Choice

According to the Department of Education (1971, p. 12) the aim of post-primary education is the "optimum personal fulfilment" of each child. If this aspiration is to be realised, however, it would seem necessary that schools give expression and accord recognition to the diverse talents and abilities of their pupils. The extent to which this is achieved depends upon the kinds of subjects that are established within the educational system: in other words the kinds of abilities that are publicly attested to and "certified" depend, for the most part, upon the particular set of subjects that are recognised for examination purposes.

But even within this set of subjects, limitations are imposed on reaching the ideal of optimum personal fulfilment, since not all pupils have access to all the available junior and senior cycle subjects: so, for example, girls who may have practical technical abilities are unlikely to find an outlet for them because almost no girls' schools teach subjects such as Mechanical Drawing, Metalwork, Woodwork, Technical Drawing, Building Construction or Engineering Workshop and within coeducational schools girls are often excluded either explicitly or implicitly from taking these subjects (Hannan and Breen, *et al.*, 1983). Likewise, young people may be given no opportunity to develop talents in specific areas of the curriculum – such as Modern or Classical Languages or the Sciences – if they happen to be in a school which does not teach these subjects, or if, indeed, none of the schools in their immediate locality has these subjects on the curriculum.

Of course, no school can offer all possible subjects to its pupils. For one thing Irish schools are not large enough to teach the full range of subjects and, as well as this, very few schools are likely to be able to offer a particular subject simply to meet the demands of a handful of pupils.

Schools, therefore, vary in their curricula and because of this pupils in post-primary education will not have access to the same set of subjects. This is particularly true of the senior cycle where the core component of the curriculum is small and there is, as a result, more scope for variation between schools in the subjects they teach and between pupils in the subjects they take.

Such variation is, of course, inevitable, given that the educational system operates with finite resources, and if this variation were purely random it would give us little or no cause for concern. However, we already know that it is not random: there are, for example, marked differences in subject availability and take-up according to sex (Hannan, Breen, *et al.*, 1983, Chapter 5). Here we shall seek to identify similar non-random variation according to pupils' social class background. Thus, we shall be asking, implicitly at least, questions such as "are working class boys more likely than middle class boys to have the opportunity of taking Technical Drawing, and if so, are they more or less likely to avail of this?"

Schools vary not only in their curricula but also in the way they allocate subjects to pupils. The fact of a subject's being on the curriculum does not ensure that it will be offered to all pupils in the school. We have previously termed such school decisions regarding who is allowed to take a particular subject and the way in which it is offered to pupils (as an obligatory or optional subject, for example) as school *allocation* as distinct from subject *provision* which refers to whether or not the subject is taught in the school (Hannan and Breen, *et al.*, 1983, Chapter 5). For example, although a school may teach Technical Drawing, not all pupils in the senior cycle will necessarily be allowed to take it: so it may not be offered to girls, or it may be offered to lower stream pupils in place of, say, Physics, which is offered to higher stream pupils. Equally it may only be open to pupils who have already sat for, and perhaps only those who received a certain grade, in Inter Cert Mechanical Drawing. Even when a subject is made available to pupils the basis of its availability may differ: for some it might be optional while for others it may be compulsory (part of the core).

Our first aim in the present chapter then is to look at how, if at all, provision and allocation differences give rise to a situation in which pupils of certain class origins are more likely than those of other class origins to be offered particular Leaving Certificate subjects. We already know that such differences exist between the two sexes (Hannan and Breen, *et al.*, 1983), with, for example, girls being much less likely than boys to have the opportunity of taking subjects such

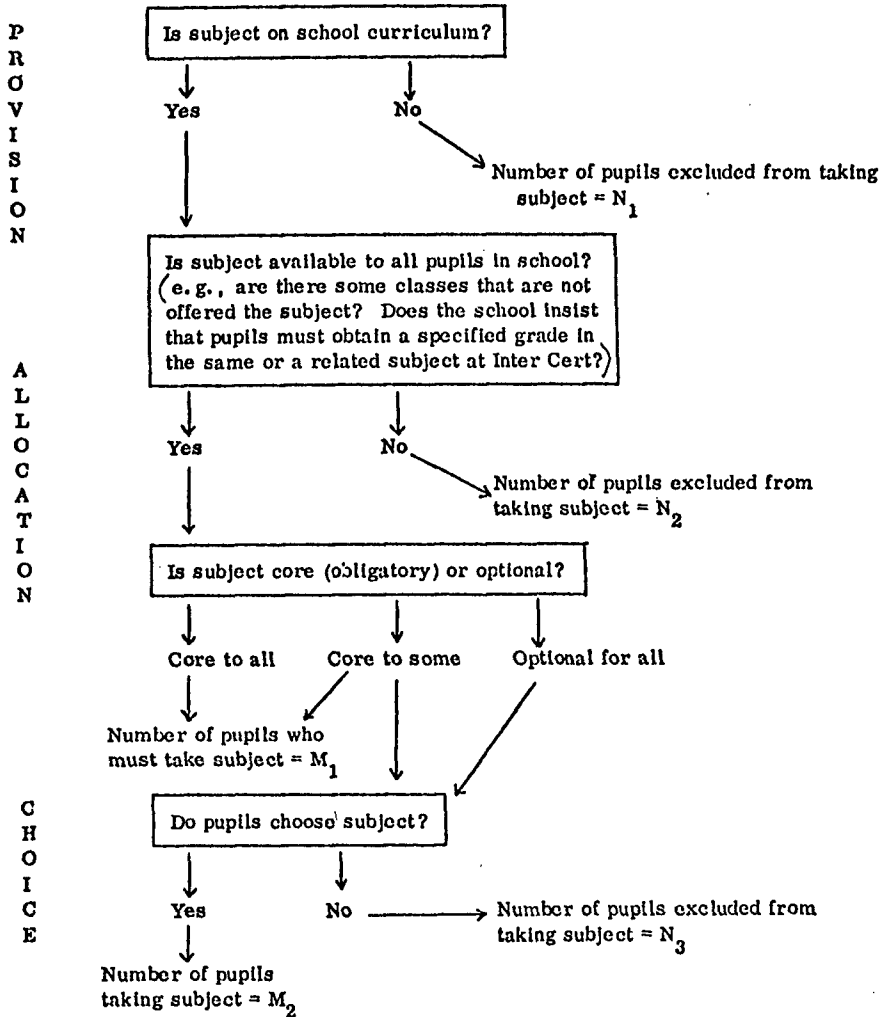
as Physics or Technical Drawing. Now we seek to discover, using the same analytical model, if comparable differences exist between pupils of different class origins.

If a pupil is in a school teaching a given subject and if he or she is allowed to choose that subject, it does not follow that all who are given the option will take it up; therefore, we also want to look at class differences in pupil choice of subjects. If a middle class pupil is given the choice of a particular subject is he or she more or less likely to take it up than would be a working class pupil under the same circumstances? The analysis of these three factors – provision, allocation and choice – is carried out for seven subjects. The relationship between provision, allocation and choice is shown diagrammatically in Figure 2.1. As shown here, this model enables us to determine for any group of pupils, the relative importance of these three factors in the final take-up of a subject. So, the number of pupils who cannot take the subject because it is not provided (i.e., not on the curriculum) is labelled N_1 . The number who cannot take it because, despite its being on the school curriculum, it is not available to them, is labelled N_2 . Finally, the number who could take the subject if they wished but choose not to, is N_3 . On the other side of the coin, the number who must take the subject because it is obligatory is labelled M_1 , and those who choose to take it, M_2 . Overall, the take-up rate of the subject is simply $M_1 + M_2$ divided by the total sample ($= M_1 + M_2, N_2 + N_3$), while what we have earlier termed the “true rate of subject choice” (Hannan and Breen, *et al.*, 1983, p. 133) – that is to say, the percentage of those to whom the subject is available who actually choose it – is, M_2 divided by $M_2 + N_3$, or in other words, the ratio of take-up to availability.

The seven subjects analysed are, Higher Maths, Physics, Chemistry, Biology, Technical Drawing, French and Home Economics (Social and Scientific). With the exception of French these subjects were chosen because they had previously been analysed in this way to investigate sex differences in provision, allocation and choice (Hannan and Breen, *et al.*, 1983, Chapter 5). Thus the analysis in the first half of this chapter is directly comparable to that – although here our emphasis is on class rather than sex differences in subject availability and take-up. Using a simple model of provision, allocation and choice we shall attempt to gauge the importance of each in determining the level of take-up of these subjects among pupils of each social class category.

One limitation of this form of analysis is that it looks at subjects separately. Thus, in the second part of this chapter we examine variations between pupils in the number of subjects of each type which they took at the Leaving Certificate. The areas of the curriculum which we examine are (1) the sciences, (2) the commerce subjects, (3) the technical subjects and (4) the modern languages. Again, albeit using a different methodology, we seek to weigh the relative

Figure 2.1: Diagrammatic representation of model of provision, allocation and choice applied to one subject



Number of pupils excluded from subject because of:

lack of provision = N_1
 lack of allocation = N_2
 choice = N_3

Total taking subject = M_1 (core) + M_2 (optional)

True rate of subject choice (controlling for provision and allocation differences)

= $M_2 / M_2 + N_3 = \text{take-up/availability}$.

Table 2.1: *Subjects making up each subject group at Intermediate and Leaving Certificate Level*

| <i>Subject Group</i> | <i>Intermediate Certificate</i> | <i>Leaving Certificate</i> |
|----------------------|--|--|
| Sciences | Higher Maths Science | Higher Maths, Physics, Chemistry, Biology, Physics and Chemistry, Applied Maths |
| Commerce | Commerce | Accountancy, Business Organisation Economics |
| Modern Languages | French, Spanish, German | French, Spanish, German, Italian |
| Technical | Mechanical Drawing, Woodwork, Metalwork | Technical Drawing, Building Construction, Engineering Workshop |

importance of factors such as provision levels in accounting for the number of subjects of each group taken by pupils. The subjects which we define as making up these groupings at both Leaving and Inter Cert are shown in Table 2.1.

In general, we have counted the most common subjects in each area to represent the number of subjects of that type a pupil is taking. So, for example, the number of Science subjects taken at Leaving Certificate is based on Higher Maths, Physics, Chemistry, Biology, Applied Maths and Physics and Chemistry. This measure, therefore, takes no account of whether or not a pupil is taking subjects such as Mechanics, or Agricultural Science. However, these subjects are taken by so few candidates that their exclusion is unlikely to lead to any erroneous results.⁶

Clearly the sciences, languages, technical and commerce subjects do not exhaust the areas examined in the Leaving Certificate. They do not, for example, include the Classical Languages, Irish or English; the humanities – History and Geography; the arts – Art and Music; or the Home Economics subjects. However, they do provide a set of measures based for the most part on commonly taken subjects and they represent some – though not all – of the

⁶According to the most recent available statistics (for 1983), 1,390 candidates sat for Agricultural Science, and only 23 sat for Mechanics, (Dept. of Education Statistical Report 1982-83, pp. 104-105).

major dimensions of ability or knowledge that the Leaving Certificate seeks to examine.

Subject Take-up

Table 2.2 shows the percentages of pupils of each occupational category in our sample taking each of the seven subjects we intend to look at, and these figures are given separately for boys and girls. There are a number of very clear relationships between take-up rates and occupational category. Thus, for both sexes, the percentages taking Higher Maths, Physics, Chemistry and French decrease as we move from the non-manual to the manual categories. Middle class pupils, in other words, are considerably more likely to take these subjects than are those of working class origins. The same is also true of the take-up of Biology among girls. Of course, there are also very great differences in the take-up rates between different subjects and comparing girls' and boys' take-up of the same subject, but these differences have been dealt with exhaustively elsewhere (Hannan and Breen, *et al.*, 1983, Ch. 5).

The opposite relationship between occupational group and take-up rates holds for Biology and Technical Drawing (TD) among boys, and among girls for Home Economics (Social and Scientific S&S). The take-up rates for these subjects are greater in the manual than the non-manual categories. Lastly, there is no relationship between occupational group and take-up for TD among girls and Home Economics among boys (take-up rates are, in any case, low in these two cases, particularly the former).

On the basis of this evidence, we can say that subjects such as Higher Maths, Physics, Chemistry and French are "middle class subjects" while TD and Home Economics are "working class subjects" in the sense of being, apparently, more popular with one class or certain occupational groups, than others. Furthermore, Higher Maths, Physics, Chemistry and TD are all "boys" subjects, so that, for example, the bulk of candidates for, say, Physics will be male and of middle class origins, while the bulk of candidates for TD will be males of the working classes.⁷ Biology presents an interesting contrast between the sexes in that, for males, it shows a tendency to be more popular among those of working class backgrounds, while it is least popular with this group among females. This may be due to the sex differences in the availability of science

⁷Although these data relate to candidates for the 1981 Leaving Certificate exam (concerning whom no published information relating to individual subject candidature is available in the Department of Education's *Statistical Report* for that year), more recent data show that sex differences in subject take-up have lessened slightly, but substantial sex differences remain. For example, in the 1983 Leaving Certificate exam (the most recent for which information is published), the proportion of male candidates taking Higher Maths was 3 times the proportion of female candidates (17 per cent of males, 6 per cent of females). In the case of Physics the male candidature rate was 6 times that of the female (35 per cent compared with 6 per cent), in Chemistry twice as great (26 per cent as against 14 per cent), and, in TD, 96 times as great (23 per cent as against 0.2 per cent) (Department of Education *Statistical Report* 1982-83, pp. 104-105).

Table 2.2: Percentages of Male and Female Leaving Certificate candidates taking various subjects according to class origins

| | | <i>Higher Maths</i> | <i>Physics</i> | <i>Chemistry</i> | <i>Biology</i> | <i>TD</i> | <i>Home Economics (S&S)</i> | <i>French</i> | <i>N</i> |
|----------------|---|-------------------------|----------------|------------------|----------------|-----------|---|---------------|----------|
| Females | | | | | | | | | |
| | 1 | 5.1 | 6.5 | 23.2 | 71.9 | 0.1 | 38.3 | 75.0 | 459 |
| | 2 | 2.4 | 3.0 | 12.3 | 60.0 | 0.2 | 43.0 | 74.5 | 667 |
| Class | 3 | 1.8 | 1.9 | 7.9 | 57.5 | 0.1 | 44.2 | 59.2 | 501 |
| | 4 | 2.5 | 2.3 | 6.8 | 56.0 | 0.0 | 47.2 | 56.4 | 286 |
| Males | | | | | | | | | |
| | 1 | 30.0 | 38.0 | 38.9 | 41.9 | 6.8 | 5.9 | 60.9 | 637 |
| | 2 | 19.3 | 27.3 | 28.9 | 44.3 | 16.7 | 4.9 | 54.8 | 624 |
| Class | 3 | 11.1 | 26.1 | 23.7 | 48.0 | 30.5 | 5.2 | 42.7 | 280 |
| | 4 | 13.3 | 19.7 | 21.2 | 46.2 | 40.5 | 4.5 | 27.3 | 132 |

Class 1: Upper non-manual;
 2: Lower non-manual;
 3: Skilled manual;
 4: Semi or unskilled manual.

subjects. For girls, Biology may be the only science subject open to them, while for boys, the greater availability of sciences may lead to Physics, Chemistry and Higher Maths being assigned to pupils of higher perceived ability, leaving Biology as a subject aimed at those of lower perceived ability.

Subject Availability: Outline of Method

To speak of differences in take-up as being due to differences in subject availability is, of course, to pre-empt what follows in this chapter. Our initial interest lies, in fact, in determining the extent to which the differences in take-up in Table 2.2 can be regarded as being caused by social class differences in the availability of these seven subjects to pupils.

As we noted earlier, we analyse the availability of subjects in terms of provision and allocation, the former referring to whether or not the particular subject is taught in the school, the latter to whether or not, given that the subject is taught, it is made available to individual pupils. This form of analysis is carried out for each of our seven subjects in Tables 2.3 to 2.9, and the figures given there correspond to the categories labelled M and N in Figure 2.1. This correspondence is shown explicitly in Table 2.3 to facilitate interpretation of the figures in this and subsequent tables.

Table 2.3 looks at the availability of Higher Maths to each of our four occupational categories within each sex. So, for example, of the 637 male pupils of the upper non-manual Category 1, 3.6 per cent were in schools which did not teach Higher Maths, i.e., these pupils are not *provided* with the subject and constitute, in this case, Category N₁ in Figure 2.1. A further 0.2 per cent, although in schools where the subject is taught, were in classes to which it was not open. This left just over 96 per cent of pupils to whom, formally at least, the subject was open. Of these, just under a half (40.9 per cent) were not able to choose the subject because they failed to meet the school's academic prerequisites for taking Higher Maths: in general this means that they either had not sat for or had not done well enough in, Inter Cert Higher Maths. For all classes this can be seen to be the major factor in determining the take-up of Higher Maths in the sense that it is the single largest exclusionary factor.

Almost 2 per cent of males of social class Category 1 were obliged to take Higher Maths (i.e., it was part of the core for them), and just over half – 53.4 per cent – were in a position to choose Higher Maths if they wished. Just over half of these pupils – 28.1 per cent of the whole sample – chose to take it, yielding a true rate of choice, shown at the foot of the table, of 52.6 per cent. The difference between the percentage choosing each subject (28.1 per cent in this case) and the percentage taking it (30.0) is due in most cases and for the most part, to the fact that a number of pupils are obliged to take each subject. However, this difference is also due in some measure to the existence of errors – for

Table 2.3: Provision, allocation and choice factors in take-up of Higher Maths

| Class | Males | | | | Females | | | |
|--|----------|----------|----------|----------|----------|----------|----------|----------|
| | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 |
| Total Sample | 637 % | 624 % | 280 % | 132 % | 459 % | 667 % | 501 % | 286 % |
| Excluded because subject not on curriculum (N1) | 3.6 | 7.2 | 12.1 | 18.9 | 12.4 | 9.2 | 10.0 | 10.9 |
| Excluded because subject not allocated to class (N2) | 0.2 | 0.4 | 0.9 | 1.9 | 8.5 | 9.1 | 6.2 | 9.8 |
| Excluded because failed to meet academic criteria (N2) | 40.9 | 42.6 | 48.1 | 49.2 | 48.2 | 61.0 | 66.6 | 60.5 |
| Pupils who may choose subject | 53.4 | 48.4 | 37.1 | 29.6 | 30.9 | 20.7 | 17.2 | 18.8 |
| Pupils choosing subject (M2) | 28.1 | 17.9 | 9.3 | 12.9 | 4.8 | 2.4 | 1.8 | 1.9 |
| Pupils not choosing subject (N3) | 25.3 | 30.5 | 27.8 | 16.7 | 26.1 | 18.3 | 15.4 | 16.2 |
| True rate of subject choice + | 52.6 | 37.0 | 25.1 | 43.6 | 15.5 | 11.6 | 10.5 | 10.1 |
| Total subject take-up* | 30.0 | 19.3 | 11.1 | 13.3 | 5.1 | 2.4 | 1.8 | 2.5 |

$$+ \text{ True rate of subject choice} = \left[\frac{\text{Number choosing subject}}{\text{Number who may choose subject}} \right] \times 100$$

Class categories: 1 Upper non-manual
 2 Lower non-manual
 3 Skilled manual
 4 Semi-skilled/unskilled manual

*Total take-up = number choosing subject + number who must take subject (M1) + error (see text).

Table 2.4: *Provision, allocation and choice factors in take-up of Physics*

| Class | Males | | | | Females | | | |
|---|----------|----------|----------|----------|----------|----------|----------|----------|
| | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 |
| Total Sample | 637 % | 624 % | 280 % | 132 % | 459 % | 667 % | 501 % | 286 % |
| Excluded because subject not on curriculum | 13.0 | 20.7 | 28.4 | 45.8 | 48.1 | 68.9 | 72.5 | 73.9 |
| Excluded because subject not allocated to class | 1.7 | 3.5 | 4.3 | 3.0 | 5.2 | 3.2 | 2.4 | 3.9 |
| Excluded because failed to meet academic criteria | 24.5 | 20.5 | 15.2 | 13.3 | 20.8 | 9.2 | 8.7 | 7.6 |
| Pupils who may choose subject | 60.8 | 55.3 | 52.1 | 37.9 | 25.9 | 18.7 | 16.4 | 14.6 |
| Pupils choosing subject | 31.7 | 21.8 | 21.8 | 14.4 | 5.2 | 2.8 | 1.6 | 2.1 |
| Pupils not choosing subject | 29.2 | 33.5 | 30.4 | 23.5 | 20.9 | 15.9 | 14.8 | 12.6 |
| True rate of subject choice + | 52.1 | 39.4 | 41.6 | 38.0 | 19.7 | 14.9 | 9.8 | 14.5 |
| Total subject take-up | 37.3 | 27.0 | 25.6 | 19.7 | 6.5 | 2.9 | 1.9 | 2.2 |

$$+ \text{ True rate of subject choice} = \left[\frac{\text{Number choosing subject}}{\text{Number who may choose subject}} \right] \times 100$$

Class categories: 1 Upper non-manual
 2 Lower non-manual
 3 Skilled manual
 4 Semi-skilled/unskilled manual

*Total take-up = number choosing subject + number who must take subject + error (see text).

Table 2.5: *Provision, allocation and choice factors in take-up of Chemistry*

| Class | Males | | | | Females | | | |
|---|----------|----------|----------|----------|----------|----------|----------|----------|
| | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 |
| Total Sample | 637 % | 624 % | 280 % | 132 % | 459 % | 667 % | 501 % | 286 % |
| Excluded because subject not on curriculum | 9.9 | 19.4 | 30.2 | 43.2 | 13.3 | 22.9 | 27.5 | 29.8 |
| Excluded because subject not allocated to class | 2.0 | 4.8 | 6.1 | 6.1 | 1.3 | 3.3 | 3.6 | 4.6 |
| Excluded because failed to meet academic criteria | 12.9 | 13.6 | 10.5 | 9.8 | 30.1 | 22.4 | 23.0 | 21.9 |
| Pupils who may choose subject | 75.2 | 62.2 | 53.2 | 40.9 | 55.3 | 51.4 | 45.9 | 43.7 |
| Pupils choosing subject | 36.4 | 27.2 | 23.2 | 19.7 | 20.0 | 11.8 | 7.6 | 5.8 |
| Pupils not choosing subject | 38.9 | 34.9 | 30.0 | 21.2 | 35.3 | 39.6 | 38.3 | 37.9 |
| True rate of subject choice + | 48.3 | 43.7 | 43.4 | 48.6 | 36.2 | 23.1 | 16.3 | 13.2 |
| Total subject take-up* | 38.9 | 28.8 | 23.7 | 21.2 | 23.2 | 12.1 | 7.9 | 6.8 |

$$+ \text{ True rate of subject choice} = \left[\frac{\text{Number choosing subject}}{\text{Number who may choose subject}} \right] \times 100$$

Class categories: 1 Upper non-manual
 2 Lower non-manual
 3 Skilled manual
 4 Semi-skilled/unskilled manual

*Total take-up = number choosing subject + number who must take subject + error (see text).

Table 2.6: *Provision, allocation and choice factors in take-up of Biology*

| Class | Males | | | | Females | | | |
|---|----------|----------|----------|----------|----------|----------|----------|----------|
| | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 |
| Total Sample | 637 % | 624 % | 280 % | 132 % | 459 % | 667 % | 501 % | 286 % |
| Excluded because subject not on curriculum | 6.9 | 6.9 | 9.3 | 6.1 | 0.0 | 0.2 | 0.4 | 0.4 |
| Excluded because subject not allocated to class | 5.3 | 5.8 | 6.1 | 6.1 | 0.2 | 0.0 | 0.0 | 0.0 |
| Excluded because failed to meet academic criteria | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Pupils who may choose subject | | | | | | | | |
| Pupils choosing subject | | | | | | | | |
| Pupils not choosing subject | | | | | | | | |
| True rate of subject choice + | | | | | | | | |
| Total subject take-up* | 41.7 | 44.2 | 47.3 | 45.5 | 71.9 | 60.0 | 57.5 | 56.0 |

$$+ \text{ True rate of subject choice} = \left[\frac{\text{Number choosing subject}}{\text{Number who may choose subject}} \right] \times 100$$

Class categories: 1 Upper non-manual
 2 Lower non-manual
 3 Skilled manual
 4 Semi-skilled/unskilled manual

*Total take-up = number choosing subject + number who must take subject + error (see text).

Table 2.7: *Provision, allocation and choice factors in take-up of Technical Drawing*

| Class | Males | | | | Females | | | |
|---|----------|----------|----------|----------|----------|----------|----------|----------|
| | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 |
| <i>Total Sample</i> | 637 % | 624 % | 280 % | 132 % | 459 % | 667 % | 501 % | 286 % |
| Excluded because subject not on curriculum | 70.4 | 49.4 | 33.6 | 25.0 | 78.3 | 79.8 | 72.3 | 73.6 |
| Excluded because subject not allocated to class | 0.9 | 1.1 | 2.1 | 1.5 | 0.0 | 0.0 | 0.0 | 0.0 |
| Excluded because failed to meet academic criteria | 13.2 | 22.6 | 23.2 | 22.0 | 19.3 | 19.2 | 25.1 | 22.6 |
| Pupils who may choose subject | 15.5 | 26.9 | 41.1 | 51.5 | 2.4 | 1.0 | 2.6 | 3.8 |
| Pupils choosing subject | 6.3 | 13.9 | 28.9 | 36.4 | 0.2 | 0.1 | 0.2 | 0.0 |
| Pupils not choosing subject | 9.3 | 13.0 | 12.1 | 15.2 | 2.4 | 0.9 | 2.4 | 3.8 |
| True rate of subject choice + | 40.3 | 51.6 | 70.6 | 71.1 | 8.3 | 10.0 | 7.7 | — |
| Total subject take-up* | 6.6 | 16.7 | 30.5 | 40.5 | 0.2 | 0.2 | 0.2 | 0.0 |

$$+ \text{ True rate of subject choice} = \frac{\text{Number choosing subject}}{\text{Number who may choose subject}} \times 100$$

Class categories: 1 Upper non-manual
 2 Lower non-manual
 3 Skilled manual
 4 Semi-skilled/unskilled manual

*Total take-up = number choosing subject + number who must take subject + error (see text).

Table 2.8: *Provision, allocation and choice factors in take-up of Home Economics (Social and Scientific)*

| Class | Males | | | | Females | | | |
|---|----------|----------|----------|----------|----------|----------|----------|----------|
| | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 |
| Total Sample | 637 % | 624 % | 280 % | 132 % | 459 % | 667 % | 501 % | 286 % |
| Excluded because subject not on curriculum | 84.1 | 73.6 | 66.6 | 59.5 | 12.2 | 4.2 | 4.6 | 5.6 |
| Excluded because subject not allocated to class | 0.0 | 0.0 | 0.0 | 0.0 | 3.9 | 4.7 | 4.2 | 4.9 |
| Excluded because failed to meet academic criteria | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Pupils who may choose subject | | | | | | | | |
| Pupils choosing subject | | | | | | | | |
| Pupils not choosing subject | | | | | | | | |
| True rate of subject choice + | | | | | | | | |
| Total subject take-up* | 1.5 | 1.2 | 2.7 | 3.2 | 37.9 | 42.7 | 44.0 | 47.2 |

$$+ \text{ True rate of subject choice} = \left[\frac{\text{Number choosing subject}}{\text{Number who may choose subject}} \right] \times 100$$

Class categories: 1 Upper non-manual
 2 Lower non-manual
 3 Skilled manual
 4 Semi-skilled/unskilled manual

*Total take-up = number choosing subject + number who must take subject + error (see text).

Table 2.9: *Provision, allocation and choice factors in take-up of French*

| Class | Males | | | | Females | | | |
|---|-------|------|------|------|---------|------|------|------|
| | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 |
| Total Sample | 637 | 624 | 280 | 132 | 459 | 667 | 501 | 286 |
| | % | % | % | % | % | % | % | % |
| Excluded because subject not on curriculum | 0.0 | 0.0 | 0.0 | 0.0 | 1.7 | 0.8 | 0.0 | 2.1 |
| Excluded because subject not allocated to class | 1.4 | 3.7 | 3.6 | 4.2 | 1.5 | 2.5 | 3.0 | 4.0 |
| Excluded because failed to meet academic criteria | 16.3 | 17.9 | 16.8 | 18.5 | 9.4 | 13.9 | 18.6 | 14.2 |
| Pupils who may choose subject | 82.3 | 78.4 | 79.6 | 77.3 | 87.4 | 82.8 | 78.4 | 79.7 |
| Pupils choosing subject | 57.1 | 50.2 | 40.0 | 23.5 | 68.0 | 65.5 | 51.3 | 50.0 |
| Pupils not choosing subject | 25.1 | 28.2 | 39.6 | 53.8 | 19.4 | 17.2 | 27.1 | 29.7 |
| True rate of subject choice + | 69.4 | 64.1 | 50.1 | 30.5 | 77.8 | 79.2 | 65.4 | 62.6 |
| Total subject take-up* | 60.9 | 54.7 | 42.7 | 27.3 | 74.6 | 74.5 | 59.0 | 56.4 |

$$+ \text{ True rate of subject choice} = \frac{\text{Number choosing subject}}{\text{Number who may choose subject}} \times 100$$

Class categories: 1 Upper non-manual
 2 Lower non-manual
 3 Skilled manual
 4 Semi-skilled/unskilled manual

*Total take-up = number choosing subject + number who must take subject + error (see text).

example, pupils who, for whatever reason (lack of provision or allocation), were not in a position to take the subject, but were in fact doing so. This might occur if, say, a school waived its academic prerequisites for subject take-up in the case of a particular pupil, or if a student was taking a subject privately rather than at school. In no case does this margin of error exceed 1 or 2 percentage points.

We may also note that in the case of the two subjects for which there were no academic prerequisites – Biology and Home Economics (Social and Scientific) – it was not always possible to distinguish between pupils who were taking the subject from choice and those who took it as part of the core. Accordingly these distinctions are not made in Tables 2.6 and 2.8.

Subject Availability: Results

Tables 2.3 to 2.9 and the results derived from them are useful for two main purposes: first they allow us to look at how provision, allocation and choice factors affect the take-up of subjects by pupils of various social class origins, and, second, they allow us to see the extent of social class differences in provision allocation and choice. To put this slightly differently, we can use these data to reveal the absolute importance of provision, allocation and choice in determining final levels of take-up within each social class grouping, and we can also use these data, and figures derived from them (displayed in Table 2.10) to show where – in provision, allocation or choice – the greatest social class differences occur.

In Table 2.3 it is clear that the chief factor determining take-up levels of Higher Maths is the degree of exclusion from the subject caused by the failure of pupils to meet academic criteria. The percentage excluded in this way is greatest here among both sexes and all social class groups. The next largest exclusionary factor is the pupil's own choice – their "failure" to choose the subject – and the only other significant exclusionary factor is provision differences.⁸ Two reasons probably account for the great importance of school academic criteria in determining the take-up of this subject: first, these criteria are generally more stringent than in the case of any of the other subjects we deal with here and, secondly, there are significant allocation factors concerning Inter Cert Higher Maths which subsequently have a major bearing on whether or not pupils will be allowed to take Higher maths in the senior cycle (Hannan and Breen, *et al.*, 1983, p. 132).

In the case of Physics (Table 2.4), this is noticeable for its very poor provision levels among girls, and provision is the single most important exclusionary factor among girls. Among middle class boys, provision levels are relatively high and failure to meet academic criteria and choice factors are of most impor-

⁸Though in the case of boys Category 4 social class provision effects are greater than choice effects as an exclusionary factor.

Table 2.10: *Social class differences in effects of three exclusionary factors (see text for details)*

| Class Category | Boys | | | | | Girls | | | | |
|-----------------------------------|------|----|----|----|-------------------------------------|-------|----|----|-----|-------------------------------------|
| | 1 | 2 | 3 | 4 | Difference: Largest- Smallest | 1 | 2 | 3 | 4 | Difference: Largest- Smallest |
| <i>Higher Maths</i> | | | | | | | | | | |
| Provision | 4 | 7 | 12 | 19 | 15 | 12 | 9 | 10 | 11 | 3 |
| Academic Criteria | 43 | 46 | 55 | 62 | 19 | 61 | 75 | 79 | 76 | 18 |
| Choice | 47 | 63 | 75 | 56 | 28 | 84 | 88 | 90 | 90 | 6 |
| <i>Physics</i> | | | | | | | | | | |
| Provision | 13 | 21 | 28 | 46 | 33 | 48 | 69 | 73 | 74 | 26 |
| Academic Criteria | 29 | 27 | 23 | 26 | 6 | 45 | 33 | 35 | 34 | 12 |
| Choice | 48 | 61 | 58 | 62 | 14 | 80 | 85 | 90 | 85 | 10 |
| <i>Chemistry</i> | | | | | | | | | | |
| Provision | 10 | 19 | 30 | 43 | 33 | 13 | 23 | 28 | 30 | 17 |
| Academic Criteria | 15 | 18 | 16 | 19 | 4 | 35 | 30 | 33 | 33 | 5 |
| Choice | 52 | 56 | 57 | 51 | 6 | 64 | 77 | 84 | 87 | 23 |
| <i>Biology</i> | | | | | | | | | | |
| Provision | 7 | 7 | 9 | 6 | 3 | 0 | 0 | 0 | 0 | — |
| Academic Criteria | | | | | — | | | | | — |
| Choice | | | | | — | | | | | — |
| <i>TD</i> | | | | | | | | | | |
| Provision | 70 | 49 | 34 | 25 | 45 | 78 | 80 | 72 | 74 | 8 |
| Academic Criteria | 46 | 46 | 36 | 30 | 16 | 89 | 95 | 91 | 86 | 9 |
| Choice | 60 | 48 | 29 | 29 | 31 | 92 | 90 | 92 | 100 | 10 |
| <i>Home Econ. (S & S)</i> | | | | | | | | | | |
| Provision | 84 | 74 | 67 | 60 | 24 | 12 | 4 | 5 | 6 | 8 |
| Academic Criteria | | | | | — | | | | | — |
| Choice | | | | | — | | | | | — |
| <i>French</i> | | | | | | | | | | |
| Provision | 0 | 0 | 0 | 0 | — | 2 | 1 | 0 | 2 | 2 |
| Academic Criteria | 17 | 19 | 17 | 19 | 2 | 10 | 14 | 19 | 15 | 9 |
| Choice | 31 | 36 | 50 | 79 | 48 | 22 | 21 | 35 | 37 | 16 |

tance. However, among working class boys, where provision levels are poorer, this becomes a major exclusionary factor.

Among boys, a similar pattern holds for Chemistry (Table 2.5) where absence of provision is crucial among working class boys but choice is most important for those of the middle classes. Failure to meet academic criteria is much less important in this case than in Higher Maths or Physics, possibly because the criteria established by schools are somewhat less stringent in this case. Among girls, choice is the most significant factor, with absence of provision being important for working class girls, failure to meet academic criteria being important for middle class girls.

As noted earlier, our information on Biology (Table 2.6) is limited, though the evidence shows that it is widely available to students, albeit with some provision and allocation restrictions among boys. It is also associated among both sexes and all social classes, with the highest take-up levels of any science subject. We may assume, therefore, that these rates of take-up are chiefly determined by pupils' own choices.

Among middle class boys, absence of provision is the major exclusionary factor in the case of Technical Drawing (Table 2.7) while for working class boys, among whom provision levels are better, failure to meet academic criteria takes on more weight. Among girls, provision levels are very low, and the level of failure to meet academic criteria, even where the subject is taught, is generally high. This latter arises because, in those schools which contain girls and where TD is taught, girls are generally not given access to it because of their lack of experience of Mechanical Drawing at Inter Cert.

Boys' low level of take-up of Home Economics is attributable to low levels of provision, though among working class pupils (who have higher levels of provision) doubtless to pupil choice also. Girls are generally provided with this subject (although there are some restrictions on its availability as Table 2.8 shows), and take-up levels are probably primarily responsive to pupil choice.

Finally, French (Table 2.9) is very widely provided to both sexes and the percentage excluded because of failure to meet academic criteria in no case reaches 20 per cent. Thus, pupils' own choice appears to be the crucial factor determining levels of take-up of French.

Social Class Differences in Provision, Allocation and Choice

If we compare the effects of factors such as provision and choice across social class categories it is evident that they are of different strengths. For example, only 4 per cent of boys of the highest social class are not in schools teaching Higher Maths, whereas 19 per cent of boys of social class four are in this position. Similar differences apply to the percentages who fail to qualify and to the true rates of subject choice. If we wish to compare class differences at each

of these points, however, we have to bear in mind that the strength of any factor is limited by the effect of factors preceding it. So, for example, if a large percentage of pupils are excluded from a subject by virtue of attending schools where that subject is not taught, the percentage who can then be excluded by failure to meet academic criteria will, of necessity, be quite small. Table 2.10 presents adjusted figures which seek to allow for this interdependence of factors. Again, distinguishing boys and girls of each social class category, this table shows, for each subject, the following:

- (a) Provision: defined as in Tables 2.3 to 2.9, namely, the percentage of pupils excluded because they are in schools not teaching the subject;
- (b) Academic Criteria: of those pupils in schools and classes to which the subject is open, percentage excluded by virtue of failure to meet academic criteria;
- (c) Choice: of those who are given choice of subject (i.e., meet academic criteria, etc.) the percentage who choose not to take the subject.

For each of these measures, we then show the difference between the largest and the smallest percentage. This yields a measure of the maximum class difference in the effect of each of these factors. To illustrate, among males, in the case of Higher Maths, the provision difference is 15 percentage points (social class 4 – class 1), the academic criteria difference is 19 points and the choice difference 28 points (class 3 – class 1). Thus the largest social class difference is associated with pupil choice in this case.

The general picture to emerge from Table 2.10 regarding factors (a), (b) and (c) is as follows:

- (i) Provision differences are positively related to class origins in the case of Physics and Chemistry (for both sexes) and Higher Maths (for boys only). In other words, provision levels are better for the middle rather than the working class, and this is especially marked among boys. For example, almost 9 out of 10 male pupils of higher non-manual origins are in schools teaching Physics as against 5 out of 10 males of lower manual origins.
- (ii) Provision differences favour pupils of working class origins in the cases of Home Economics and TD, the latter among boys only (the same relationship does exist among girls also, but it is relatively weak). One suspects that the better provision of these two subjects to working class pupils is strongly related to the greater likelihood of such pupils being found in the Vocational or Community/Comprehensive sector.
- (iii) There is no relationship between provision levels and class origins in the cases of French and Biology (which are very widely taught in schools) or

in the case of Higher Maths, TD and Home Economics among girls.

- (iv) Perhaps surprisingly, there is a relationship between the percentage excluded from the subject by virtue of a failure to meet academic criteria (controlling for provision and other aspects of allocation) only in the cases of Higher Maths, Physics (girls only) and TD (boys only). For each of these, working class pupils are more likely to be excluded because they fail to meet academic criteria. On the other hand, in areas such as Chemistry, Physics (boys only) and French, there is virtually no relationship between the percentage failing to meet these criteria and class origins.
- (v) A number of subjects show a clear relationship between social class and true rates of subject choice. This is particularly noticeable in the case of French, especially among boys, where there are no class differences in either lack of provision or failure to meet academic criteria, yet working class boys are much less likely than those of the middle class to choose this subject. Similarly class differences in choice among boys are evident for Higher Maths, Physics and TD, (though here working class boys are the more likely to choose this subject), and among girls for French and Chemistry. In none of the other subjects is there a significant relationship between true rates of choice and social class origins.

Individual Subject Take-up

Let us summarise the discussion so far. We began by pointing to the existence of social class differences in subject take-up (Table 2.2). We then tried to account for those in terms of provision, allocation and choice differences. We saw that, in particular, provision levels in schools, the percentages who succeeded or failed to meet school academic criteria for the take-up of subjects, and pupils' own patterns of choice, appeared to be the three most significant factors in explaining levels of take-up.⁹ The importance of these three factors varied however: for example, class differences in the take-up of French were found to be virtually wholly due to class-specific patterns of subject choice, whereas in, say, Physics and Chemistry (especially among boys) class differences in provision appeared to be of far greater importance.

As well as looking at the importance of each factor we also sought to measure the extent of the class difference in the effects of each. Overall, provision and choice appeared to demonstrate the highest levels of class difference, with the percentage failing to meet academic criteria (once we controlled for provision

⁹The only obvious exception to this generalisation among the seven subjects analysed here is Higher Maths among girls, where allocation rules appear important in excluding girls of all social classes from access to the subject. Set against the minimal importance of allocation as a factor determining the availability of Higher Maths to boys, this suggests that girls' schools (or schools containing girls) are much more likely to make rigid allocation decisions about the subject than are boys' schools.

and other allocation effects) being, for the most part, remarkably similar across classes (though differing widely between sexes).

The question naturally arises of how far social class differences in subject take-up are attributable to each of the factors we have been discussing. We shall try to answer that question in the following way. Taking each subject and each sex separately, we set up a three dimensional cross-tabulation of social class category by whether or not the subject was provided to the pupil's class (thus this incorporates both provision and some aspects of allocation) by whether or not the pupil reached the academic requirements to take the subject. In each cell of this table we have the number who took the subject divided by the number who did not. This ratio has a binomial distribution and we regress (by means of logistic regression) this ratio on each of the three variables making up our cross-tabulation – those are Class (C), provision (P) and qualification (Q). If we simply regress the dependent variable on C, this will give us a set of coefficients and also a value for the likelihood ratio chi-squared (χ^2_{LR}) that tell us the total effect of class category on rates of take-up. In other words the χ^2_{LR} associated with C is a measure of how strongly class origins are related to subject take-up. It is then possible, by fitting additional models, to discover the degree to which this relationship is weakened or strengthened by taking into account P and Q. To do this we fit models thus:

χ^2_{LR} for models fitting P minus χ^2_{LR} for model P + C yields χ^2_{LR} value associated with C controlling for P;

χ^2_{LR} for P + Q minus χ^2_{LR} for P + Q + C yields χ^2_{LR} associated with C controlling for P and Q.

These results make use of the additive properties of χ^2_{LR} . Some manipulation of these models allows us to express the percentage by which the overall relationship of class to take-up rates weakens with the addition of P and Q.¹⁰ This is shown in Table 2.11. So, for example, in the case of boys' Higher Maths we see that the overall class effect yields χ^2_{LR} of 54.2 on 3 degrees of freedom (df), which is statistically significant ($p < .05$). Indeed there are significant χ^2_{LR} values associated with total class effects in all cases, as we would have anticipated from Table 2.2. Of this total χ^2_{LR} of C, we see that in this case it falls by 22 per cent when we take into account provision and certain aspects of allocation to school classes, and by a further 22 per cent when we take into account the extent to which pupils meet or fail to meet qualifying criteria. The residual is 56 per cent or a χ^2_{LR} of 30.31, which is associated with class specific patterns of subject

¹⁰The additive model P + Q + C was the most complex fitted to any of these data, i.e., we made no use of interaction terms. The additive model in all cases fitted the data.

choice. Thus, of provision, allocation and choice, social class differences in take-up seem to be predominantly due to pupils' own choices.¹¹

We carried out these analyses for all our subjects except Biology and Home Economics, which we took to have no qualifying criteria, and TD among girls, where rates of take-up are too low to permit analysis. In several cases in Table 2.11 it can be seen that allowing for certain effects actually magnifies the impact of class on take-up, and provision and qualification work against one another. So, for example, if we took into account only provision differences in the case of girls' Higher Maths, we would find that class effects on take-up actually exceeded the raw effect of class. However, when we allow for qualification

Table 2.11: *Percentage change in χ^2_{LR} associated with class effects on take-up rates controlling for provision and allocation (P) and qualification (Q)*

| | <i>Higher Maths</i> | | <i>Physics</i> | |
|-----------------------------------|---------------------|-----------------|----------------|-------------------|
| | <i>B</i> | <i>G</i> | <i>B</i> | <i>G</i> |
| Total χ^2_{LR} of C | 54.2 | 10.3 | 28.2 | 16.5 |
| % age change due to P | -22 | +11 | -75 | -79.6 |
| % age change due to Q | -22 | -78 | +4 | +11.0 |
| % age remaining (choice) | 56 | 33 ⁺ | 29 | 31.3 ⁺ |
| | <i>Chemistry</i> | | <i>French</i> | |
| | <i>B</i> | <i>G</i> | <i>B</i> | <i>G</i> |
| Total χ^2_{LR} of C | 33.0 | 60.1 | 65.9 | 251.47 |
| % age change due to P | -85 | -34 | -5 | +186 |
| % age change due to Q | -3 | +b | +3 | -196 |
| % age remaining (choice) | 12 ⁺ | 75 | 98 | 90 |
| | | | <i>TD</i> | |
| | | | <i>B</i> | |
| Total χ^2_{LR} of C | | | 131.7 | |
| % age change due to P | | | -71 | |
| % age change due to Q | | | -7 | |
| % age remaining (choice) | | | 22 | |
| Total χ^2_{LR} of C has 3 df | | | | |

+ indicates non-statistically significant effect, i.e., C controlling for P+Q is not significant.

¹¹This is not the same undertaking as trying to explain how much of the variance in take-up is due to the factors P, Q and C. Here we are asking how much of the effect of C on take-up is mediated via P and Q and how much is independent of them.

differences, the class effect declines substantially and, indeed, the true rate of subject take-up shows no significant social class differences. The latter is true of girls' Physics and boys' Chemistry. In other words, once we allow for provision and qualification, there is no evidence of a class specific pattern of subject choice.

The results shown in Table 2.11 indicate that overall class differences in take-up in many cases owe very little to pupils' own subject choice and much more to provision differences. The exceptions to this are Higher Maths among boys, Chemistry among girls, and French among both sexes. Elsewhere provision differences appear to be of prime importance in determining class differences in take-up, except among girls' Higher Maths where qualification effects are of most importance.

Overall, then, we cannot point to any very clear pattern operating across subjects and sexes. In some cases class differences in rates of subject take-up can be traced back to provision and allocation (including the ability to meet school qualifying criteria) whereas in other cases pupils' own patterns of choice give rise to these social class differences.

Availability of Subject Groups

The class and sex differences that were evident in our analyses of the availability of individual subjects are equally clear when we turn to subject groups (defined as in Table 2.1), as Table 2.12 shows. For each subject group, the occupational group differences in its provision are statistically significant. In this case we have measured provision as the number of subjects in each area taught by schools. So, on average, male Leaving Certificate candidates of semi-skilled or unskilled manual origins are in schools which have 3.2 science subjects on the curriculum, 1.8 commerce subjects, 1.6 technical subjects and 1.1 modern languages.¹²

The relationship between this measure and occupational group background is very clear for most subject groups, especially among males, where provision of the sciences, commerce and language subjects is positively related to origins (declining as we move to working class origins) while that of the technical subjects is markedly skewed in favour of working class pupils. Among females, occupational group differences are less pronounced and less clear. For the modern languages and sciences the positive relationship with class origins is apparent, but for the commerce subjects, the relationship is not so clearcut.

Since class differences in provision arise because of the distribution of pupils of different class origins over different schools, it is reasonable to ask how far these class differences arise because of the sectoral distribution of pupils accord-

¹²Strictly speaking this table reports levels of provision rather than of availability.

Table 2.12: *Mean number of subjects in four areas taught in schools, according to sex and parental occupation group*

| Occupational Group | Subject areas: | | | |
|--------------------|----------------|----------|-----------|-----------|
| | Science | Commerce | Technical | Languages |
| Males: | | | | |
| 1 | 4.2 | 2.4 | 0.5 | 1.7 |
| 2 | 3.9 | 2.3 | 0.9 | 1.5 |
| 3 | 3.5 | 2.0 | 1.3 | 1.2 |
| 4 | 3.2 | 1.8 | 1.6 | 1.1 |
| Females: | | | | |
| 1 | 3.6 | 1.9 | 0.5 | 1.9 |
| 2 | 3.0 | 2.1 | 0.5 | 1.8 |
| 3 | 3.0 | 2.2 | 0.7 | 1.8 |
| 4 | 2.8 | 2.0 | 0.7 | 1.7 |

All F-tests of differences in provision between occupational groups (within each sex and for each subject area) are statistically significant ($p < .05$).

ing to social class. As we saw in Chapter 1, the sectoral distribution of pupils (i.e., the distribution of pupils in Secondary, Vocational and Community/Comprehensive schools) is not random; previous research has shown, for example, that female pupils are much less likely than males to be found in the vocational sector, while working class male pupils are over-represented there. We might expect, therefore, that the different levels of subject group provision to pupils of different origins would be caused by this distribution of pupils over the sectors. This is particularly plausible when we take into consideration the fact that not only are there important curricular variations in the kinds of subjects taught in schools of the different sectors, but that there are also differences in the average size of schools.¹³ Community/Comprehensive schools tend to be very large, while Vocational schools are, on average, the smallest of all three types. As a result, the curricula of Community/Comprehensive schools are correspondingly large, those of Vocational schools rather smaller, as the final column of Table 2.13 shows.

Table 2.13 reports the mean number of subjects in each area of the curriculum of schools in each sector. For example, although Vocational schools

¹³A very full discussion of curricular differences between Secondary, Vocational and Community/Comprehensive schools, and among Secondary schools themselves as well as a discussion of the relationship between school size and the size of the curriculum is given in Hannan and Breen *et al.*, 1983, Chapter 6.

have the greatest concentration on technical subjects, in the sense that they devote the largest share of their curriculum to these subjects, they actually teach fewer of them, on average, than do Community/Comprehensive schools (which tend to be far larger and to have, as a result, a more extensive curriculum). In the other three areas, Vocational schools teach fewer subjects than either of the other two types. Conversely, Community/Comprehensive schools have the highest average levels of provision in all four areas except for modern languages.

These observations indicate that some, at any rate, of the occupational group differences in subject area provision (shown in Table 2.12) will be accounted for by the distribution of pupils over the three school sectors. This is likely to be especially true for males. Males of manual origins are more likely than those of non-manual origins to be in Vocational schools, and these schools have the lowest levels of provision of science, commerce and languages, but a very high level of provision of technical subjects. This exactly mirrors the occupational group/provision relationships among males shown in Table 2.12.

One way of determining whether or not the occupational group differences in provision derive from the occupational group distribution of pupils over the three sectors is to examine provision within each sector separately, and this is done in Tables 2.14 a and b. Here we see that among boys in the Vocational and Community/Comprehensive sectors, there are no significant differences between occupational groups in the average level of provision in any of our four groups of subjects. Among girls the same is true except that there are significant occupational group differences in the provision of technical subjects in Vocational schools, and of the sciences in Community/Comprehensive schools. Among both sexes, class differences occur in provision in all four subject areas within the Secondary sector.

These results, then, tell us that the overall occupational group differences in average provision levels are attributable to effects operating at two levels. First,

Table 2.13: *Mean number of Leaving Certificate subjects in each area taught according to school type*

| | <i>Subject Areas</i> | | | | <i>All Subjects</i> |
|-----------------------------|----------------------|-----------------|------------------|------------------|---------------------|
| | <i>Science</i> | <i>Commerce</i> | <i>Technical</i> | <i>Languages</i> | |
| Secondary | 3.6 | 2.2 | 0.3 | 1.8 | 11.4 |
| Vocational | 1.9 | 1.3 | 2.6 | 0.9 | 9.6 |
| Community/ Comprehensive | 4.1 | 2.3 | 3.0 | 1.5 | 15.3 |

Table 2.14a: Mean number of subjects in four areas taught in schools according to pupil sex and parental occupation group within each school type (boys)

| Occupational Group | Sciences | | | Technical | | |
|------------------------|----------|------|------|------------------|------|------|
| | S | V | C | S | V | C |
| 1. | 4.39 | 1.65 | 4.18 | 0.21 | 2.48 | 3.00 |
| 2. | 4.18 | 2.23 | 3.98 | 0.46 | 2.77 | 3.00 |
| 3. | 3.94 | 2.06 | 4.08 | 0.60 | 2.70 | 3.00 |
| 4. | 3.81 | 1.89 | 3.88 | 0.69 | 2.62 | 3.00 |
| Significance of F-test | <.05 | n.s. | n.s. | <.05 | n.s. | n.s. |
| | Commerce | | | Modern Languages | | |
| | S | V | C | S | V | C |
| 1. | 2.49 | 1.35 | 2.30 | 1.75 | 0.97 | 1.57 |
| 2. | 2.38 | 1.32 | 2.45 | 1.61 | 0.90 | 1.42 |
| 3. | 2.22 | 1.31 | 2.08 | 1.35 | 0.90 | 1.30 |
| 4. | 2.01 | 1.16 | 2.56 | 1.19 | 0.93 | 1.41 |
| F: | <.05 | n.s. | n.s. | <.05 | n.s. | n.s. |

S: Secondary

V: Vocational

C: Community/Comprehensive

n.s.: not significant ($p > .05$)

there are differences in provision between the three school sectors, and because the distribution of pupils over these sectors is not random with respect to occupational group origins, this gives rise to large differences in provision. Second, there are important differences in provision within the Secondary sector, such that those schools catering for a greater proportion of middle class pupils tend, for example, to have better provision of science subjects.

It might, however, be argued that provision levels in areas such as the sciences will respond to the measured performance of pupils. In other words, schools with very high average levels of exam performance may well choose to teach a lot of science subjects which are generally presumed to be difficult. At the level of the individual pupil, however, this does not appear to be true, since the correlation between the number of subjects in each subject area taught in a pupil's school and the individual pupil's Intermediate Certificate performance

Table 2.14b: *Mean number of subjects in four areas taught in schools according to pupil sex and parental occupation group within each school type (girls)*

| Occupational Group | Sciences | | | Technical | | |
|------------------------|----------|------|------|------------------|------|------|
| | S | V | C | S | V | C |
| 1. | 3.61 | 1.76 | 4.33 | 0.17 | 2.48 | 3.00 |
| 2. | 3.06 | 1.48 | 4.14 | 0.18 | 2.55 | 3.00 |
| 3. | 3.00 | 1.79 | 4.14 | 0.27 | 2.58 | 3.00 |
| 4. | 2.83 | 1.87 | 3.82 | 0.13 | 2.66 | 3.00 |
| Significance of F-test | <.05 | n.s. | <.05 | <.05 | <.05 | n.s. |
| | Commerce | | | Modern Languages | | |
| | S | V | C | S | V | C |
| 1. | 1.91 | 1.36 | 2.11 | 1.96 | 0.96 | 1.71 |
| 2. | 2.18 | 1.45 | 2.28 | 1.85 | 0.93 | 1.68 |
| 3. | 2.25 | 1.35 | 2.24 | 1.91 | 0.98 | 1.64 |
| 4. | 2.06 | 1.55 | 2.64 | 1.80 | 0.89 | 1.53 |
| F: | <.05 | n.s. | n.s. | <.05 | n.s. | n.s. |

S: Secondary

V: Vocational

C: Community/Comprehensive

n.s.: not significant ($p > .05$)

(measured as a grade point average score) is actually weaker than that between provision and the pupils' occupational background (as measured on the eight point Hall-Jones scale). Put another way, if we wanted to predict how many senior cycle subjects of any type were provided in the school attended by a pupil, we would find that basing our prediction on knowledge of the pupil's occupational group origins would lead to a more accurate result than would knowledge of his or her Inter Cert performance.

Subject Availability and Subject Take-up

Table 2.15 shows the average number of science, commerce, technical and

language subjects taken at the Leaving Certificate by pupils of each social class category. Among boys the sciences, commerce and modern language subjects are "middle class" subjects in so far as pupils of social classes 1 and 2 take more of these than do pupils of classes 3 and 4 and the same is true of the sciences and languages among girls. Working class pupils are more likely than middle class to take the technical subjects (boys) and commerce subjects (girls). These take-up differences parallel the differences shown in Table 2.12, suggesting that differences in take-up will be strongly related to differences in subject availability.

We now turn to the question of the relationship between the number of subjects in a specific area on the school's curriculum and the number of subjects in that area taken by each pupil. Naturally the former provides an upper bound for the latter, but our real interest lies in whether, when we allow for this, there are still occupational group differences in take-up. Clearly, however, factors other than curricular provision and occupational group will be important in determining, say, the number of commerce subjects a pupil takes. As we noted earlier, among those pupils to whom a subject is formally available, schools will generally draw distinctions by which to determine who will be given the option of choosing it. For example, it is most unlikely that a pupil who had not at least passed Intermediate Certificate Science would be allowed to sit for Leaving Certificate Physics. In some cases, schools require that a pupil has reached a particular level of performance in the Inter Cert before he or she will be allowed to take a specific Leaving Certificate subject (Hannan and Breen, *et al.*, 1983, p. 122).

Since we do not have measures of whether or not pupils met such qualifying criteria for all or any of the subjects in a subject group, we have used as a proxy measure the number of subjects passed in the equivalent group at the Inter Cert, under the assumption that the more relevant subjects a pupil has passed at this exam the more subjects will be open to her or him (allowing for differences in school provision levels) in the senior cycle. While this measure is approximate, we believe it is more valid than alternatives such as Inter Cert Grade Point Average which focus less clearly on any particular subject areas.

Table 2.16 shows, for each subject group, the simple bivariate correlation between the eight level Hall-Jones scale variable SOCLASS and the number of subjects in each area taken. It also shows the partial correlation between these two once we control for school provision levels in each area and for the number of subjects passed by the pupil in the equivalent area at Inter Cert. We show the significance level of this partial correlation and the associated standardised partial regression coefficient of SOCLASS on the number of subjects taken, controlling for the other two variables. These data are given separately for males and females.

Table 2.15: *Mean number of subjects in four areas taken according to sex and occupational background*

| Occupational Group | Subject areas | | | |
|--------------------|---------------|----------|-----------|-----------|
| | Science | Commerce | Technical | Languages |
| Males: | | | | |
| 1 | 1.3 | 0.8 | 0.1 | 0.7 |
| 2 | 1.1 | 0.8 | 0.3 | 0.6 |
| 3 | 1.1 | 0.6 | 0.6 | 0.5 |
| 4 | 0.9 | 0.5 | 0.9 | 0.3 |
| Females: | | | | |
| 1 | 1.0 | 0.5 | — | 0.9 |
| 2 | 0.8 | 0.6 | — | 0.8 |
| 3 | 0.7 | 0.8 | — | 0.7 |
| 4 | 0.7 | 0.9 | — | 0.6 |

All F-tests of differences in mean take-up between occupational groups (within each sex and for each subject group) are statistically significant ($p \leq .05$). Take-up of technical subjects by females is too small to permit analysis.

Table 2.16 shows that among boys there are no social class differences in take-up in any area once we allow for provision differences and previous performance in the relevant area. In other words, while the bivariate correlation is significant, the partial correlation shrinks to insignificance. Among girls social class differences in take-up persist even when we control for provision and previous performance, though the effect of SOCLASS on female take-up is, in all cases, quite small (standardised coefficients are $-.07$ for the sciences; $.10$ for commerce subjects; and $-.05$ for modern languages).¹⁴ Overall, we appear to be on safe ground when we conclude that, once provision differences and other constraints on take-up are allowed for, occupational group differences in take-up (as measured in this way) become either small or disappear entirely. This is equivalent to saying that occupational group differences in take-up in these subject areas (as shown in Table 2.15) come about largely because of different levels of subject provision afforded to pupils of different origins, and because of

¹⁴The dependent variables in the regressions reported in Table 2.16 are unlikely to be normally distributed, given that they are counts of subjects (with a maximum value of five) and are restricted to integer values. Although coefficients reported in Table 2.16 are based on untransformed measures of the dependent variable, significance tests are based on variables transformed under the plausible assumption that their distribution is binomial. The appropriate transformation of y to give y^* is (Draper and Smith, 1981, p. 238):

$$y^* = \text{Sin}^{-1}(y^{1/2})$$

For analysis using SPSS (which lacks an arcsine function) this can be expressed as

$$y^* = \text{Tan}^{-1}(y^{1/2}/1 - y)$$

Table 2.16: *Correlations, partial correlations and associated significance levels and standardised partial regression coefficients of SOCLASS on the number of subjects taken by pupils in each subject area*

| <i>Subject Group</i> | <i>Simple Correlation</i> | <i>Partial Correlation*</i> | <i>Significance</i> | <i>Standardised Partial Regression Coefficient*</i> |
|----------------------|---------------------------|-----------------------------|---------------------|---|
| <i>Females</i> | | | | |
| Sciences | -.19 | -.08 | <.05 | -.07 |
| Technical | — | — | — | — |
| Commerce | .20 | .11 | <.05 | .10 |
| Languages | -.18 | -.07 | <.05 | -.05 |
| <i>Males</i> | | | | |
| Sciences | -.14 | -.03 | n.s. | -.03 |
| Technical | .29 | .01 | n.s. | .01 |
| Commerce | -.10 | -.02 | n.s. | -.02 |
| Languages | -.21 | -.09 | n.s. | -.07 |

n.s.: not significant ($p > .05$)

* controlling for (i) number of subjects in relevant area taught in school, and (ii) number of subjects in equivalent area passed at Inter Cert.

differences in the degree to which pupils meet the academic criteria laid down by schools for those who wish to take these particular subjects.

We can, however, be somewhat more precise about the effects of provision and allocation by seeking to measure the extent to which the observed social class differences in subject group take-up diminish, as we take into account, first, subject provision and, second, the degree to which pupils meet school academic criteria. This is done in Table 2.17. Here we define the total social class differences in subject group take-up by the sum of squares associated with the regression of the number of subjects in the group taken, on SOCLASS. We term this the raw sum of squares (Raw SS). The proportion of this difference accounted for by provision factors is given by:

$$\frac{\text{Raw SS} - \text{SOCLASS Sum of Squares controlling for Provision}}{\text{Raw SS}} \quad (\text{A})$$

That is, the differences between the Raw SS and the sum of squares associated with SOCLASS if it is entered into the regression *after* the measure of provision,

divided by the Raw LSS, is our measure of the contribution of provision factors, in so far as (A) tells us how much less variance is explained by SOCLASS if we control for provision than if we do not. This is labelled (i) in Table 2.17. The proportion of the class difference accounted for by provision and performance in the relevant area at Inter Cert is given as:

$$\frac{\text{Raw SS} - \text{SOCLASS SS controlling for Provision and relevant Inter Cert Performance}}{\text{Raw SS}} \quad (\text{B})$$

which is directly analogous to (A). Since (B) measures the effects of both provision and performance, the incremental effect of the latter alone is given by (B) — (A), and this is labelled (ii) in Table 2.17. Finally the effect of pupils' own choices is given as the residual remaining when we have taken (i) and (ii) into account. In other words, this is the percentage of the social class difference that cannot be accounted for in terms of either provision or previous performance and must therefore be assumed to be due to pupil choice.

The results, shown in Table 2.17, are quite clear. The only cases in which choice plays a significant part are in girls' science, language and commerce take-up. This is as we might have expected, given that it is only in these three that the partial correlation between SOCLASS and take-up, shown in Table 2.16, reached statistical significance. Among boys, provision levels can be seen to be the crucial factor in shaping social class differences in the take-up of subject groups: only in the cases of science and languages do performance effects (which we are here equating with success in meeting school qualifying criteria) play any part.

Among girls the situation is quite different. Here provision is much less important in determining class differences in take-up, and a more major role is assigned to choice and, particularly, performance at Inter Cert. This gender difference is probably attributable to the fact that girls are, in general, given greater freedom of subject choice than boys (Hannan and Breen, *et al.*, 1983, p. 191) and also that girls tend, on average, to take fewer science and commerce subjects than boys (see Table 2.15), suggesting perhaps that provision levels are more likely to limit boys' ambitions in these areas than they are girls'.

Summary

In this chapter we have shown that the take-up of individual subjects (Table 2.2) and of subjects within a specified subject group (Table 2.13) varies markedly according to the social class origins of pupils, as well as to their sex. As a result, a working class candidate for the Leaving Certificate will, on average, be sitting the exam in a somewhat different mix of individual subjects

Table 2.17: *Percentage of social class difference in mean number of subjects taken in each curricular area attributable to the effects of (i) provision; (ii) performance in relevant Inter Cert area; and (iii) pupil choice*

| | <i>Subject Area</i> | | | |
|--------------------------|---------------------|------------------|------------------|-----------------|
| | <i>Science</i> | <i>Technical</i> | <i>Languages</i> | <i>Commerce</i> |
| <i>Boys</i> | | | | |
| (i) Provision effects | 72 | 95 | 56 | 100 |
| (ii) Performance effects | 20 | 5 | 44 | — |
| (iii) Choice | — | — | — | — |
| <i>Girls</i> | | | | |
| (i) Provision effects | 44 | — | 20 | 7 |
| (ii) Performance effects | 37 | — | 65 | 64 |
| (iii) Choice | 19 | — | 15 | 29 |

than will the average middle class candidate. And if these two candidates are of different sexes, the differences will be even greater.

The bulk of the analysis of the present chapter concentrated on accounting for these class differences in take-up. In the case of our analysis of individual subjects we found that as well as class differences in take-up rates, there also exist differences in the degree to which subjects are made available to pupils of the various class backgrounds. Most of this variation in availability is due to two factors: to provision differences — i.e., to differences in the curricula of schools — and to differences in the degree to which pupils meet schools' academic criteria for subjects. To give an example: of male senior cycle pupils of semi-skilled or unskilled manual backgrounds, only 54 per cent are in schools which teach Physics as against 87 per cent of males of professional and managerial backgrounds. This naturally leads us to suppose that class differences in take-up may owe a lot to class differences in subject availability. In addition, however, we find that (in Table 2.10) of those pupils in classes to which Higher Maths is available 38 per cent of male pupils of semi- and/or unskilled manual backgrounds meet the school's academic requirements for taking the subject as against 57 per cent of males of professional and managerial origins. Thus, we should anticipate that class differences in take-up will owe a good deal to this qualification factor (which is an aspect of school allocation practices).

Our analysis of the effect of these factors on class differences in take-up is found in Table 2.11. There we showed that there was no single pattern of effects to explain the observed differences in take-up. In French, Higher Maths (boys only) and Chemistry (girls only) pupils' own choices were crucial: clear differences in the take-up of these subjects arise mainly because of class specific patterns of choice. On the other hand in Physics, Chemistry and TD among boys and Higher Maths among girls patterns of choice play little or no part in making up class specific rates of take-up. Instead, provision factors (and qualification factors in girls' Higher Maths) are crucial.

When we turned to the relationship between the take-up and the availability of groups of subjects, we sought to do two things: as with the individual subject analysis we investigated the relationship between take-up and availability, but in addition we tried to shed some light on how social class differences in subject group availability arise. These availability differences are in some cases quite marked: for example, as Table 2.12 shows, male pupils of professional and managerial backgrounds are, on average, in schools teaching 4.2 senior cycle science subjects while males of semi-skilled or unskilled manual origins are in schools teaching 3.2 sciences.¹⁵

Such class differences in subject availability arise for two main reasons. First, the distribution of pupils over the Secondary/Vocational/Community and Comprehensive sectors is strongly related to sex and class origins: as a result the curricular characteristics of these different school types become, to some extent, the curricular characteristics of social classes. For example, because working class boys are more likely than any others to enter Vocational schools, so the mix of senior cycle subjects available to them depends very heavily (though not exclusively) on the nature of the curriculum in Vocational schools. But, second, among those pupils in the Secondary sector, similar social class differences in subject availability persist. To give a single example of the latter: within the Secondary sector, male pupils of semi-skilled or unskilled manual origins are, on average, in schools teaching 3.8 Science subjects, while males of upper non-manual origins are, on average, in schools teaching 4.4 Science subjects (see Table 2.14a). In concrete terms these findings indicate that Secondary schools whose senior cycle pupils are drawn from the middle classes tend to have different curricula (more Science, and Languages, fewer Technical subjects) than do Secondary schools which have a larger proportion of working class pupils. One reason for such distinctions within the Secondary sector may be the

¹⁵We may also note at this point that the total number of subjects taught in a pupil's school shows slight, but significant, variation according to the pupil's occupational group origins. Thus, pupils of upper non-manual origins are in schools teaching most senior cycle subjects (11.8 on average) while pupils of semi-skilled or unskilled manual backgrounds are in schools with, on average, the lowest overall provision of subjects (11.0).

existence of private, fee-charging Secondary schools whose pupils are predominantly drawn from the middle class and whose curricula are strong in Science, Commerce and Languages but weak in Technical subjects.

In examining the relationship between subject availability and subject take-up we found that, although there are clear class differences among both sexes in the average number of subjects taken in each subject group, these differences are attributable to variations in the level of subject availability and to differences in performance in relevant areas of the Intermediate Certificate exam. When we allow for these two factors, class differences in the number of subjects of a particular type taken all but disappear. This suggests that much of the observed class difference in subject take-up must be attributed to differences both in subject provision and in the ways in which schools make subjects available to pupils (for example, the level of previous performance they require before they will allow a pupil to take a particular Leaving Certificate subject) and the ability of pupils of different social class origins to meet these requirements. At this level (i.e., the level of groups of subjects) pupil choice explains little of the variance between social classes.

Conclusion

As well as quantitative differences in Leaving Certificate performance – in the sense of differences in the overall level of performance (to be discussed in Chapter 3) – there are also qualitative differences between candidates in the mix of subjects they present for examination in the Leaving Certificate. In the course of this chapter we have sought to show how social class origins are systematically related to the set of subjects that pupils study in the senior cycle and thus sit for in the Leaving Certificate. We showed that both in the probability of taking individual subjects and in the mean number of subjects of a particular subject group that pupils take, class differences were evident and in some cases marked. The bulk of our analyses sought to account for these differences.

In conclusion, it is difficult to avoid the impression that patterns of subject take-up illustrate the process of the reproduction of class and gender relationships in a striking manner. Put bluntly, Tables 2.2 and 2.15 show that working class subjects are taken by working class pupils, in the sense that subjects which are orientated towards manual work (TD and probably also Engineering Workshop and Building Construction) are almost exclusively taken by male working class pupils. Similarly, Home Economics, which is linked to the female/homemaker role, is taken mainly by female working class pupils. Likewise commerce subjects are also most likely to be taken by female working class, rather than middle class, pupils. Conversely, subjects associated with third-level entry and with professional and technical jobs – notably the sciences

and languages – are much more likely to be taken by pupils from middle class backgrounds.

It is, of course, naïve to imagine that this pattern of subject take-up is, in some sense, imposed by the educational system acting as an agent for the reproduction of class and gender relationships. As we have seen, the pattern in fact arises through the interplay of a variety of factors. More broadly, the reproduction of class and gender relationships in society operates to a great extent through the ostensibly free choices that individuals make (e.g., whether to stay at school or leave) operating within sets of externally imposed limitations that may be more or less constraining. For example, parental “choice” of school type, in the present example, has very clear implications for the kind and range of subjects that will be available to pupils (see Table 2.13) and, by and large, working class parents tend to choose those schools (namely Vocational schools) which are most likely to teach the “working class subjects” to which we have referred. Likewise, much of the class difference in individual subject take-up is due to pupil choice and pupils’ previous academic performance, and again, working class pupils generally choose subjects like TD in preference to, say, Physics or French. The remainder of the class difference in take-up is due to curricular variation associated, to a great extent, with choice of school. Within the Secondary sector; decisions about curricular provision are largely the preserve of individual school managers/principals or of the religious order owning the school, while the Vocational and Community/Comprehensive sectors each have a characteristic curriculum reflecting more centrally established objectives of Vocational and Community/Comprehensive education (Hannan and Breen, *et al.*, 1983, p. 196). In all these cases, however, we may assume that curricular provision is at least partly determined on the basis of the kinds of pupil the school attracts and beliefs about their likely post-school destinations.

Chapter 3

SENIOR CYCLE PERFORMANCE

In Chapter 2 we looked at the availability and take-up of senior cycle subjects, and we noted that differences between pupils in these areas give rise to qualitative differences in the kind of senior cycle education they receive and to variations in the type of Leaving Certificate qualification they obtain. In this chapter we move to quantitative differences: our intention is to look at senior cycle performance and, in particular, the extent to which this is influenced by pupil sex, social class background, and the type of school the pupil attends.

An interest in examination performance needs no justification when one considers how much importance is attached to exam performance in securing access to third-level education and in the labour market. However, as we pointed out in Chapter 1, the focus of our analyses is not the Leaving Certificate *per se* but, rather, senior cycle performance, which we define as the change in a pupil's performance between the Intermediate and Leaving Certificate. We chose this as our measure of performance for several reasons, which will become clear in the course of this chapter. One important reason, however, is that, in order to assess the impact of various factors on performance, it is necessary to set one's outcome measure against an initial baseline. Without such a yardstick we will be unable to say anything useful about, for example, how schools influence pupils' examination performance, since, unless we know how the pupils in schools differ from each other before schools start to influence them, we cannot assess how much of the final difference in pupil performance is due to school effects and how much to differences that pre-date any school effects. A focus on senior cycle schooling, however, provides us with the necessary "before" and "after" measures. We can compare the exam performance of pupils entering senior cycle (i.e., their Inter Cert results) with their performance at its completion (i.e., Leaving Certificate results) and thereby determine how far factors such as school type are responsible for the change in performance. Conversely, if we sought to examine factors influencing Leaving Certificate performance itself, then we would face difficulties because of our lack of any measure of pupil performance on entry to post-primary school. Lacking such a measure it would be difficult to attribute responsibility for variations in Leaving Certificate performance to effects operating after entry to post-primary education, rather

than before. By concentrating on senior cycle performance we avoid these difficulties. Any effects we identify will be effects on *senior cycle performance*: school effectiveness in that context will be *senior cycle school effectiveness*.

The present chapter is made up of four major sections. The first looks at some aspects of Leaving Certificate performance and discusses one measure of senior cycle performance. The second section looks at social class effects on senior cycle performance and the third addresses the issue of senior cycle school type effectiveness. The final section presents a summary and conclusion.

ASPECTS OF LEAVING CERTIFICATE AND SENIOR CYCLE PERFORMANCE

Leaving Certificate Performance

In our analyses we use a measure of overall Leaving Certificate Grade Point Average (LCGPA), arrived at by taking the mean performance per subject according to the scoring system shown in Table 3.1.¹⁶ We use the same system to arrive at a comparable Intermediate Certificate Grade Point Average (IGPA). While, ideally, one might wish to look at performance in individual subjects, that would not be feasible in a study such as this. Nevertheless, we hope subsequently to publish further analyses of senior cycle performance in various subject areas, possibly defined in the same way as in Table 2.1. At present, however, our concern is with the overall average level of a pupil's performance, which, we would argue, is the most important measure of her or his performance.

The mean LCGPA and IGPA scores for boys and girls are given in Table 3.2, together with their standard deviations.¹⁷ On average, boys perform better than girls at both these exams, and it appears that the mean difference between the sexes is roughly the same at both Inter and Leaving Certificate. However, the standard deviations of the scores increase over the senior cycle, especially among boys. Thus, for both sexes the Leaving Certificate discriminates more finely among senior cycle pupils than does the Intermediate Certificate. This is as we should expect, given that we are dealing with only that sub-sample of all Inter Cert candidates who went on to take the Leaving Certificate. Among this sub-sample the variation in performance will be less than in a representative

¹⁶The scoring method adopted here is the UCD points system plus five. In fact the choice of any one scoring system from the several available (e.g., those used by Universities, Colleges of Education, and so on) has little import. Examining four possible indices, Greaney and Kellaghan (1984, p.174) show that they are very highly intercorrelated and they conclude that "from the point of view of explaining differences in student performance . . . no one index was likely to be very different from any of the remaining three".

¹⁷In discussing Intermediate Certificate performance we are referring, of course, to performance only among those Inter Cert candidates who remained at school to sit for the Leaving Certificate. Thus we are not making any reference to Inter Cert performance in a general sense, since our sample of candidates is not representative of any year's set of Inter Cert candidates.

Table 3.1: Allocation of points to subject grades

| Grade | Common Level | Subject Level Mathematics | | All other subjects | |
|-------|--------------|------------------------------|--------|--------------------|--------|
| | | Ordinary | Higher | Ordinary | Higher |
| A | 7 | 6 | 11 | 6 | 9 |
| B | 6 | 5 | 9 | 5 | 8 |
| C | 5 | 4 | 8 | 4 | 7 |
| D | 4 | 4 | 6 | 4 | 6 |
| E | 2 | 2 | 3 | 2 | 3 |
| F | 1 | 1 | 2 | 1 | 2 |
| Other | 0 | 0 | 0 | 0 | 0 |

Table 3.2: Mean Performance at Intermediate and Leaving Certificate according to grade point average, boys and girls

| | Intermediate | | Leaving | |
|-------|--------------|--------------------|---------|--------------------|
| | Mean | Standard Deviation | Mean | Standard Deviation |
| Boys | 4.62 | 1.10 | 4.93 | 1.46 |
| Girls | 4.38 | 1.05 | 4.67 | 1.22 |

sample of Inter Cert candidates, given that the poorer performers will have been removed by virtue of their not remaining at school to sit for the Leaving Certificate.¹⁸ Furthermore, we would also expect the Leaving Certificate to discriminate more finely because of the greater availability of Ordinary and Higher level distinctions within subjects.

The greater standard deviation of LCGPA among boys shows also that while boys' average score may be higher than girls', boys are more widely distributed over the range of LCGPA scores. Girls are more closely clustered round their mean score whereas boys show somewhat more variability in Leaving Certificate performance.

As well as looking at performance measured in this way, we can also look at

¹⁸Technically, our Intermediate Certificate sample is truncated.

a simpler index, namely the number of passes obtained in the Leaving Certificate. We count as a pass any subject for which the pupil obtained a grade D or better on a Common, Higher or Ordinary level paper. In fact this is a relatively insensitive measure of differences in performance according to factors such as sex, occupational group and school type, as Tables 3.3 and 3.4 show. In all cases the median number of passes is 5 to 6, with over 80 per cent of candidates falling within the 5 to 8 range. On the other hand, this measure does give some idea of the range of performance: less than 1 per cent of candidates fail all papers, and less than 1 per cent obtain more than 8 passes. Because of the insensitivity of this measure we use only grade point average scores in the remainder of our analyses.

Intermediate and Leaving Certificate Performance

In this report we have argued that the difference or change between Intermediate and Leaving Certificate performance is a measure of the aggregate effects of senior cycle schooling¹⁹ as this is reflected by public examinations. In other words the strength of the relationship between Intermediate and Leaving Certificate performance will tell us how much of an effect senior cycle schooling has. For example, if Intermediate and Leaving Certificate performance were perfectly correlated, then the latter could be predicted exactly from the former, and in the strict sense of the word, the latter would be redundant. Although pupils might, under such circumstances, be increasing their stock of knowledge and abilities over the period spent in the senior cycle, all those decisions based in large part or in whole on aggregate Leaving Certificate performance – such as who gets into third-level education, and who gets what sort of job – could equally well be based on Intermediate Certificate performance.

Of course the relationship between the two exams is not as strong as this, nor should we wish it to be. For example, it is probably desirable that there should be scope for changes in the relative positions of pupils between these two exams, so that those who do poorly in the Intermediate Certificate have the possibility of improving their relative performance in the Leaving, and equally, that a good performance in the former should not guarantee a good performance in the latter. On the other hand, it would give cause for concern if performance in the Leaving and Intermediate exams were wholly independent and unrelated. It might suggest that one or both of the two exams was not very reliable, in the sense that it was not measuring what it was intended to, or that the two exams were measuring different things and not really tapping the same sets of pupil abilities and attributes.

¹⁹Aggregate in that we are looking at overall performance. It follows that while at an aggregate level, for example, Intermediate and Leaving Certificate performance may be strongly related, there may be weaker relationships among individual subjects at the two exams (as, for example, the ICE report (1975, pp. 25-27) suggested).

Table 3.3: *Percentage frequency distribution of number of LC passes according to pupil sex*

| <i>Number of Passes:</i> | <i>All</i> | <i>Males</i> | <i>Females</i> |
|--------------------------|------------|--------------|----------------|
| 0 | 0.6 | 0.8 | 0.4 |
| 1—2 | 4.0 | 3.8 | 4.0 |
| 3—4 | 13.8 | 14.8 | 12.9 |
| 5—6 | 39.4 | 39.3 | 39.4 |
| 7—8 | 41.5 | 40.3 | 42.7 |
| >8 | 0.6 | 0.9 | 0.5 |
| N | 3,680 | 1,715 | 1,965 |

Table 3.4: *Percentage frequency distribution of LC passes according to school type and according to occupational group*

| <i>Number of Passes:</i> | <i>School Type</i> | | | <i>Occupational group</i> | | | |
|--------------------------|--------------------|------------|------------------|---------------------------|----------|----------|----------|
| | <i>Sec</i> | <i>Voc</i> | <i>C & C</i> | <i>1</i> | <i>2</i> | <i>3</i> | <i>4</i> |
| 0 | 0.5 | 1.1 | 0.9 | 0.5 | 0.8 | 0.6 | 0.2 |
| 1—2 | 3.4 | 6.9 | 6.3 | 2.1 | 4.0 | 4.6 | 6.7 |
| 3—4 | 12.8 | 19.0 | 18.3 | 12.6 | 12.7 | 15.2 | 15.6 |
| 5—6 | 39.8 | 40.0 | 32.9 | 37.3 | 39.0 | 42.7 | 38.0 |
| 7—8 | 42.9 | 31.2 | 41.6 | 46.7 | 42.5 | 36.4 | 38.5 |
| >8 | 0.5 | 1.9 | 0.0 | 0.7 | 0.7 | 0.4 | 1.0 |
| | 3,031 | 378 | 271 | 1,095 | 1,291 | 781 | 418 |

Occupational groups in this and following tables are:

- 1: Higher non-manual;
- 2: Lower non-manual
- 3: Skilled manual
- 4: Semi or unskilled manual

Table 3.5: *Correlation matrix; exam performance and class, sex and school type*

| | LCGPA | IGPA | SOCLASS | SEC | VOC | SEX |
|---------|-------|------|---------|-------|-------|-------|
| LCGPA | 1 | .773 | -.214 | .182 | -.194 | -.092 |
| IGPA | | 1 | -.178 | .142 | -.150 | -.097 |
| SOCLASS | | | 1 | -.141 | .162 | .210 |
| SEC | | | | 1 | -.728 | .086 |
| VOC | | | | | 1 | -.083 |
| SEX | | | | | | 1 |

In fact, as we see in Table 3.5, the correlation between overall Intermediate Certificate (IGPA) and Leaving Certificate (LCGPA) performance is .77. Thus, about 60 per cent of the variance in the latter is accounted for by how well pupils performed at the earlier examination.²⁰

It is important to bear in mind that this refers to overall performance: the relationship between Intermediate and Leaving performance in specific subjects may show more or less variance than this. Furthermore, this correlation also tells us nothing about whether overall levels of performance improve or decline between these two sets of examinations; rather it tells us that a pupil's relative performance at one examination is strongly related to her or his relative performance at the other.

Pupils who do relatively poorly at the Intermediate Certificate are unlikely to do well at the Leaving Certificate, and vice-versa. This close relationship between the two examinations probably arises because, unsurprisingly, the Intermediate and Leaving Certificate examinations measure the same kind of thing. That is to say, the qualities needed for success in the one are the same as those required in the other. These qualities are probably various: measured "intelligence", short-term memory, the facility to express oneself clearly, for example. What the high correlation between the two examination scores shows is that one pupil's abilities in these areas relative to those of other pupils are not greatly affected by senior cycle schooling.

The high correlation between the two exams arises not because of a causal relationship between them (i.e., a good Inter Cert performance does not *cause* a good Leaving Cert performance), but rather because the same factors influ-

²⁰Greaney and Kellaghan (1984, p. 177) report a slightly higher correlation between Inter and Leaving Certificate performance of .82.

ence performance in both. This relationship is shown diagrammatically in Figure 3.1. The same variables (labelled X) influence performance at both exams in a similar way, but there is no direct effect of Inter Cert on Leaving Cert performance. In the terms of causal analysis, the IGPA/LCGPA correlation is "spurious", arising out of "shared prior causes".

Figure 3.1: *Relationship between performance at the Intermediate and Leaving Certificate*

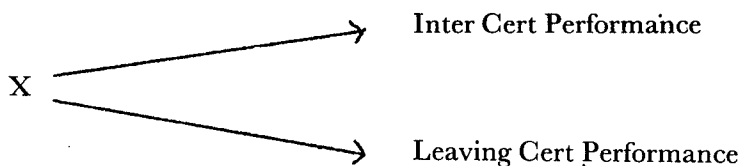


Table 3.5 also shows the intercorrelations between measures of our independent variables and exam performance. Here, SOCLASS is the 8 point Hall-Jones scale discussed in Chapter 1, which runs from 1 = higher professional, managerial, to 8 = unskilled labourer; thus a higher score corresponds to a "lower" class origin. SEC and VOC are dummy variables, SEC distinguishing pupils at Secondary schools from those at Vocational or Community/Comprehensive schools, VOC distinguishing pupils at Vocational schools from those at Secondary or Community/Comprehensive schools. Finally SEX is a dummy variable scoring 1 for girls and 0 for boys. Three things are worth noting about Table 3.5.

(i) our independent variables – SOCLASS, SEC, VOC and SEX, are themselves highly intercorrelated. SOCLASS correlates positively with VOC, negatively with SEC, showing the greater preponderance of working class pupils in Vocational schools. SOCLASS and SEX are positively correlated, reflecting the fact that working class girls are more likely than working class boys to remain at school into the senior cycle. SEX and VOC are negatively correlated because of the greater likelihood of girls being found in Secondary rather than Vocational schools;

(ii) these independent variables all enjoy a statistically significant relationship with IGPA and LCGPA. These results present *prima facie* evidence of the existence of gender, class and school type effects on educational performance within the senior cycle. Such a finding supports the re-analysis of Greaney and Kellaghan's (1984) data by Whelan and Whelan (1984) who found that pupils' socio-economic group origins had a considerable influence on educational attainment in the post-primary sector, even when ability differences on entry to

the post-primary sector were taken into account (Whelan and Whelan, 1984, p. 172). This redresses the balance somewhat over previous studies – such as that of Greaney and Kellaghan (1984) – which have tended to direct attention to those class effects that take place before the age of 11 or 12. As Whelan and Whelan (1984, p. 172) point out:

Failure to emphasise the importance of such departures from meritocratic principles at . . . (the post-primary) . . . level encourages the notion that our post-primary educational institutions have a very limited potential to contribute to the reduction of class differentials. This would, we believe, be quite erroneous. (Parentheses added).

(iii) the correlations between SOCLASS, SEX, SEC and VOC on the one hand, and the two measures of exam performance, IGPA and LCGPA, on the other, are quite similar. This is particularly true of SEX, where the correlations are almost identical ($-.092$ and $-.097$). Among the other three variables, their effects appear rather stronger at the Leaving than at the Intermediate Certificate. However, the overall similarity of these correlations suggests that the effects of class origins, school type and gender are three elements common to both Inter and Leaving Certificate performance.

Predicting Leaving Certificate Performance

It is clear that, given knowledge of a pupil's Inter Cert performance we could predict her or his Leaving Certificate performance reasonably well: given in addition measures of SOCLASS, school type and sex, we would probably improve this predictive power somewhat (though, of course, the partial effects of SOCLASS, SEX, VOC and SEC, controlling for IGPA will probably be much less than their bivariate effects because of their strong correlation with IGPA). A predictive equation for boys and girls using these variables is shown in Table 3.6.

These regression results are as we might have anticipated. IGPA is a very strong predictor of LCGPA, and there are also significant effects associated with class origins (identical among both sexes, showing middle class pupils to perform better than working class even when IGPA and the other variables are taken into account) and school type. Among boys, the non-significant coefficient associated with Vocational schools taken together with the significant effect for Secondary schools shows that pupils in Secondary schools perform better than those in Vocational or Community/Comprehensive schools, among whom there is nothing to choose. Conversely, among girls, pupils in Vocational schools perform more poorly than those in Secondary or Community/Comprehensive schools, among whom there is, on average, no difference in

Table 3.6: *Regression model predicting Leaving Certificate Performance*

| | <i>Coefficients</i> | |
|----------------|---------------------|----------------|
| | <i>Males</i> | <i>Females</i> |
| IGPA | .98 | .86 |
| SOCLASS | -.04 | -.04 |
| Secondary | .23 | -.02† |
| Vocational | -.11† | -.30 |
| Intercept | .41 | 1.12 |
| R ² | .62 | .60 |
| \bar{R} | .62 | .59 |
| N | 1,620 | 1,858 |

†Not statistically significant at $p \leq .05$

performance once all the other relevant variables are taken into account.

In general, however, SOCLASS and the school type variables add little to this model. Virtually all the predictive power is due to IGPA, and the other effects add only 2 or 3 per cent to the explained variance. For example, in boys' performance, the partial effect of SOCLASS will range from $-.04$ (for Hall-Jones category one) to $-.32$ (for category eight) a difference of .28 points, which is quite small when set against the mean LCGPA for boys of 4.93 and a standard deviation of 1.46. On the other hand, as we pointed out in Chapter 1, we should not expect the effects of class origins to be particularly strong at this stage of pupils' educational careers, since they will have had substantial effects in determining which pupils get as far as senior cycle, and in influencing Intermediate Certificate performance, which is the baseline against which we are measuring Leaving Certificate performance. What is perhaps most surprising about the results shown in Table 3.6 is that despite these earlier class effects, class effects persist at this level.²¹

Senior Cycle Performance

While a regression model such as that shown in Table 3.6 is adequate for predictive purposes, it is not really a good explanatory model. This is because,

²¹We might also note that this occupational group effect is measured as the average result for overall performance: that is, the maximum effect of SOCLASS gives rise to a difference of .28 points *per subject*.

first, as we noted earlier, entering IGPA into the regression seems to imply that Inter Cert performance has a causal effect on Leaving Certificate performance, whereas, we argued, the relationship between the two really arises because the same sorts of factors influence performance at each, as shown in Figure 3.1. Second, the coefficients estimated in Table 3.6 are likely to be biased, and, as a result, we cannot use this model to answer those questions we posed in Chapter 1 – such as whether the education a pupil receives in one type of school is better or worse than that available in another. While focusing on senior cycle performance cannot guarantee that we will arrive at unbiased estimates of the effects of our independent variables, it does furnish us with a framework within which it appears possible to reduce this bias.

To illustrate how bias arises in a model such as that shown in Table 3.6, we return to the example of school effectiveness discussed in Chapter 1. There we showed that attempting to assess school effectiveness (or, in our case, *school type* effectiveness since we shall chiefly be concerned with comparisons between Vocational, Community and Secondary schools) by using background variables to control for differences between the pupils in the school types, is unlikely to prove entirely satisfactory. This is because of the probable existence of variables unmeasured by the researcher which influence both the outcome variable (i.e., Leaving Certificate performance) and the type of school a pupil attends. Likewise the coefficient for the effect of social class origins will also be biased if an unmeasured variable influencing performance is also correlated with class origins.²² Much of the content of the next two sections – “Mis-specification and Sample Selection Bias” and “Sample Selection Bias in Public Examinations” is technical. Readers who wish to avoid these statistical issues are invited to turn to the section “A Model of Senior Cycle Performance”, which summarises the preceding sections.

Mis-Specification and Sample Selection Bias

To generalise: let y_1 be an outcome measure (such as LCGPA) x_1 be one or more control variables (such as social class origins, sex and so forth) and v be, say, a dummy variable indicating attendance at one type of school rather than another. The regression equation:

$$y_1 = \beta x_1 + \gamma v + u_1 \quad (1)$$

is the usual specification for an analysis to test for the presence of a school type effect (the null hypothesis being $\gamma = 0$). Clearly, if we omitted the x_1 variables from (1) to yield:

²²This general problem of mis-specification and the likely bias that will result is discussed in most econometrics texts (e.g. Johnston, 1972, pp. 168-169).

$$y_1 = \phi v + u_2 \quad (2)$$

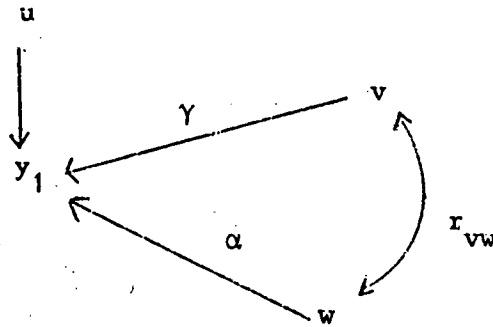
then ϕ would not constitute sound evidence of a school effect because we had failed to control for factors that influenced y_1 but which are also correlated with v . Given that such factors would become part of the error term, u_2 , then our estimate of ϕ , the school effect, would be biased because of a non-zero covariance between v and u_2 . Let us suppose that this covariance arises because of the omission of a variable (or set of variables) w , whose inclusion in the model would, therefore, lead to a zero covariance between v and the error term. This "true model" is shown diagrammatically in Figure 3.2 in the form of a path diagram. According to path analysis it follows that the ϕ coefficient in (2) is actually equal to:

$$\phi = \gamma + r_{vw} \alpha \quad (3)$$

(where α is the partial regression coefficient of y_1 on w and r_{vw} is the correlation between v and w). Thus, ϕ can be seen to be biased by a factor which is a multiple of the effect of the omitted variable(s), w on y_1 and the correlation between v and w . If we had measured w , however, then entering it into (2) would clearly allow an unbiased estimate of the school effect. In other words, if x_1 (in (1)) equals w , then we have no difficulties. The problem arises, however, in so far as our measured control variable(s), x_1 , will seldom be wholly exhaustive in this way, and the non-zero covariance of v and u_1 will persist, as a result of the influence of unmeasured factors affecting y_1 , but which are also correlated with v . This non-zero covariance means that the sub-samples in the two types of school are biased in ways relevant to the outcome measure. The existence of such sample selection bias implies biased estimates of the coefficient γ .

To sharpen the focus of this discussion, let us examine a recent instance of where problems of this type may have occurred. In their re-analysis of data originally utilised by Greaney and Kellaghan (1984), Hout and Raftery (1985) used logistic regression to estimate the effects of a number of variables on the probability of members of a sample of roughly 500 pupils making transitions between various levels of the Irish educational system. Specifically they examined the effects of class origins (measured on the Hope-Goldthorpe scale), gender, ability (measured as verbal reasoning ability at age 11) and school type (a dummy variable distinguishing Secondary from Vocational schools) on five transition probabilities:

Figure 3.2: Path diagram of effects on outcome measure



- (i) the probability of entering post-primary education;
- (ii) the probability of completing the junior cycle of post-primary schooling (i.e., the first two or three years of post-primary education leading to the Group or Intermediate Certificate exams);
- (iii) the probability of entering the senior cycle of post-primary education;
- (iv) the probability of completing the senior cycle (i.e., of sitting for the terminal Leaving Certificate exam);
- (v) the probability of entry to third level.

One of the tasks Hout and Raftery set themselves was to look at the effects of being in a Secondary school (which tends to teach an academic type of curriculum) from being in a Vocational school (which are more technically orientated). There are important differences in the types of pupils attending these schools, however: Vocational schools tend to attract pupils of lower ability and lower social class and to attract males rather than females (Breen, 1984b, pp. 29-30; Greaney and Kellaghan, 1984, pp. 50-71; Hannan *et al.*, 1983, pp. 88-92). In interpreting school effects, Hout and Raftery use class, ability and gender as control variables, and they find a significant and large positive effect of attendance at a Secondary school on the probability of making each of these transitions, except (v). This leads them to conclude that by entering a Vocational school, students from disadvantaged backgrounds are "substantially reducing their probability of sitting the Leaving Certificate" (Hout and Raftery, 1985, p. 139) and that they would be better off in Secondary schools.

To be effective, future efforts to equalise the educational opportunities of all

social classes in Ireland must focus on getting disadvantaged students into *Secondary* schools and keeping them there (Hout and Raftery 1985, p. 139, italics in original).

The crucial question on which the correctness of this conclusion stands or falls is whether or not introducing controls for gender, class and ability is sufficient to remove the sample selection bias arising from differences in the characteristics of pupils attending the two types of school. Consideration of the issues involved tends to the view that these controls are not sufficient and the conclusion is unwarranted. To the extent that, as seems likely, Hout and Raftery have confounded effects of pupil and home background characteristics with school effects, then a policy of enrolling in Secondary schools pupils who would otherwise have enrolled in Vocational schools (even assuming this to be possible) would have correspondingly little effect. For example, one set of factors which is likely to influence both the kind of post-primary school a pupil attends and her or his likelihood of remaining at school afterwards, concerns parental attitudes towards education and parental "motivation". All things being equal, and given the common perceptions held of the various sectors of the Irish post-primary system, highly educationally motivated parents are more likely to seek to send their children to a Secondary school; likewise, pupils whose parents are supportive of their remaining at school and who actively encourage them in this respect, may be considered more likely to remain at school longer. Thus, the link between expected level of educational attainment and the type of school attended can be expected to arise, at least in part, because of the common influence of a third factor – parental "motivation" – on both.

In general, the magnitude of the bias in school effect coefficients introduced by the sample selection problem will depend upon, first, how strongly the sample selection effects are correlated with both the outcome and the school effect variable(s); and, second, how well we are able to control for these selection effects. The latter can be accomplished satisfactorily in experimental studies with some form of random assignment of subjects (pupils) to treatments (schools), but this is not generally a feasible option in the study of school effectiveness. However, even in some non-experimental situations, the sample selection problem may be small or even absent. For example, in the work by Gray, McPherson and Raffe (1983) pupils appear to have been distributed over the schools in their study in a way which ensured that possible biasing variables were randomly distributed.

Sample Selection Bias in Public Examinations

It follows from this discussion that any attempt to estimate coefficients of the effect of factors on exam performance runs the risk of arriving at biased

estimates because of mis-specification and, in the case of school effects, sample selection bias. This is equally true of Inter and Leaving Certificate performance. However, the existence of bias at both these levels suggests that we might use one to offset the other. To clarify, let us write an equation for Inter Cert performance as:

$$y_2 = \alpha_i x_i + \delta_i s_i + \gamma v + \phi_i w_i + u \quad (4)$$

and for Leaving Certificate performance:

$$y_1 = \beta_i x_i + \pi_i z_i + \theta v + \lambda_i w_i + e \quad (5)$$

Here, $y_2 = \text{IGPA}$ and $y_1 = \text{LCGPA}$. The x_i variables are ones which influence performance in both exams, while the s_i variables influence only Inter Cert and the z_i only Leaving Certificate. A dummy variable for school type is indicated by v , and w_i are variables which, if included in the analysis, would remove any sample selection bias. In other words, while x_i , s_i , z_i and v are all measured, w_i may be unmeasured, and their omission is the mis-specification which causes the sample selection bias problem.

If we now define senior cycle performance to be the change in pupils' performance between the Intermediate and Leaving Certificate, we can measure it thus:

$$\Delta = \frac{\text{LCGPA} - \bar{y}_1}{\sigma_1} - \frac{\text{IGPA} - \bar{y}_2}{\sigma_2} \quad (6)$$

In other words, we standardise our two exam measures to give them comparable metrics and subtract one from the other to arrive at a change measure. This change of metric is of no consequence for Equations (4) and (5): however, rewriting (6) in terms of (4) and (5) we get:

$$\begin{aligned} \Delta &= \beta_i x_i + \pi_i z_i + \theta v + \lambda_i w_i + e - (\alpha_i x_i + \delta_i s_i + \gamma v + \phi_i w_i + u) \\ &= (\beta_i - \alpha_i)x + \pi_i z_i - \delta_i s_i + (\theta - \gamma)v + (\lambda_i - \phi_i)w_i + (e - u) \\ &= a_i x_i + b_i z_i - c_i s_i + dv + f_i w_i + (e - u) \end{aligned} \quad (7a)$$

So, (7a) is a model of senior cycle performance. If we assume that the effects of the omitted biasing variables, w_i , are the same at Inter and Leaving Certificate

(i.e., that $\phi_i = \lambda_i$) it follows that $f_i = 0$, since f_i is simply equal to the difference between ϕ_i and λ_i . Thus, $f_i w_i$ drops out to leave:

$$\Delta = a_i x_i + b_i z_i - c_i s_i + dv + (e - u) \quad (7b)$$

We have eliminated the source of bias in our coefficients by making this assumption. We are left with a_i , which is an unbiased estimate of the difference between the effects of the x_i on Leaving and Intermediate Certificate performance; b_i , which is an unbiased estimate of the effects of the z_i on Leaving Certificate performance (i.e., $b_i = \pi_i$); c_i , which is an unbiased estimate of the effects of the s_i on Intermediate Certificate performance but with the signs reversed (i.e., $c_i = \delta_i$); and, finally, d is an unbiased estimate of the difference in the school type effect at the two exams. In other words, while it is not possible to obtain unbiased estimates of the effects of attendance at a particular type of school on performance at either exam (or of the effects of the x_i variables) it is possible to obtain an unbiased estimate of its effect on the change in performance, if we are willing to assume that the omitted biasing effect is constant across (4) and (5).²³

Much, then, hinges on this assumption. The most obvious omitted variable in this case is some measure of "intelligence" or "ability". However, Greaney and Kellaghan (1984, pp. 159, 177) show that the correlations between verbal reasoning ability (VRA) and Inter Cert performance and between VRA and Leaving Certificate performance are equal (.52 and .51 respectively). Although these correlations are carried out on nested samples (the Leaving Certificate sample being a subset of the Inter Certificate sample) this at least provides some evidence to support the plausibility of assuming the effect of ability to be constant at Inter and Leaving Certificate level. More generally, we shall see that the coefficients for the measured variables which are assumed to influence performance at both exams (i.e., the x_i variables) are non-significant, showing that their effects at each exam are approximately equal. Again, this lends support to our assumption that the omitted effects are also of equal strength, as does our earlier discussion of the similarity of the magnitude of the bivariate correlations between IGPA and LCGPA and the variables shown in Table 3.5.

Rather than rely wholly on the assumption $\lambda_i = \phi_i$, we shall also carry out an analysis to attempt to control for specification error. This involves attempt-

²³In general, in (4) and (5) none of the coefficients is identified because of the effect of omitted variables. In (7a) and (7b) we achieve identification by the use of the assumption that $\lambda_i = \phi_i$. For this it follows that coefficients relating to variables common to (4) and (5), namely x_i and v_i will not be identified, but their difference will (i.e., we can estimate $\theta - \gamma$ but not θ or γ) while variables unique to (4) or (5) will now have identifiable coefficients (e.g. δ_i in (a) is identified because it equals c_i in (7b)).

ing to estimate the coefficient f in (7a) and follows the method of Heckman (1976; 1979) and Barnow, Cain and Goldberger (1980). This requires that we seek to construct the omitted variables, w_j , and to include these measures in the regression analysis so as to remove any specification error. The method will be discussed more fully later.

A Model of Senior Cycle Performance

There are a number of reasons why we choose to focus on senior cycle performance, rather than on Leaving Certificate performance. As we noted, the former provides "before" and "after" measures (Inter and Leaving Certificate results, respectively) which allow us to be confident that the effects we find are operating within the period of the senior cycle. Furthermore, there are difficulties in properly specifying a model of Leaving Certificate performance because of the likely existence of unmeasured variables influencing it, and because of difficulties in the nature of the relationship between Intermediate and Leaving Certificate, which are not overcome simply by using the former as an independent variable to "explain" the latter.

By focusing on senior cycle performance, these problems either disappear or, at least, become tractable. However, equations taking senior cycle performance as a dependent variable also have another attractive interpretation. Since we have defined senior cycle performance as standardised LCGPA minus standardised IGPA, we can add standardised IGPA to both sides of the equation yielding the model:

$$\text{LCGPA} = \text{IGPA} + \text{change in performance}$$

In other words we now view Leaving Certificate performance as the sum of a baseline measure (IGPA) plus a set of change effects (which are, of course, the coefficients and variables of Equation (7a)). Unlike our earlier specification we are no longer positing any sort of direct causal relationship of IGPA and LCGPA, but we have returned the focus of the discussion to Leaving Certificate performance.

The model, as we have so far defined it, is abstract. Change in performance over the senior cycle is held to depend upon (i) measured variables influencing Inter and Leaving Certificate performance; (ii) measured variables influencing performance at one exam but not the other; (iii) possibly some unmeasured variables influencing performance at both exams; and (iv) a random error term. In the following sections we seek to arrive at a more concrete specification of this model. Lastly, we shall carry out two analyses of senior cycle performance. The first assumes no effects of unmeasured variables on senior cycle performance; the second relaxes this

assumption and attempts to assess the magnitude of the effects of these unmeasured variables.²⁴

II SOCIAL CLASS AND SENIOR CYCLE PERFORMANCE

In this part of Chapter 3 we turn our attention to the question of whether, and how, social class origins exert an influence on senior cycle performance. This discussion is intended to provide, together with the discussion of school type effects in Part III, a basis for the selection of the actual variables to be used in our model of senior cycle performance.

Explaining Class Effects

As Hannan (1968, p.345) has noted:

The social class label summarises a multiplicity of factors besides occupational background or earning power. The educational level of the parents, the linguistic and mathematical skills, the physical facilities in the home . . . the values and attitudes of parents in regard to the education of their children, all of these are also highly correlated with social class. The economic barrier then is only one of a series of factors which cause this variation.

One of the questions that we seek to address here is: which, if any, of this "multiplicity of factors" can we point to as being particularly important in determining the effectiveness of senior cycle schooling? The second issue we deal with is an attempt to model more accurately the process by which the educational system reproduces class relationships.

The easiest way to model social class effects is by looking only indirectly at influences on senior cycle performance. Instead we shall build up simple models of exam (i.e., Inter and Leaving Certificate) performance and arrive at a model of senior cycle performance in the same way as we arrived at our equation of senior cycle performance (7a and 7b), namely by looking at the difference in the magnitude of various influences on performance at the two exams.

We begin with a model of Intermediate Certificate performance, shown in Figure 3.3. This is a two-stage model, expressing IGPA as a function of six influences, five of which we assume to be measured, and one of which – school

²⁴For those familiar with problems of sample selection bias, we note that the same argument applies to the sample selection bias implicit in the use of a sample of pupils who remained at school to complete the senior cycle. In this case we assume that those factors which would cause the bias (i.e. omitted variables which influence both a pupil's decision to stay on at school and also affect her or his exam performance) are identical and have identical effects (i.e. are subsumed under w_1) on pupils' performance at both the Intermediate and Leaving Certificate exams.

type – is endogenous, rather than truly exogenous. Our argument is that performance in the Intermediate Certificate (X_7 in Figure 3.3) is influenced by:

- (i) the type of school the pupil attends (Secondary, Vocational, etc.); (X_6)
- (ii) the class position of the pupil's family; (X_1)
- (iii) the "cultural capital" of the pupil's family; (X_2)
- (iv) the size of the pupil's family; (X_3)
- (v) the pupil's birth order in the family; (X_4)
- (vi) certain unmeasured variables (such as ability); (X_5)

We also argue that the type of school the pupil attends is influenced by X_1 to X_5 . Thus, X_1 to X_5 influence IGPA both directly and via their effects on X_6 , school type.

The size of the pupil's family and the birth order of the pupil, have been found to relate to the type of school attended as well as to Intermediate Certificate performance (Greaney and Kellaghan, 1984, pp. 52-53, 158; Kellaghan and Greaney 1970). The term "cultural capital" is taken from Piere Bourdieu (Bourdieu 1976; Bourdieu and Passeron, 1977) who argues that different classes not only have differential access and ownership of resources, but they also have differential "cultural capital", by which he means "skills and socially conditioned attitudes" (Halsey *et al.*, 1980, p. 74). In the context of educational achievement, Bourdieu's argument appears to be that even if access to education were open to all, and even if there were no formal barriers to educational participation by all classes or differences in the kinds of education available to them (which, broadly speaking, are the aims underlying the expansion of educational systems and their attempts to be "meritocratic") class inequalities in education would persist because of the unequal division of cultural capital. Put simply this is because "children secure more from their schooling if they already have acquired from their parents the linguistic and cultural competence needed to comprehend what the school has to offer" (Halsey *et al.*, 1980, p. 74). Since what the school has to offer is transmitted through the "dominant culture", in Bourdieu's phrase, those pupils whose own cultural capital is further removed from this (the working class) are least likely to profit.

A comparable model of Leaving Certificate performance is shown in Figure 3.4. The relationship between class origins and educational outcomes is, of course, complex. The reproduction of class relationships through the educational system is, for want of a better word, a dialectical process, in which pupils' (and parents') experience of schooling shapes their expectations of schooling and of their future role in society, and in turn influences the attitudes and approach of teachers and educators generally in their interaction with those pupils.

Pupils coming to schools from different class backgrounds will be treated differently within the educational system. For example, the fact that the State spends roughly the same amount on each child at each stage of its education means that those who can draw on additional non-State resources will probably receive a better quality of education. Tussing (1978, Ch. 5; 1981) has shown that even within the free scheme, per pupil expenditure at the post-primary level shows significant regional variation. For example, within Dublin expenditure is greater in the higher income areas than in the lower. Tussing notes that such differences in per pupil expenditure “account for differences in educational opportunity which seem contrary to egalitarian standards” (1978, p. 168). The additional funds from parents and the community available to schools serving a middle class clientele and the disadvantages suffered by schools in run-down deprived areas – vandalism, theft, a high turnover of teachers – mean that the quality of education available to working class and middle class pupils is far from uniform.

A further source of inequality of educational opportunity lies in the existence of fee paying, private secondary schools outside the free scheme. Tussing’s (1978, p. 169) analyses indicate that per school and per pupil expenditures in these schools are considerably greater than in comparable schools in the free

Figure 3.3: Model of Intermediate Certificate Performance

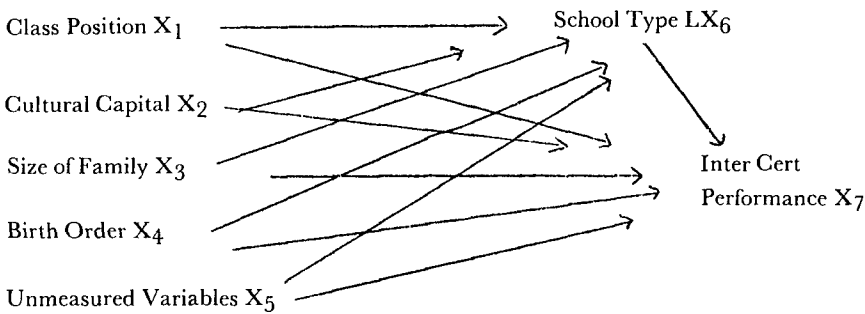
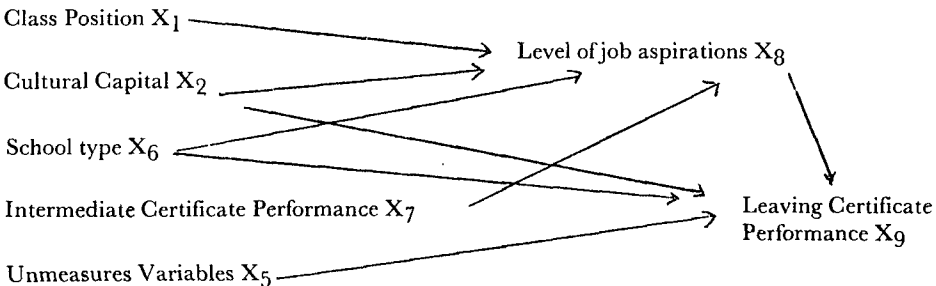


Figure 3.4: Model of Leaving Certificate Performance



scheme. It is perhaps ironic, therefore, that these private schools receive a substantial part of their funding from the State.

As well as differences in expenditure, there are clear class differences in the kinds of school that pupils attend and in the sorts of subjects available to them. Furthermore, the relationship between pupils and teachers, as numerous studies in other countries have shown, varies according to teachers' perceptions of pupils – which appear to be shaped in some degree by pupils' class background – and the accumulated experience that teachers have of the educational potential, the attitudes, and likely destinations of pupils of different class backgrounds. In turn, this interaction between class origins and educational experience shapes pupils' own perceptions of what to expect after school, and this in turn influences what they hope to achieve within the educational system. So, although a working class child may begin his post-primary career with a set of "unrealistic" occupational aspirations, his experience of schooling and the reinforcing effects of his own peer group, will gradually lead to a modification of these aspirations,²⁵ and the level of aspiration will then exercise a clear influence on the pupil's attitude to education. To give an example: a pupil who aspires to be a doctor or a solicitor or research scientist is going to have a far greater incentive to perform well at the Leaving Certificate than a pupil whose aspirations are for nothing more ambitious than semi-skilled labouring.

The process we have outlined suggests that class origins will affect Leaving Certificate performance because of their influence on pupils' aspirations and ambitions, which will also be heavily influenced by their experience of schooling. In this model we identify their experiences with pupils' Intermediate Certificate performance, IGPA (which, in turn, depends upon pupils' class origins) and on the type of school attended by the pupil (assuming, e.g., that a Vocational education may lead to different job aspirations than a Secondary education). Pupils' work aspirations by the time they are in the senior cycle, are a product both of class origins and the previous experience of school and they influence Leaving Certificate performance. This accounts for the presence of the endogenous factor X_8 , in Figure 3.4, which depends upon class position, X_1 , cultural capital, X_2 , school type X_6 , and Inter Cert performance, X_7 . The other factors which we assume to have direct effects on Leaving Certificate performance, X_9 , are cultural capital, the unmeasured variables X_5 , and school type. We assume no direct causal relationship between Intermediate and Leaving Certificate performance, in accordance with our earlier discussions, nor do we hypothesise any direct effects of family size or birth order on performance at the later exam. We further assume that the direct effects of class position X_1 , will not extend to Leaving Certificate performance, being

²⁵This account draws upon common themes in the sociology of education in recent years; see for example, Ashton and Field (1976); Bourdieu and Passeron (1977); Brannen (1978); Willis (1977).

mediated via the level of job aspirations, though cultural capital will continue to be important, and may even grow in importance at Leaving Certificate level.

Putting the Inter and Leaving Certificate models together we arrive at the large model shown in Figure 3.5. There are, as can be seen, five exogenous variables and four endogenous. The equations corresponding to each of the latter are as follows:

$$X_6 \text{ (School type)} = c_1X_1 + c_2X_2 + c_3X_3 + c_4X_4 + c_5X_5 + u_1 \quad (8a)$$

$$X_8 \text{ (Level of aspirations)} = d_1X_1 + d_2X_2 + d_3X_6 + d_4X_7 + u_2 \quad (8b)$$

$$X_7 \text{ (Inter Cert. Performance)} = a_1X_1 + a_2X_2 + a_3X_3 + a_4X_4 + a_5X_5 + a_6X_6 + u_3 \quad (8c)$$

$$X_9 \text{ (Leaving Cert. Performance)} = b_1X_2 + b_2X_5 + b_3X_6 + b_4X_8 + u_4 \quad (8d)$$

where the X labels correspond to the influences shown in Figures 3.3 and 3.4.

Having specified our models of exam performance, only two things remain to be done. First, we must use these to arrive at a model of senior cycle performance; and, second, we must discuss the operationalisation of these models in terms of measured variables.

Since we define senior cycle performance as the change or the difference between Intermediate and Leaving Certificate performance, an equation for senior cycle performance is easily obtained by subtracting (8c) from (8d) to yield:

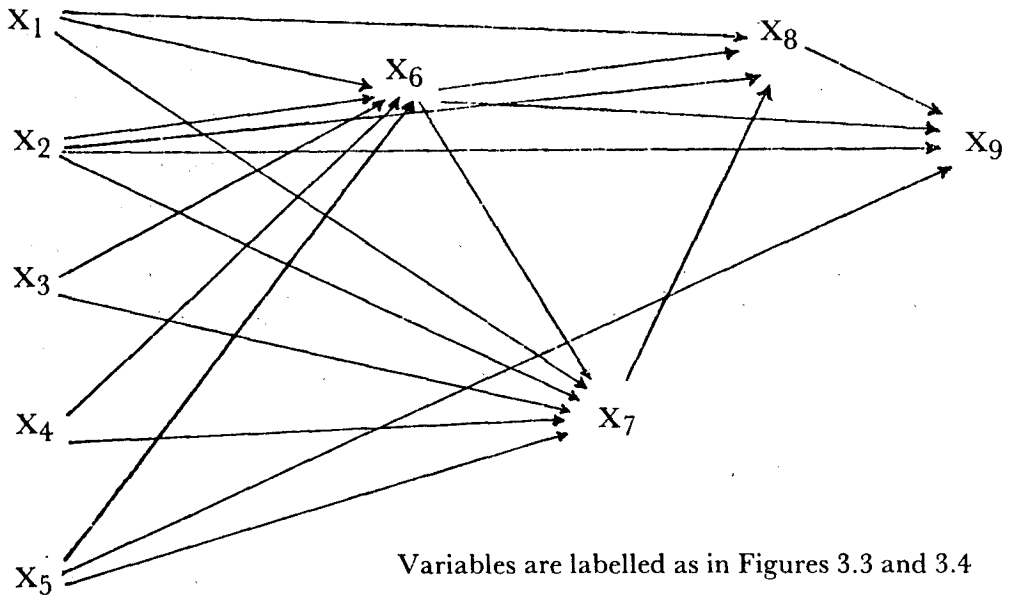
$$\Delta \text{ (Senior Cycle Performance)} = -a_1X_1 + (b_1 - a_2)X_2 - a_3X_3 - a_4X_4 + (b_2 - a_5)X_5 + (b_3 - a_6)X_6 + b_4X_8 + (u_4 - u_3) \quad (8e)$$

It can be seen that there are four clear effects of X_1 , X_3 , X_4 , and X_8 . The coefficients for X_1 , X_3 , and X_4 , will be the same as in (8c) (i.e., for their effect on Inter Cert performance) but with the signs reversed. Thus, if these are significant influences on Inter Cert performance, they will also be significant in shaping senior cycle performance. Similarly, if X_8 , does indeed influence Leaving Certificate performance it will have a significant effect on senior cycle performance. The coefficients for X_2 , X_5 , and X_6 , in (8e) are given by the difference in the effects of these three in (8e) and (8d), respectively. Obviously we can have no directly testable hypothesis in the case of X_5 , the unmeasured effects: rather we must make certain assumptions about b_2 , and a_5 , assumptions discussed earlier and again in Part III of this chapter. In the case of X_2 , cultural capital, and X_6 , school type, the finding of a significant effect in (8e)

depends upon whether or not the influence of each is sufficiently dissimilar at each exam. If, for example, the effects of X_6 , are the same at each exam, we will have a zero coefficient for X_6 , in (8e) by virtue of $a_6 = b_3$. Likewise, although we have suggested that the effects of cultural capital may be greater at the later exam, it by no means follows that they will be sufficiently stronger to make the quantity $b_1 - a_2$, significantly greater than zero.

So far, we have been talking in terms of influences on senior cycle performance; in order to estimate the models we have developed we must have measurable indices of these (with the exception of X_5 , of course, which, by definition, is unmeasured).

Figure 3.5: *Model of Intermediate and Leaving Certificate Performance*



We operationalise “cultural capital” using measures of father’s and mother’s educational level (scored from 1 representing a primary education only, to 8 for a university degree). We label these variables FAED and MOED. Of the information available to us on the Leaving Certificate pupils’ questionnaire, these are the best available indicators of the attitudes towards education prevailing within families and the kind of family-based linguistic and cultural competencies which also form part of cultural capital.²⁶ By including both these variables

²⁶Halsey *et al.* (1980, pp. 73-89) also operationalise cultural capital by measures of parental education.

together with SOCLASS in our analyses, it follows that coefficients associated with SOCLASS will now represent the effects of those aspects of occupational group origins which are distinct from cultural capital. Thus SOCLASS is used as a general measure of class position (X_1). Pupils' family size is measured by the number of the pupil's siblings (SIBS) while birth order is the pupil's ordinal position in his or her family (BIRTH). Exam performance is measured by IGPA and LCGPA and senior cycle performance (Δ) by the difference between the standardised measures of these. The level of aspirations is indexed by JOB, which ranks the pupil's desired occupation on the Hall-Jones scale. Lastly, school type is measured by dummy variables for Community/Comprehensive and Vocational schools (COM and VOC).

Overall, then, we have 11 measured and one hypothesised unmeasured variable. This latter we denote from now on as λ . We can now write a set of equations corresponding to (8a) to (8e) in terms of these variables.

$$\begin{aligned} \text{School type (COM or VOC)} = & c_1 \text{SOCLASS} + c_2 \text{FAED} + c_3 \text{MOED} \\ & + c_4 \text{SIBS} + c_5 \text{BIRTH} + c_6 \lambda + u_1 \end{aligned} \quad (9a)$$

$$\begin{aligned} \text{JOB} = & d_1 \text{SOCLASS} + d_2 \text{FAED} + d_3 \text{MOED} + d_4 \text{COM} \\ & + d_5 \text{VOC} + d_6 \text{IGPA} + u_2 \end{aligned} \quad (9b)$$

$$\begin{aligned} \text{IGPA} = & a_1 \text{SOCLASS} + a_2 \text{FAED} + a_3 \text{MOED} + a_4 \text{SIBS} \\ & + a_5 \text{BIRTH} + a_6 \text{COM} + a_7 \text{VOC} + a_8 \lambda + u_3 \end{aligned} \quad (9c)$$

$$\begin{aligned} \text{LCGPA} = & b_1 \text{FAED} + b_2 \text{MOED} + b_3 \text{SEC} + b_4 \text{COM} \\ & + b_5 \text{JOB} + b_6 \lambda + u_4 \end{aligned} \quad (9d)$$

$$\begin{aligned} \Delta = & -a_1 \text{SOCLASS} + (b_1 - a_2) \text{FAED} + (b_2 - a_3) \text{MOED} \\ & - a_4 \text{SIBS} - a_5 \text{BIRTH} + (b_3 - a_6) \text{COM} + (b_4 - a_7) \text{VOC} \\ & + b_5 \text{JOB} + (b_6 - a_8) \lambda + (u_4 - u_3) \end{aligned} \quad (9e)$$

While we shall mainly be concerned with estimating (9e), we shall also make use of (9a) and (9b) in order to trace the effects of SOCLASS on senior cycle performance via variables such as JOB.

III SCHOOL EFFECTS IN THE SENIOR CYCLE

Our chief concern in this chapter, other than looking at class effects on senior cycle performance, is to determine whether or not the type of school a pupil attends exercises an influence over how well he or she performs. So, before estimating Equation (9e) we want to look at the question of school comparisons in some more detail. In particular we shall try to show exactly what such a comparison seeks to achieve and why it is worthwhile.

First, school type comparisons are useful and relevant because parents and pupils often have to make a choice of school at the age of 11 or 12. In some cases this choice may lie between Secondary, Vocational or Community/Comprehensive education, but perhaps the most commonly occurring choice is between a Secondary and Vocational school. It is less common for parents to have the choice between, say, a fee charging or free scheme school, or between schools run by different religious orders. Of course, a comparison such as that carried out here is not between individual schools but between Vocational and Secondary schools in general. However, parental choice of school for their children is probably determined as much, if not more, by beliefs about the nature of Vocational versus Secondary education in general, than by the merits and otherwise of specific Vocational and Secondary schools. These general beliefs have been, to put it bluntly, that Vocational schools are poorer, as educational establishments, than Secondary schools. In the competition among local schools for pupils, Vocational schools appear to find themselves at a disadvantage because of the reputation of, and beliefs about, Vocational schooling in general, as much as for any of their own particular characteristics. Thus, a comparison such as this seeks to bring an objective light to bear on the reputation of Secondary and Vocational schools.

Second, a comparison between average levels of effectiveness in school sectors is relevant if we believe that any particular structure or set of organisational arrangements of education is better than any other. For example, if we believed that local control of education at a county level was preferable to any other form, then it would be natural to seek to support this preference by showing that the sector organised in this way – Vocational education – was in some sense better or more effective than schools or sectors organised differently, and one useful index would be the average level of senior cycle effectiveness.

It might be argued that Vocational, Community/Comprehensive and Secondary schools have such distinctively different aims as to render comparisons between them invalid. Such an objection might have carried greater weight thirty years ago before the establishing of Community/Comprehensive schools and when the orientations of the other two sectors do appear to have been quite distinct. However, over the past twenty years there has been a convergence in

their curricula and aims, most notable in the introduction of the Intermediate and Leaving Certificate to Vocational schools, together with the incorporation of more "academic" subjects into their curricula and the extension of practical subjects to Secondary schools (and the Community/Comprehensive schools, of course, have curricula explicitly aimed at merging the two traditions of "academic" and "technical" education). But, perhaps most importantly, young people leaving the senior cycle of Secondary, Community/Comprehensive and Vocational schools are not competing in different labour markets: by and large they are in competition for the same third-level places and the same jobs, and the credentials they use to try to obtain these – mainly Leaving Certificate results – are derived from an exam common throughout the post-primary system.

A similar argument is that comparisons of this kind are invalid because, despite similarities in their curricula and so forth, schools still have different aims, possibly as a result of differences in pupil intake. So, for example, we might suggest that exam results are not a valid criterion of school effectiveness because some schools put less emphasis on them than others, and those schools with an intake of low ability pupils may have a range of other goals that carry more weight than exam performance.

To the extent that such an argument has any force it seems to point to the need to measure school effectiveness in various ways in order to reflect differences in school goals, or, if we measure it using only one index, we must append to our conclusions the qualification that this is effectiveness in one particular respect only. However, the argument has little relevance to senior cycle performance. At this stage, differences between schools in the composition of the pupil body are likely to be much less than in the junior cycle because of differential drop-out rates. Correspondingly, differences in school aims are likely to be less also. We can assume that, at the senior cycle, all schools place a high priority on examination results and, clearly, when young people leave the senior cycle, it is examination results that provide the most concrete expression of what they have gained from and achieved in, the educational system.²⁷

We have already stated that by a school effect we mean an influence on some outcome measure – in this case senior cycle performance – which is separate from other influences on the outcome, notably those associated with characteristics of pupils. However, it might be argued that, aside from the technical difficulties of distinguishing these two kinds of effect, they are not separable in principle, because the educational processes (broadly defined) that go on in schools, and which constitute the "school effect", will themselves be responsive to the kinds of pupils in the schools. This has been argued cogently by Murnane

²⁷This is not to justify an over-emphasis on the role of exam results in the educational system or society at large: it is meant as a descriptive statement.

(1981, p.486) among others. In other words, this argument indicates that the school effect will be responsive to the composition of the pupil body. In our case it implies that, if Vocational schools had the pupils currently found in Secondary schools, they would, to all intents and purposes, be indistinguishable from Secondary schools. There is, therefore, a school effect, but it is wholly due to the pupil composition of the school. As a result, although we might be able to separate individual pupil effects from school level effects *analytically*, the distinction, when applied to the real world, is of dubious value because the individual pupil will influence the school effect through his or her impact on the school's pupil composition.

Taken as an objection to the kind of comparison undertaken here, this argument is patently weak. It assumes away the institutional differences between schools and school types as having no effect on outcomes, and, if taken to its extreme, implies that questions concerning the relative merits of different forms of post-primary education are irrelevant. However, as a source of hypotheses to test, the argument is fruitful. For example, it leads us to ask how much of the school effect can be attributed to pupil composition, a question which might be answered using a framework such as the multi-level model (e.g., Mason, Wong and Entwisle 1983; Willms 1984). Obviously the model we use, (9c), does not allow for school composition effects. What we seek to do is to discover, in a straightforward manner, if school effects are present at senior cycle. Should such effects be detected by this model, then we must turn to explanations of how they arise and, clearly, one hypothesis would be that they are wholly, or partly, attributable to differences in the pupil composition of the school.

IV REGRESSION ANALYSES, SUMMARY AND CONCLUSIONS

In this section we begin by presenting the results of our analyses using equation (9e). We carry out two regressions. The first assumes that there is no bias in our coefficient estimates because the partial effects of omitted variables are constant at both the Intermediate and Leaving Certificate and thus zero over the period of the senior cycle. The second attempts to estimate the effects of omitted variables on senior cycle performance using the Heckman (1976; 1979) method which is described fully in Appendix 1.²⁸

The regression estimates are shown in Table 3.7 for boys and girls

²⁸In this case the Heckman method requires two estimates of λ : λ_1 which proxies for the omitted variables relating to attendance at a Vocational school and λ_2 which fulfils the same role with respect to Community/Comprehensive attendance. However, as discussed in Appendix 1, only λ_1 was used in which these analyses because of the difficulties of obtaining an estimate of λ_2 which displayed sufficient variance.

separately.²⁹ Column (1) shows the unadjusted estimated, (2) the estimates adjusted by the Heckman approach. Turning first to the boys' results, we can see that the coefficient estimates remain very stable over both columns, giving a strong indication that our assumption concerning the zero effects of omitted variables ($\lambda = 0$) on senior cycle performance, was reasonable. The signs of the coefficients remain virtually unchanged across the two methods, and generally are in the expected direction. Thus, parental education (cultural capital) is positively related to performance, and the higher the level of job aspiration, the better the senior cycle performance. We argued that SOCLASS, SIBS and BIRTH would have no effect on Leaving Certificate and therefore their effect on senior cycle performance would be exactly the reverse of their influence on Inter Cert performance. So, according to Table 3.7, the higher the social class the better the Inter Cert performance: thus senior cycle performance is better the lower the social class. Likewise, the larger the family and the higher the birth order, the better the Inter Cert performance, a state of affairs reversed in senior cycle performance. The coefficient for COM is negative, suggesting that male pupils in Community/Comprehensive schools perform more poorly in the senior cycle even when all other effects are allowed for, than do those in Secondary schools. Conversely, boys in Vocational schools appear to perform marginally better than in Secondary schools. Lastly, the omitted variables, estimated by Heckman's method, exercise a negative effect on senior cycle performance.³⁰

Among girls, the coefficient estimates differ somewhat between (1) and the Heckman method, (2). In particular the effects of most of those variables which also enter into the estimation of λ (namely FAED, MOED, SOCLASS and SIBS) become much stronger in Column (2) and, in the case of the measures of parental education, reach statistical significance, whereas under (1) they do not. The signs of the coefficients, however, remain identical across both methods. Several variables appear to play a similar role in senior cycle performance among both sexes: thus the coefficients for JOB, BIRTH and SIBS (except in (2) among girls) are virtually the same for boys and girls. However, parental education – especially father's education – is much more important in determining girls' performance (using the adjusted estimates), while in the case of SOCLASS, the sign of the coefficient changes. Most plausibly this is because the effects of SOCLASS (which we presume will be negative) are stronger at the Leaving than at the Intermediate Certificate among girls, whereas the reverse is true of boys. Additionally the school effects operate differently: among girls

²⁹The R^2 's report in Table 3.7 refer to the variance explained in LCGPA under the model $LCGPA = IGPA + \text{change effects}$, discussed earlier.

³⁰Since the effect of the omitted variable at senior cycle is given by the difference in its effects on the Leaving and Intermediate Certificate, the direction of the effect is susceptible both to the direction of its effect at each exam and the relative magnitude of these two effects.

a Vocational education has a negative effect on performance while a Community/Comprehensive education has a slight positive effect.

What is perhaps most striking about Table 3.7 is the absence of large or statistically significant effects. Among boys the only statistically significant effects are those associated with father's education and with the level of job aspirations. Among girls, the level of job aspirations and a Vocational education are consistently significant, with the parental education variables reaching significance in (2) along with λ . These findings suggest that the effects of the variables included in our analyses are approximately the same at both the Intermediate and Leaving Certificate.

Table 3.7: *Regression results, senior cycle performance, boys and girls*
(absolute t-ratios in parentheses)

| | Boys | | Girls | |
|-------------|------------------|------------------|------------------|------------------|
| | (1) | (2) | (1) | (2) |
| FAED | 0.024 (2.68) | 0.025 (2.72) | 0.004 (0.46) | 0.049 (3.28) |
| MOED | 0.007 (0.76) | 0.009 (0.90) | 0.001 (0.15) | 0.020 (2.02) |
| SOCLASS | 0.012 (1.18) | 0.012 (1.15) | -0.007 (0.80) | -0.013 (1.46) |
| SIBS | -0.003 (0.35) | -0.004 (0.39) | -0.003 (0.31) | 0.014 (1.47) |
| BIRTH | 0.016 (1.38) | 0.016 (1.42) | 0.017 (1.69) | 0.015 (1.53) |
| JOB | -0.036 (3.48) | -0.036 (3.47) | -0.037 (2.92) | -0.033 (2.59) |
| VOC | 0.019 (0.32) | 0.015 (0.25) | -0.182 (3.00) | -0.197 (3.25) |
| COM | -0.058 (1.21) | -0.059 (1.22) | 0.061 (1.28) | 0.063 (1.33) |
| λ | — — | -0.028 (0.51) | — — | -0.502 (3.63) |
| INTERCEPT | -0.107 (1.33) | -0.071 (0.67) | 0.103 (1.29) | 0.944 (3.86) |
| R^2 | .56 | .56 | .55 | .55 |
| \bar{R}^2 | .56 | .56 | .55 | .55 |
| N | 1,578 | 1,578 | 1,853 | 1,853 |

School Effects

As already noted, a Vocational education appears to have a small positive influence on boys' senior cycle performance and a small negative influence on girls', while the pattern for Community/Comprehensive schools is the reverse of this. However, only in the case of the Vocational school effect on girls are any of the coefficients statistically significant. Among boys, as well as being not statistically significant, the VOC coefficient is reduced by the addition of the estimate of λ to the regression, while among both sexes the remaining school type coefficients change very little when we make the corrections for sample selection bias. Even in the case of the statistically significant effects of VOC among girls, the coefficient is quite small. For example, under Equation (1), the effect of being in a Vocational school rather than a Secondary school is to reduce LCGPA by about 0.22 points. Using (1), a girl whose performance at the Intermediate Certificate (as measured by IGPA) equalled the mean, and whose scores on all other variables equalled their mean would have an LCGPA of 4.70 in a Secondary school, 4.48 in a Vocational school and 4.77 in a Community/Comprehensive school. Thus the largest difference is between the two latter school types, a matter of roughly 0.3 of a grade point. Given that the median number of subjects taken at the exam is seven, this translates into an overall performance of 33.4 in a Community/Comprehensive school and 31.4 in a Vocational school, a difference of two points. The largest differences are to be found if we use the coefficients estimated under (2), but even here the gap between otherwise matched pupils in these two school types is only 2.2 points. Under the different points system used for entry to UCD, say, the difference would probably be even smaller, and a difference of this magnitude probably has no bearing whatsoever on how school leavers fare in the labour market.

Thus, there seems to be no evidence that attendance at one type of school rather than another has a marked direct influence on senior cycle performance. This is not to say that such influences do not operate on performance at the Intermediate or Leaving Certificate: the finding of no substantial senior cycle effect is quite compatible with, say, large but identical effects at each of these examinations. A further possibility is that schools influence senior cycle performance *indirectly*. A re-examination of Figure 3.5 or of Equations (9a) to (9e) will show that school type is held to influence the level of a pupil's job aspirations, which in turn influences performance. Thus, there may be a knock-on, or indirect, effect of school type on performance mediated via the variable JOB.

The estimates of the magnitude of this effect are given in Appendix 2. In estimating the effect of attendance at one type of school or another on the level of job aspirations, problems arise analogous to estimating school effects on performance. As a result adjusted estimates had to be obtained in these cases also. Among both sexes, attendance at a Vocational school leads to a lower level

of job aspirations than does attendance at a Secondary school. For males the coefficient is around 0.75, for females between 0.20 and 0.25. While these effects are statistically significant, they do not give rise to any substantial school effect on performance via aspirations. The indirect effects of Vocational school attendance on senior cycle performance for males lie between $-.035$ and $-.027$ and for females between $.011$ and $.008$. Adding these to the direct effects we get total effects of Vocational school attendance of between $-.008$ and $-.031$ for males, and between $-.190$ and $-.205$ for females. This latter coefficient is equivalent to a quarter of a grade point per subject, and can be taken as an upper bound on the extent of the difference in senior cycle effectiveness between girls in Vocational and those in Secondary schools.

Taking the indirect effects into account in computing the total effect of attendance at a Community/Comprehensive school on performance leads to no change from our previous conclusion (reached on the basis of direct effects alone) that there are no substantive effects to differentiate attendance at this type of school from a Secondary school.

Social Class Effects on Performance

Table 3.7 shows that, of the variables SOCLASS, MOED, FAED, only the latter has a statistically significant effect on senior cycle performance, consistently so only in the case of boys. The effects of mother's education seem particularly weak.

Earlier we identified two distinct types of class effect. One we labelled "cultural capital" and operationalised by using measures of mother's and father's education, the other we operationalised in the variables SOCLASS, whose coefficient, we suggested, reflected the other elements associated with occupational group of origin. In reporting our results, rather than using separate measures for the effects of father's and mother's education we aggregate them in the form of a sheaf coefficient (Heise, 1972). We assume that both FAED and MOED are indices of the same thing, namely cultural capital, and we therefore use this simple measure to show its effects.³¹

³¹Cultural capital is an unobserved variable of which FAED and MOED are observed indicators. The sheaf coefficient for cultural capital is obtained from the regression equation using FAED and MOED.

$$\hat{Y} = \alpha + \beta_1 \text{MOED} + \beta_2 \text{FAED} + \sum_i \gamma_i X_i$$

Here \hat{Y} is the estimated value of the dependent variable, and X_i represents other variables in the equation. The sheaf coefficient for cultural capital (B) is obtained as:

$$\beta = [\beta_1^2 + \beta_2^2 + 2\beta_1\beta_2r_{12}]^{1/2}$$

Where r_{12} is the correlation between FAED and MOED (Heise, 1972, p. 157).

Table 3.8: *Maximum and minimum direct, indirect and total effects of SOCLASS and cultural capital (standardised coefficients)*

| | <i>Boys</i> | | <i>Girls</i> | |
|--------------------------|-------------|------------|--------------|------------|
| | <i>High</i> | <i>Low</i> | <i>High</i> | <i>Low</i> |
| SOCLASS: | | | | |
| Direct effects | .024 | .023 | -.014 | -.026 |
| Indirect effects | -.003 | -.010 | -.002 | -.006 |
| Total effects | .021 | .013 | -.014 | -.032 |
| CULTURAL CAPITAL: | | | | |
| Direct effects | .077 | .075 | .145 | .011 |
| Indirect effects | .011 | -.004 | .023 | .005 |
| Total effects | .077 | .075 | .163 | .016 |

In addition to the direct effects of SOCLASS and cultural capital they also have indirect effects on performance. For example, both of them influence the kind of school attended which in turn influences performance both directly and indirectly, via the level of occupational aspiration. In Appendix 3 these indirect paths are discussed, as is the method of estimating their magnitude. In Table 3.8 however, we show the maximum and minimum effects of these variables (these different estimates arise because of the different procedures we adopt to overcome sample selection bias in Table 3.7) both overall, and in terms of their direct and indirect effects. Because these effects are derived from standardised partial regression coefficients, they record the number of standard deviation changes in senior cycle performance, brought about by a one standard deviation change in either SOCLASS or cultural capital. Thus, these results suggest, for example, that a change of one standard deviation on a male pupil's cultural capital score leads to a total change of three-quarters of a standard deviation (or about one point) in his Leaving Certificate grade point average.

From Table 3.8 it is clear that the total effects show less variance among boys than girls. This is because, as we saw in Table 3.7, the girls' coefficients for FAED, MOED and, to a lesser extent, SOCLASS, are less stable than boys' under the correction for sample selection bias. What is clear from Table 3.8, however, is that the effects of cultural capital are stronger than those of SOCLASS for both sexes. Thus, in so far as pupils' social class origins influence senior cycle performance, it is cultural capital that appears to be important, rather than other aspects of social class position.

Summary

In this chapter we examined senior cycle performance, and our central aims were to look at how school type and social class origins influence senior cycle performance. In addition we looked at some descriptive statistics relating to Leaving Certificate performance and at the Intermediate-Leaving Certificate relationship.

If we measure aggregate Leaving Certificate performance by the number of passes achieved by a pupil, we find that this is relatively insensitive, showing little variation according to sex, social class origins or the type of school attended. In all cases the median number of passes is five to six, with less than 1 per cent of candidates recording no passes and less than 1 per cent recording more than eight. If, however, we measure performance by a grade point average scale (LCGPA) we find that this is much more sensitive to the influence of variables such as sex and class. There are significant bivariate relationships between LCGPA and class origins (such that working class pupils perform more poorly), between LCGPA and school type (such that Secondary schools get, on average, the best results, Vocational schools the poorest) and between LCGPA and sex (such that girls perform a little more poorly than boys). The highest correlation (.77), however, is between Intermediate performance (IGPA) and LCGPA. This indicates that Leaving Certificate performance can be predicted quite well from Intermediate performance and that there is not a great deal of change in pupils' relative performance between these two exams.

This close relationship between the two exams suggests that they are measuring much the same thing, and also that the same set of influences acts upon both. In other words, their correlation is not a sign of a causal influence: rather it arises from shared prior causes. If we simply wish to predict Leaving Certificate performance, including IGPA as a regressor, along with other variables, will give us a fairly accurate prediction. It will not, however, allow us to explain much about what influences Leaving Certificate performance.

Our analyses proper examined senior cycle performance, which is defined as the difference in examination performance attributable to the period spent by a pupil in the senior cycle of post-primary education. We measured senior cycle performance as the difference between standardised measures of a pupil's Leaving and Intermediate Certificate performance. This, we noted, was equivalent to expressing Leaving Certificate performance as the sum of Intermediate Certificate performance plus a set of change variables and coefficients.

We sought to discover two central things: first, how, if at all, a pupil's social class origins influenced senior cycle performance (i.e., whether class origins influenced the change in performance between Intermediate and Leaving Certificate); and, second, whether the type of school a pupil attends (Secondary/Vocational/Community-Comprehensive) influences her or his senior

cycle performance. In Section III of this chapter we discussed at some length why such a school type comparison is of value.

In our analyses, reported in Section IV, we found little indication of a school type effect on senior cycle performance. Although the relative standings of the three school types differ as between the sexes – Vocational schools having a positive effect on boys' performance, when compared with Secondary schools, and Community/Comprehensive schools having a negative effect, exactly the reverse situation holding among girls – only the negative influence of Vocational schooling on girls reached statistical significance. Substantively this means that between girls in Community/Comprehensive schools (which appear to have the strongest positive effect) and girls in Vocational schools there will, on average, be a difference of just over two points (under the scoring system used here) in their overall performance. The difference between them under, say, the UCD points system would probably be rather less. The consequences for individuals' labour market position and prospects of such a difference must be assumed to be very slight.³²

In the study of effects on senior cycle performance associated with class origins we attempted to develop models of the process by which origins, together with experiences of schooling, influence job aspirations and, through them, subsequent performance, and we also examined the effects of cultural capital as distinct from other dimensions of occupational group origins. By cultural capital we refer to skills, attitudes and abilities of pupils that derive from their home environment. In our analyses we found that the effects arising in this manner had a more significant impact on senior cycle performance than did other dimensions of class difference.

Conclusion

In Chapters 2 and 3 we have looked at differences in the kinds of subjects pupils study in the senior cycle (qualitative differences, in other words) and in their performance (quantitative differences). It remains, in the following chapter, to draw our findings together and to discuss their consequences both for individual pupils and for post-primary educational policy.

³²Other methods of comparing senior cycle school effectiveness gave very similar results: one such strategy is discussed in Appendix 4. It is also of interest to note that the formulation

$$LCGPA = a_1 IGPA + \sum_i a_i x_i + u$$

(a version of which is reported in Table 3.6), where x_i = parental education, social class, job aspirations, etc., yields the same estimates of school type effects as does Equation 9c. This model can also be given an interpretation in terms of senior cycle performance, since it is equivalent to:

$$\Delta = b_1 IGPA + \sum_i b_i x_i + u$$

where $b_1 = a_1 - 1$.

Chapter 4

SUMMARY AND CONCLUSIONS

We began this study by setting out two issues we wished to investigate:

- (1) the availability and levels of take-up of various subjects and groups of subjects in the senior cycle;
- (2) pupil academic performance within the senior cycle.

In this final chapter we shall summarise the findings of our investigations and discuss some issues arising from them.

Subject Availability and Take-up

While it is now well known that there are pronounced sex differences in the take-up of several senior cycle subjects (Hannan and Breen *et al.*, 1983), in Chapter 2 of the present report we demonstrated the existence of similar disparities according to social class origins. So, for example, we saw that higher proportions of middle class than of working class pupils take subjects such as Higher Maths, Physics and French, while TD and Home Economics are taken disproportionately by working class pupils. More generally, the science subjects and modern languages are more popular among middle class pupils, while the technical subjects and, among girls, commerce subjects, tend to be taken by greater percentages of working class pupils.

In looking at social class differences in take-up, we sought to show the extent to which this was due, on the one hand to differences in school factors, namely levels of subject provision and methods of subject allocation to individuals, and, on the other, to pupils' own choices. So, for example, it is clear that levels of subject provision show variations according to pupils' social class origins. Earlier, to illustrate such differences, we noted that while 87 per cent of male senior cycle pupils of upper non-manual (professional and managerial) backgrounds are in schools teaching Physics, only 54 per cent of male senior cycle pupils of lower manual backgrounds are in this position.

In our investigation of class differences in the take-up rates of certain individual subjects we found that the importance of school influences and pupil

choice varied, depending upon which particular subject we were examining. So, in French, Higher Maths (among boys) and Chemistry (girls only) pupils' own choices were crucial: clear differences in the take-up of these subjects arise mainly because of class specific patterns of choice. On the other hand, in Physics, Chemistry and TD among boys and Higher Maths among girls, patterns of choice play little or no part in making up class specific rates of take-up. Instead, provision factors (and qualification factors in girls' Higher Maths) are crucial.

At the aggregate level, however, the picture is much clearer: that is to say, if we look at the number of subjects of each type taken by pupils (e.g., the number of Sciences or Modern Languages) we find that the class differences in take-up are almost wholly accounted for by differences in school provision of these subjects and in the ways in which schools make subjects available to pupils (for example, the level of previous performance they require before they will allow a pupil to take a particular Leaving Certificate subject) and the ability of pupils of different social class origins to meet these requirements. At this level (i.e., the level of groups of subjects) pupil choice explains little of the variance between social classes.

Subject Provision

Since provision levels in particular subject areas seem to be a significant source of social class differences in subject take-up, we sought to shed some light on how variations in provision levels arise. We argued that they come about in two ways. First, the distribution of pupils over the Secondary/Vocational/Community and Comprehensive sectors is strongly related to sex and class origins: as a result the curricular characteristics of these different school types become, to some extent, the curricular characteristics of social classes. For example, because working class boys are more likely than any others to enter Vocational schools, so the mix of senior cycle subjects available to them depends very heavily (though not exclusively) on the nature of the curriculum in Vocational schools. But, second, among those pupils in the Secondary sector, similar social class differences in subject availability persist, showing that, to a significant extent, the curricula of particular Secondary schools are related to the social class composition of their pupil body.

Senior Cycle Performance

In Chapter 3 we looked at senior cycle academic performance, which we defined as the change in a pupil's exam performance between the Intermediate and Leaving Certificate exams. As we noted, Intermediate and Leaving Certificate performance are very strongly correlated, indicating that both exams measure much the same kind of thing (and, indeed, factors such as pupils' class

origins and sex enjoy very similar relationships with each exam as Table 3.5 showed) and also that, in practice, pupils who do poorly at the Intermediate generally do quite poorly at the Leaving Certificate.

In our analyses we were particularly concerned with the effects on senior cycle performance of pupils' social class origins and the type of school they attended (Secondary/Vocational/Community and Comprehensive). At the bivariate level it appeared that pupils of working class origins perform more poorly than those of middle class origins and also that pupils in Vocational schools perform more poorly than those in other types of school. However, the question at issue in the study of school effectiveness is whether, when we allow for all possible differences between the kinds of pupils in the different school types, we still detect systematic variations in the average level of performance attained by pupils in these school types. Put differently, is there a source of differences in exam performance that can be associated with school types and which would persist despite changes in the kinds of pupils coming into those schools?

In Chapter 3 we sought to answer this question (as well as to provide a discussion of why the question is relevant). We found that, to all intents and purposes, the type of school attended has little influence on senior cycle performance. Among boys there were no statistically significant variations as between performance in each of the three types. Among girls, there was one significant result: Vocational schools appear to depress senior cycle performance among girls, though, in substantive terms, this effect is quite small.

No previous school effectiveness studies comparing the three school sectors – Secondary, Vocational and Community/Comprehensive – have been carried out in Ireland (with the partial exception of the Hout and Raftery (1985) study, though this does not deal with exam performance), and thus there is no body of previous findings against which to compare our results. It would seem important, therefore, that further research be carried out in this area, the results of which could serve to support or reject our findings.

In the case of the social class effect we argued that the aspect of class background that was most significant in influencing senior cycle performance was the "cultural capital" of the family, by which we mean the "skills and socially conditioned attitudes" possessed, differentially, by families in different locations in the class structure. There is some evidence in our data that these influences are of greater importance for girls than for boys. While these social class effects on senior cycle performance are quite small, it is somewhat surprising that such effects even reach significance given that, by the time a cohort of post-primary entrants reaches the Leaving Certificate, it has already been quite markedly selected, in social class terms, through differential dropout rates. Our analysis attempted to go further than simply establishing the existence of class

differentials: however we sought to show what aspects of class position were particularly relevant to senior cycle performance. So, by the time of senior cycle, it is class related cultural differences that are important. Differences between families in income, in ownership of resources and so on, appear to be much less important in influencing senior cycle performance than does the possession of particular competencies, social skills and attitudes.

Implications for Policy

The finding of little significant or substantive difference between school types in their senior cycle effectiveness does not necessarily mean that schools do not make a difference. Individual schools, of whatever type, may be particularly effective or ineffective, and perhaps the best way of improving the standards of schools generally would be to investigate and learn from such particular cases. What our findings do point to, however, is that no one of the three sectors (Secondary, Vocational, Community/Comprehensive) provides a *form* or *model* of post-primary schooling that is unequivocally better than another. In other words the different organisational or other distinctive and distinguishing features of the sectors do not appear to make them either more or less effective, if we measure effectiveness in terms of senior cycle examination results.³⁵

On the other hand, if our results concerning quantitative school effects in the senior cycle suggest that there is little to choose between the three sectors or models of organisation, our results regarding qualitative effects in terms of the nature of the curricula of these schools, show that there are important differences in this respect. On average, Community/Comprehensive schools teach the largest number of senior cycle subjects and have better levels of provision in all of the four subject areas we identified (Sciences, Commerce subjects, Technical subjects and Modern Languages) than do Vocational or Secondary schools (except in Modern Languages where Secondary schools do best). Conversely, Vocational schools have the smallest curricula and the poorest levels of subject area provision in all areas except Technical subjects.

Such differences between the curricula of Secondary, Vocational and Community/Comprehensive schools are to be expected not alone because they have, to some degree, different educational aims, but also because of differences in their size, Community/Comprehensive schools being somewhat larger, on average, than others. However, because attendance at one type of school rather than another is class and gender related, these school differences translate into gender and class differences.

To what extent should this be regarded as a bad thing? It might be argued, for example, that pupils and parents choose their schools freely and that the

³⁵Though this may not necessarily be the case for other measures of effectiveness, such as junior cycle performance or the differential ability of school types to retain pupils at school.

position of a high percentage of male, working class, pupils in Vocational schools who have, as a result, access to a large number of technical subjects but, in general, have few languages and relatively few sciences, arises through pupils' own choice. To argue this, however, overstates both the extent of choice available and the ability of parents to make the informed judgements necessary. For example, although parents and pupils formally choose the latter's post-primary school, they do so three or four years before the pupil enters the senior cycle and thus the nature of the senior cycle curriculum is unlikely to be a major factor influencing their decision. There appears to be relatively little movement between schools after initial entry and indeed those parents most likely to transfer their children to another school after, say, the Inter Cert, or who are likely to have the knowledge and experience of second-level education permitting them to make initial and subsequent choices of school, informed by relevant educational criteria (such as the composition of the school's curriculum) are more likely to be of the middle, rather than the working class. For example, reporting the results of a parent/school liaison study in the Liberties area of Dublin, the Curriculum Development Unit (CDU) noted that:

It was assumed that parents know what the school was offering their children, and, once given the opportunity, would be anxious to help the school achieve the aims of its programmes. In practice the contacts made with the home revealed a more fundamental need: the first function of Home/School liaison should be an educational function for parents (CDU, 1982, p. 21).

Furthermore, the extent of choice of school available is easily overstated. In many cases the element of choice may be more apparent than real. It is well known that schools often compete for brighter pupils and that pupils of poorer perceived ability can be discouraged from attending particular schools in ways that may be direct or indirect. If, for example, the local Secondary school gives first preference in its intake to pupils from an attached primary school or to brothers and/or sisters of present or past pupils, this obviously reduces the options open to other National school leavers. Finally, in rural areas or small towns the choice of school may lie between a Vocational school and the boys' or girls' Secondary school, all of which may, in fact, be quite small and have correspondingly restricted curricula.

The net result is that these school differences in provision help to give rise to the situation identified in Chapter 2 whereby patterns of subject take-up were such that "working class subjects" – in the sense of subjects which are orientated towards manual work (TD and probably also Engineering Workshop and Building Construction) – are almost exclusively taken by male working class

pupils. Similarly, Home Economics which is linked to the female/homemaker role, is taken mainly by female working class pupils. Likewise commerce subjects are also more likely to be taken by female working class, rather than middle class, pupils. Conversely, subjects associated with third-level entry and with professional and technical jobs – notably the sciences and languages – are much more likely to be taken by pupils from middle class backgrounds.

It would, of course, be naïve to suggest that differences in subject provision levels were wholly responsible for this state of affairs. Nevertheless, differential provision levels do contribute to it and this may help to lead to an early narrowing of young people's occupational horizons. Such considerations suggest that if we are to seek the optimum personal fulfilment of each child, through the provision of the widest range of subjects possible, then some change in the organisational arrangements existing within and between schools will be necessary. The Department of Education has, for many years, sought to encourage local schools to co-operate in subject provision and, with varying degrees of enthusiasm and success, has pursued a policy of amalgamating a number of small local schools into a single Community school, so as to both provide a wider range of subjects and to reduce unnecessary duplication of provision. More recently, in the *Programme for Action in Education, 1984-1987* (p. 24) it was stated that:

Discussions will be initiated immediately, therefore, with major interests at national and local level to ensure the maximum amount of co-ordination and integration in the provision and use of school facilities . . . Consultation will take place with a view to the establishment of local co-ordination committees representative of all educational interests in a given area to facilitate initiatives in promoting co-operation in educational provision in that area.

In the Green Paper of 1985 (Department of Education 1985) the government has proposed that such co-ordination of resources should be undertaken via Local Education Councils.

Whatever means are adopted to achieve it, there appears to be scope for increased efficiency in subject provision by schools. For example, the size of a school (i.e., number of pupils) is obviously a limiting factor on the size of its curriculum (though not necessarily on its composition: Hannan and Breen *et al.*, 1983, Chapter 6). However, small schools teaching relatively few subjects are not usually the product of location in a sparsely populated area, but rather they arise because a disproportionately large number of schools in a locality are competing for the available pupils. So, in our sample, there are 29 schools which have 300 pupils or less (and could therefore be considered small), but only 5, or 17 per cent of them, are in areas in which, according to the Principal,

there are no other local post-primary schools. Thus, to the extent that small school size leads to a limited curriculum and thus to restricted availability of subjects, the problem calls for structural reform through the amalgamation of, or co-operation among, schools which are currently competing for a limited pool of students.

Further Research

This paper constitutes a first attempt explicitly to address the issue of school type examination effectiveness in Ireland – though, as we noted in Chapter 3, it is a topic which has been much debated elsewhere. Clearly, however, the methods by which the issue has been approached in this report are not the only ones possible, and we urge that further research be carried out on this topic, for those reasons cited in Chapter 3. No one would dispute that there are popular conceptions – or misconceptions – about this issue: one of the rôles of the social scientist in such circumstances is to examine, critically, the available evidence which may or may not support them.

In the present study we have been concerned with senior cycle performance: however, this is not the only yardstick of the relative effectiveness of schools or school types. We might, had the data been available, also have examined issues such as performance in the junior cycle, or the probability of pupils' completing a particular stage of the educational process. The latter undertaking then, would yield, as its measure of effectiveness, the school's or school type's, "ability" to retain pupils to progressively higher levels of the post-primary course. As we pointed out earlier, this is an issue addressed by Hout and Raftery (1985), though we do not believe that they addressed it adequately. It might be argued, however, that this is an area of considerable importance in which differences in school effectiveness, if they arose, could conceivably be of greater importance than differences in examination performance. This is because, for the bulk of pupils, level of educational attainment is probably a more important determinant of their labour market fortunes than is variation in performance at a specific exam.

We have reiterated the point that our comparison in this paper is made not between individual schools, but, rather, between school types taken on average. However, the former sort of comparison – the analysis of school, rather than school type, effectiveness – obviously is of major significance in providing answers to certain sorts of questions, other than those addressed here. In particular, comparisons between individual schools may help to tell us what constitutes a good (i.e., effective) school and the degree to which those factors which cause this, if identified, can be manipulated via the policies of educational authorities (government or VECs, for example) or of individual school decision-makers (principals and managers, for example). If we want to develop

better schools, then such analyses present a way of providing ourselves with some guidelines as to how we might achieve this goal.

REFERENCES

- ASHTON, D. N. and D. FIELD, 1976. *Young Workers: From School to Work*, London: Hutchinson.
- BARNOW, B. S., G. G. CAIN and A. S. GOLDBERGER, 1980. "Issues in the Analysis of Selectivity Bias", in E. W. Stromsdorfer and G. Farkas (eds.), *Evaluation Studies Review Annual, Vol. 5*, Beverly Hills: Sage, pp. 43-59.
- BERK, R. A. 1983. "An Introduction to Sample Selection Bias in Sociological Data", *American Sociological Review*, Vol. 48, No. 3, pp. 386-398.
- BERK, R. A. and S. C. RAY, 1982. "Selection Biases in Sociological Data", *Social Science Research*, Vol. 11, pp. 352-398.
- BIDWELL, C. E. and J. D. KASARDA, 1975. "School District Organisation and Student Achievement", *American Sociological Review*, Vol. 40, No. 1, pp. 55-70.
- BOURDIEU, P. 1976. "Cultural Reproduction and Social Reproduction" in J. Karabel and A. H. Halsey (eds.), *Power and Ideology in Education*, Oxford: Oxford University Press.
- BOURDIEU, P. and J. C. PASSERON, 1977. *Reproduction in Education, Society and Culture*, London: Sage.
- BRANNEN, P. (ed.), 1978. *Entering the World of Work: Some Sociological Perspectives*, London: HMSO.
- BREEN, R., 1983. "Path Analysis: An Example", *The Journal of Agricultural Economics*, Vol. 34, No. 3, pp. 417-425.
- BREEN, R., 1984a. "Irish Educational Policy: Past Performance and Future Prospects" in *Public Social Expenditure: Value for Money?* Dublin: The Economic and Social Research Institute, pp. 99-128.
- BREEN, R. 1984b. *Education and the Labour Market: Work and Unemployment among Recent Cohorts of Irish School Leavers*, Paper No. 119, Dublin: The Economic and Social Research Institute.
- CDU, 1982. *Parents' and Primaries' Links with the Post-Primary Schools*, Dublin: CDU
- COLEMAN, J. S. et al., 1966. *Equality of Educational Opportunity*, Washington D.C. Office of Education, US Department of Health, Education and Welfare.
- COLEMAN, J. S., T. HOFFER and S. KILGORE, 1982. *High School Achievement: Public, Catholic and Other Private Schools Compared*, New York: Basic Books.
- COOLAHAN, J., 1979 (ed.). *University Entrance Requirements and their effects on Second Level Curricula*, Dublin: Irish Federation of University Teachers.
- CUTTANCE, P. F., 1985. "Methodological Issues in the Statistical Analysis of Data on the Effectiveness of Schooling", *British Educational Research Journal*, Vol. 11, No. 2, pp. 163-179.
- DEPARTMENT OF EDUCATION, 1971. *Primary School Curriculum: Teacher's Hand Book*, Dublin: Department of Education.
- DEPARTMENT OF EDUCATION, *Statistical Reports* (various years). Dublin: The Stationery Office.
- DEPARTMENT OF EDUCATION, 1984. *Programme for Action in Education, 1984-1987*. Dublin: The Stationery Office.
- DEPARTMENT OF EDUCATION, 1985, *Partners in Education*. Dublin: The Stationery Office.
- DRAPER, N. and H. SMITH, 1981. *Applied Regression Analysis* (2nd Edition), New York: Wiley.
- GIDDENS, A., 1973. *The Class Structure of the Advanced Societies*, London: Hutchinson.
- GOLDTHORPE, J. H., 1980. *Social Mobility and Class Structure in Modern Britain*, Oxford: Clarendon Press.
- GRAY, J. 1981. "Towards Effective Schools: Problems and Progress in British Research", *British Educational Research Journal*, Vol. 7, No. 1, pp. 59-69.
- GRAY, J., A. F. McPHERSON and D. RAFFE, 1983. *Reconstructions of Secondary Education: Theory, Myth and Practice since the War*, Henley: Routledge and Kegan Paul.
- GREANEY, V., 1973. "A Comparison of Secondary School Entrants, Vocational School Entrants and Terminal Leavers", *The Irish Journal of Education*, Vol. 7, No. 2.
- GREANEY, V. and T. KELLAGHAN, 1977. "Ireland" in F. M. Ottobre (ed.). *Criteria for Awarding School Leaving Certificates*, Oxford: Pergamon.

- GREANEY, V. and T. KELLAGHAN, 1984. *Equality of Opportunity in Irish Schools: A Longitudinal Study of 500 Students*, Dublin: The Educational Company of Ireland.
- GREANEY, V., and T. KELLAGHAN, 1985. "Factors Related to Level of Educational Attainment in Ireland", *The Economic and Social Review*, Vol. 16, No. 2, pp.141-156.
- HALL, J. and D. C. JONES, 1950. "Social Grading of Occupations", *British Journal of Sociology*, Vol. I, No. 1, pp.31-35.
- HALSEY, A. H., A. F. HEATH and J. M. RIDGE, 1980. *Origins and Destinations: Family, Class and Education in Modern Britain*, Oxford: Clarendon Press.
- HANNAN, D. F., 1968. "Education in Rural Ireland", *Christus Rex*, Vol. 22, No. 4 pp. 343-352.
- HANNAN, D., R. BREEN and B. MURRAY, D. WATSON, N. HARDIMAN, K. O'HIGGINS, 1983. *Schooling and Sex Roles: Sex Differences in Subject Provision and Student Choice in Irish Post-Primary Schools*, Paper No. 113, Dublin: The Economic and Social Research Institute.
- HARVARD EDUCATIONAL REVIEW, 1981. Vol. 51, No. 4.
- HEATH, A. and P. CLIFFORD, 1980. "The Seventy Thousand Hours that Rutter left out", *Oxford Review of Education*, Vol. 6, No. 1, pp. 3-19.
- HEATH, A. and P. CLIFFORD, 1981. "The Measurement and Explanation of School Differences", *Oxford Review of Education*, Vol. 7, No. 1, pp. 33-40.
- HECKMAN, J. J., 1976. "The Common Structure of Statistical Models of Truncation, Sample Selection and Limited Dependent Variables and a Simple Estimator for such Models", *Annals of Economic and Social Measurement*, Vol. 5, No. 4, pp. 475-492.
- HECKMAN, J. J., 1979. "Sample Selection Bias as a Specification Error", *Econometrica*, No. 47, pp. 153-161.
- HEISE, D. R., 1972. "Employing Nominal Variables, Induced Variables and Block Variables in Path Analyses", *Sociological Methods and Research*, Vol. 1, No. 2, pp. 147-173.
- HOUT, M. and A. RAFTERY, 1985. "Does Irish Education Approach the Meritocratic Ideal? A Logistic Analysis", *The Economic and Social Review*, Vol. 16, No. 2, pp. 115-140.
- ICE REPORT 1975. *Final Report of the Committee on the form and function of the Intermediate Certificate Examination*, Dublin: The Stationery Office.
- JENKS, C., 1972. *Inequality: A Reassessment of the Effects of Family and Schooling*, New York: Basic Books.
- JOHNSON, N. and S. KOTZ, 1972. *Distributions in Statistics: Continuous Multivariate Distributions*, New York: Wiley.
- JOHNSTON, J., 1972. *Econometric Methods*, Tokyo: McGraw Hill-Kogakusha.
- JOURNAL OF THE ROYAL STATISTICAL SOCIETY, SERIES A, 1984, Vol. 147, No. 4.
- KEDDIE, N., 1973. *Tinker, Tailor . . . The Myth of Cultural Deprivation*, Harmondsworth: Penguin.
- KELLAGHAN, T., and V. GREANEY, 1970. "Factors Related to Choice of Post Primary School in Ireland", *The Irish Journal of Education*, Vol. 4, No. 2, pp. 69-83.
- KELLAGHAN, T., G. F. MADAUS and E. A. RAKOW, 1979. "Within School Variance in Achievement: School Effects or Error?" *Studies in Educational Evaluation*, Vol. 5, London: Pergamon Press, pp. 101-107.
- MADAUS, G. E., P. W. AIRASIAN and T. KELLAGHAN, 1980. *School Effectiveness*, New York: McGraw Hill.
- MADAUS, G. and J. MacNAMARA, 1970. *Public Examinations: A Study of the Irish Leaving Certificate*, Dublin: Educational Research Centre.
- MADAUS, G., T. KELLAGHAN, E. A. RAKOW and D. J. KING, 1979. "The Sensitivity of Measures of School Effectiveness", *Harvard Educational Review*, Vol. 49, No. 2, pp. 207-230.
- MADDALA, G. S., 1983. *Limited Dependent and Qualitative Variables in Econometrics*, Cambridge: Cambridge University Press.
- MARKS, J., C. COX and M. POMIAN - SRZEDNICKI, 1983. *Standards in English Schools: An Analysis of the Examination Results of Secondary Schools in England for 1981*. London: National Foundation for Educational Research.
- MASON, W. M., G. Y. WONG, B. ENTWISLE, 1983. "Contextual Analysis through the Multilevel Linear Model" in *Sociological Methodology 1983-84* (S. Leinhardt, ed.), San Francisco: Jossey-Bass, pp. 72-103.
- MAUGHAN, B., P. MORTIMER, J. OUSTON and M. RUTTER, 1980. "Fifteen Thousand Hours: A Reply to Heath and Clifford", *Oxford Review of Education*, Vol. 6, No. 3, pp. 289-303.
- MORAN, M. A., and M. J. CROWLEY, 1978-79. "The Leaving Certificate and First Year University Performance", *Journal of the Statistical and Social Inquiry Society of Ireland*, Vol. 34, Part I, pp. 231-266.
- MURNANE, R. J., 1981. "Evidence, Analysis and Unanswered Questions", *Harvard Educational Review*, Vol. 51, No. 4, pp. 483-489.
- MURPHY, J., 1985. "Does the difference schools make, make a difference?" *British Journal of Sociology*, Vol. 36, No. 1, pp. 106-116.

- OLSEN, R. J., 1980. "A Least Squares Correction for Selectivity Bias", *Econometrica*, Vol. 48, No. 7, pp. 1815-1820.
- OPPENHEIM, A. N., 1966. *Questionnaire Design and Attitude Measurement*, London, Heinemann.
- OXFORD REVIEW OF EDUCATION, 1984, Vol. 10, No. 1. Theme: Comprehensive and Selective Schooling.
- ROTTMAN, D. B., D. F. HANNAN and N. HARDIMAN, M. WILEY, 1982. *The Distribution of Income in the Republic of Ireland: A Study in Social Class and Family-Cycle Inequalities*. Paper No. 109, Dublin: The Economic and Social Research Institute.
- RUTTER, M., et al., 1979. *Fifteen Thousand Hours: Secondary Schools and their Effects on Children*, London, Open Books.
- SMITH, M. S., 1976. "Discussion: Evaluation of Educational Programs" in C. C. Act (ed.), *The Evaluation of Social Programmes*, Beverly Hills: Sage.
- STROMSDORFER, E. W. and G. FARKAS (eds.), 1980. *Evaluation Studies Review Annual, Vol. 5*, Beverly Hills: Sage.
- TUSSING, A. D., 1978. *Irish Educational Expenditures - Past, Present and Future*, Paper No. 92, Dublin: The Economic and Social Research Institute.
- TUSSING, A. D., 1981. "Equity and the Financing of Education" in S. Kennedy (ed.), *One Million Poor?* Dublin: Turoe Press, pp. 201-215.
- WHELAN, C. T., 1980. *Employment Conditions and Job Satisfaction: The Distribution, Perception and Evaluation of Job Rewards*, Paper No. 101, Dublin: The Economic and Social Research Institute.
- WHELAN, C. T. and B. J. WHELAN, 1984. *Social Mobility in The Republic of Ireland: A Comparative Perspective*, Paper No. 116, Dublin: The Economic and Social Research Institute.
- WILLIS, P., 1977. *Learning to Labour: How Working Class Kids get Working Class Jobs*, Farnborough: Saxon House.
- WILLMS, J. D., 1984. "A Multilevel Approach for Assigning School Effectiveness Scores", Edinburgh, January 9.
- WILLMS, J. D., and P. CUTTANCE, 1985. "School Effects in Scottish Secondary Schools", *British Journal of Sociology of Education*, Vol. 6, No. 3, pp. 289-306.
- YOUNG, M. F. D., 1971. *Knowledge and Control: New Directions for the Sociology of Education*, London: Collier-Macmillan.

Appendix 1

MIS-SPECIFICATION AND SAMPLE SELECTION BIAS

In the equation:

$$y_1 = \beta x_1 + \gamma v + u_1 \quad (1)$$

where y_1 is an outcome measure (e.g., senior cycle performance), v is a dummy variable indicating attendance at one school or school type rather than another and x_1 is a single or set of control variables, $\hat{\gamma}$ will be unbiased only if the set of x_1 variables is sufficiently complete to ensure that $\text{cov}(v, u_1) = 0$. That is, there must be no omitted variable, distinct from x_1 , that influences both the choice of school and the outcome measure. If this condition does not hold we have sample selection bias arising from the mis-specification of the model.

The issue of sample selection bias is pervasive in non-experimental survey research, since it may be impossible to specify a model such as (1) sufficiently well to ensure that $\text{cov}(v, u_1) = 0$. However, the pessimism regarding the feasibility of accurately assessing effects such as γ in (1) advanced by Greaney and Kellaghan (1985, p. 155) in their reply to Hout and Raftery (1985) is perhaps excessive: they claim that

Such a conclusion might be warranted if the data on which it has been based had been obtained in an experimental study in which students had been assigned to different kinds of school. It cannot be made on the basis of survey data.

If this were so, then the question of the relative effectiveness of Community/Comprehensive, Vocational and Secondary schools would always remain unanswered. However, the very pervasiveness of the issue of sample selection bias has led to the development of methods which seek to yield consistent estimates of coefficients such as γ (in (1) above) in non-experimental research. The purpose of this Appendix is to describe one such method, following Heckman (1976; 1979).

Econometric Approaches to the Problem

Recent discussions of the problem of making inter-school comparisons (e.g., the papers in *Oxford Review of Education*, Vol. 10, No. 1, November 1984) do not

appear to have drawn on recent work in economics in which analogous problems are addressed. Whereas our interest is in the effects of one type of school rather than another on some outcome measure such as exam performance, analogous problems involve, for example, assessing the effects of union membership on earnings, assessing the money returns to a particular level of education, and determining the degree to which a voluntary training programme improves job seekers' likelihood of employment (see Maddala, 1983, pp. 6-8 for further examples and references). I shall discuss the way in which economists have approached these problems and I shall show how it might be fruitful in the specific case to hand.

This is not to say that these techniques have not reached the broader sociological community: for example, the papers in *Evaluation Studies Review* Vol. 5, edited by Stromsdorfer and Farkas (albeit mostly written by economists) and the work of Berk (1983; Berk and Ray 1982) have introduced these methods to sociologists. However, much of the original work was carried out by Heckman (1976, 1979) and it is with his exposition that we begin.

Heckman (1976, 1979) begins by looking at a situation apparently slightly different from the one that concerns us. Suppose we have the regression model:

$$y_1 = \beta x_1 + u_1 \quad (2)$$

we also define a dummy variable, v :

$$v = \begin{cases} 1 & \text{if } y_2 \geq 0 \\ 0 & \text{if } y_2 < 0 \end{cases} \quad (2a)$$

and y_2 , the index determining v , is given by:

$$y_2 = \theta x_2 + u_2 \quad (3)$$

In addition we have:

$$E(u_1) = 0 \quad (3a)$$

and, adding a subscript, j , for the j^{th} unit of observation:

$$\begin{aligned} E(u_{ij}, u_{2j'}) &= \sigma_{12} \text{ if } j = j' \\ &= 0 \text{ if } j \neq j' \end{aligned} \quad (3b)$$

In other words, errors are correlated within individuals but not between them. Equations (2) and (3) then, are "seemingly unrelated regressions" (Johnston, 1972, pp. 238-240).

Suppose now that y_1 is only observed if $v = 1$. Equation (2) is thus a censored regression model (Maddala, 1983, pp. 5-7). Because of (3b), unmeasured influences (given by u_2) on the likelihood of being in the sub-sample for which y_1 is observed will also influence the individual's score on y_1 . So, estimating (2) from the sample selected via (3) will yield biased estimates of β unless we allow for the process of sample selection.

Whereas in the normal regression model we have:

$$\begin{aligned} E(y_1) &= \beta x_1 + E(u_1) \\ &= \beta x_1 + 0 \end{aligned}$$

in this case we have

$$\begin{aligned} E(y_1 | y_2 \geq 0) &= \beta x_1 + E(u_1 | y_2 \geq 0) \\ &= \beta x_1 + E(u_1 | u_2 \geq -\theta x_2) \end{aligned} \quad (4)$$

Since the unconditional expectation of u_1 is zero, the conditional expectation of u_1 (in the second term of (4) cannot be zero, unless u_1 and u_2 are uncorrelated (which, by (3b) they are not).

The solution to (4) depends on determining this second term, and how we do this depends on the distributional assumptions we make concerning $g(u_1, u_2)$, i.e., the joint distribution of the errors. If we assume this to be bivariate normal, then it transpires that (Johnson and Kotz, 1972, pp. 112-113):

$$E(u_1 | u_2 \geq -\theta x_2) = \frac{\sigma_{12}}{\sigma_{22}^{1/2}} \frac{f(-z)}{F(z)} \quad (5)$$

where $z = \theta x_2 / \sigma_{22}^{1/2}$

$(f(\cdot))$ = the normal probability density function (pdf.)

$(F(\cdot))$ = the cumulative normal density function (cdf)

The ratio of $f(-z)/F(z)$ is the hazard rate, well known from, for example, demography, where it is defined as the instantaneous risk of death at time t given survival to t . In this case it can be thought of as assigning to each observa-

tion a measure of its instantaneous risk of being omitted from the sub-sample for which y_1 is observed (Berk, 1983, p. 391).

Knowing (5), how do we estimate (4)? Heckman (1979, p. 157) suggests using (3) to obtain estimates of z via probit analysis and then using these to form the quantity

$$k = f(-z)/F(z)$$

and entering k as an extra variable in (2) to yield

$$y_1 = \beta x_1 + \alpha k + u_1 \quad (6)$$

where $\hat{\alpha}$ will be an estimate of $\sigma_{12}/\sigma_{22}^{1/2}$

Programme Evaluation

In our particular case, we have the model

$$y_1 = \beta x_1 + \gamma v + u_1 \quad (7)$$

(which is the same as (1)): i.e., we have observations on y_1 for all cases, and the dummy variable v indicates attendance at one kind of school rather than another. If, however, we see (3) as an equation predicting the kind of school attended then the problem can be seen to be much the same: the correlated error terms will lead $\hat{\gamma}$ to be biased. Likewise, the solution is similar, and is given by Barnow, Cain and Goldberger (1980).

Letting z again equal $\theta x_2/\sigma_{22}^{1/2}$, then

$$\text{if } v = 1 \quad u_2/\sigma_{22}^{1/2} \geq -z$$

$$\text{if } v = 0 \quad u_2/\sigma_{22}^{1/2} < -z$$

and $u_2/\sigma_{22}^{1/2}$ is a standard normal variable independent of x_1 . The conditional expected value of y_1 is:

$$E(y_1 | x_1, v) = \beta x_1 + \gamma v + E(u_1 | x_1, v) \quad (8)$$

$$E(u_1 | x_1, v) = \frac{\sigma_{12}}{\sigma_{22}^{1/2}} E(u_2 | x_2, v) \quad (9)$$

$$E(u_2 | x_2, v) = \begin{cases} \sigma_{22}^{1/2} f(z)/F(z) & \text{if } v = 1 \\ \sigma_{22}^{1/2} - f(z)/1-F(z) & \text{if } v = 0 \end{cases}$$

or, generally,

$$E(u_2 | x_2, v) = \sigma_{22}^{1/2} v f(z)/F(z) - (1-v) f(z)/1-F(z) \quad (10)$$

Substituting (10) into (9) and the result into (8) yields:

$$E(y_1 | x_1, v) = \beta x_1 + \gamma v + \frac{\sigma_{12}}{\sigma_{22}^{1/2}} [v f(z)/F(z) - (1-v) f(z)/1-F(z)] \quad (11)$$

Again, this equation can be estimated in two stages: first use probit analysis of (3) to yield z , and estimate the final, bracketed term of (11) from this, then use OLS to estimate

$$y = \beta x_1 + \gamma v + \delta \lambda + u_3 \quad (12)$$

where λ equals the final item of (11) and $\delta =$ is an estimate of $\sigma_{12}/\sigma_{22}^{1/2}$.

This was the method adopted in the corrected equations (labelled (2) in Table 3.7); however, the method requires two estimates of λ in our particular case where we are using two dummy variables (VOC and COM). λ_1 proxies for omitted influences on y_1 correlated with attendance at a Vocational School, while λ_2 fulfils the same rôle with regard to attendance at a Community school. The probit analysis results used to form λ_1 and λ_2 are given in Table A1. However, as noted in Chapter 3, only λ_1 was used in our analyses (i.e., the omitted factor relating to Vocational school attendance). This was because λ_2 proved to be highly correlated with the intercept value when used in our analyses, inducing a good deal of multicollinearity. The reasons for this can be seen in Table A1, where the variables chosen for the probit model all have non-significant coefficients in predicting entry to a Community/Comprehensive school (the exception is MOED among girls). Thus, for neither sex does the model yield an improvement over one fitting a constant term only. As a result, λ_2 shows very little variance, and indeed tends to act as a constant in the regressions of Chapter 3. This is not the case for λ_1 which, for both boys and girls, yields a very large likelihood ratio value for the significance of the variables' coefficients in Table A1.

Substantively our failure to predict Community school attendance in terms of our variables is not surprising; it simply reflects the fact that the intakes of these schools are not distinctive in terms of class origins, parental education,

and so forth. To a greater extent than either Secondary or Vocational schools, Community schools have pupil bodies representative of the relevant age sector of the population in education.

Table A1: *Parameter estimates for probit models of probability of attending a Vocational School and a Community / Comprehensive School*
(*t* ratios in parentheses)

| | Vocational | | Community | |
|-----------|-------------------|-------------------|-------------------|-------------------|
| | Boys | Girls | Boys | Girls |
| SOCLASS: | 0.169 (3.44) | 0.022 (0.81) | 0.037 (1.32) | -0.002 (-0.08) |
| FAED | -2.299 (-5.37) | -0.105 (-3.75) | -0.016 (-0.65) | -0.005 (-0.20) |
| MOED | -0.238 (-4.78) | -0.059 (-2.29) | -0.007 (-0.28) | 0.050 (2.04) |
| SIBS | 0.108 (2.36) | 0.030 (1.16) | 0.006 (0.21) | 0.029 (1.12) |
| BIRTH | 0.037 (0.71) | 0.038 (1.42) | -0.021 (-0.67) | 0.003 (0.13) |
| INTERCEPT | -1.584 (-4.42) | -1.337 (-6.73) | -1.395 (-6.69) | -1.762 (-8.70) |
| N | 1,463 | 1,739 | 1,463 | 1,739 |
| X^2_5 | 222.4 | 64.4 | 5.7 | 7.8 |

Difficulties with the Method

There are a number of difficulties associated with this procedure, the first of which is that it yields consistent rather than unbiased estimates of the true coefficients. Consistency, as Johnston (1972, p.271) notes, "is a large sample property and implies nothing about the small sample properties of the estimator". Thus, although the estimator will be asymptotically unbiased it will not necessarily be unbiased in finite samples.

The second difficulty concerns the assumption about the joint distribution of the error terms, $g(u_1, u_2)$. The precise assumptions we make concerning

$g(u_1, u_2)$ will determine the form in which we estimate our two equations. In the probit + OLS example given above, we assume bivariate normality. However, different distributional assumptions will imply different estimating procedures. For example, if we assume the distribution to be bivariate logistic then the two equations would be estimated as a logit and an OLS regression (Berk and Ray, 1982, pp. 387-388). Olsen (1980) has introduced a less restrictive pair of assumptions, namely that the error term in the selection Equation (3) has a rectangular distribution, and the error in (2) is a linear function of the error in (3). This permits a very simple estimation method under which (3) is estimated as a straightforward linear probability model and (2) by OLS.

It is as yet unclear what effect these different distributional assumptions will have on the parameter estimates for the corrected model or the degree to which particular estimators are robust under departures from the specified distributional form. Barnow *et al.*, (1980, p. 56) suggest that this could be an important source of difficulties: on the other hand, Olsen (1980) reports that estimates under his method differ little from those using Heckman's procedure, and Berk and Ray (1982, p. 388) suggest that "it may make little difference in practice which of the estimators are used".

One relevant consideration, however, in making such a choice, concerns the identification of the equations. If the set of variables determining selection in Equation (3) is the same as those determining the outcome in Equation (2) then the possibility arises that the two equations will not be properly identified. This difficulty is avoided in the probit + OLS method because the dependent variable in the former is a non-linear function of the independent variables. The same holds for the logit + OLS method. It does not, however, apply to Olsen's (1980) method where both equations specify the dependent variable as a linear function of the independent variables. In this case, identification requires that we find a variable to use in the selection Equation (3) which is not included in the outcome equation, (2). In other words, in our example, we must find a variable that is correlated with choice of school but not with our outcome measure. In practice it may be very difficult to locate such a measure.

Even given identification, problems of multicollinearity are likely to arise in the outcome equation, because the constructed variable (the hazard rate or the estimated probability of inclusion in one type of school) will probably be highly correlated with the other independent variables.

A third problem concerns the sensitivity of the estimators to the specification error in either equation, arising from the omission of variables. As with any misspecification, this will lead to biased parameter estimates and to a confusion, for example, between school effects and omitted effects (in the second equation) or between effects on selection and other omitted influences on selection.

A fourth and more minor problem concerns the standard errors obtained in

using OLS for Equation (2). These will be artificially small, thus making tests of significance too liberal. Reported standard errors will be correct only under the null hypothesis of no sample selection bias. The corrected standard errors for the coefficients can be obtained, however, by using the residuals from Equation (6) to estimate $\hat{\sigma}_{11}$ and $\rho(u_1, u_2)$. Estimation of the corrected standard errors using a WLS procedure is discussed by Heckman (1976, p.483). Unfortunately nothing in this method guarantees estimates of error variances or covariances that are even plausible (e.g., the method can yield negative variances and estimates of the u_1, u_2 correlation that do not fall in the interval -1 to $+1$). In the results presented in Table 3.7 unadjusted standard errors from an OLS regression are used to estimate t-ratios.

Appendix 2

INDIRECT SCHOOL EFFECTS

As well as the direct effects on performance associated with the type of school a pupil attends (as shown in Table 3.7) there are also indirect effects. These are evident in the set of Equations (9a) to (9e) as well as in Figure 3.5. These indirect effects arise because school type influences the pupil's level of job aspiration which then affects senior cycle performance. The magnitude of this effect can be estimated as follows: the effect of being in a vocational school on the level of job aspiration is given by d_5 in Equation (9b) and the effect JOB on senior cycle performance by b_5 in (9e). Thus the indirect effect on performance of being in a vocational school is given by $d_5 b_5$, and the total effect is $d_5 b_5 + (b_4 - a_7)$: in other words indirect plus direct effects. The comparable Community/Comprehensive effects are $d_4 b_5$ (indirect) and $(b_3 - a_6)$ (direct). Again these are measured in terms of the difference of the particular school type effect from that in Secondary schools.

To estimate these effects we need estimates of d_4 and d_5 obtained by running (9b) as a regression. However, the sample selection bias problem is present here, in so far as we are trying to assess the school effect on level of job aspiration. Again, if there are omitted variables related to both the dependent variable (JOB) and the type of school attended, our estimates of d_4 and d_5 (the school effects) will be biased. So, in estimating (9b) we ran the regression twice; once including only the measured variables, and once using an estimate of λ derived by Heckman's method. In fact this correction made relatively little difference to the estimates for VOC and COM as Table A2 shows. Attendance at a Vocational school clearly appears to depress aspirations, compared with Secondary school attendance, while attendance at a Community/Comprehensive school makes much less difference.

Table A2: *Unadjusted (Col. (1)) and adjusted (Col. (2)), using Heckman's method, regression of level of job aspirations (absolute t-values in parentheses).*

| | Boys | | Girls | |
|----------------|-------------------|-------------------|-------------------|-------------------|
| | (1) | (2) | (1) | (2) |
| SOCCLASS: | 0.105 (4.39) | 0.104 (4.36) | 0.059 (3.80) | 0.071 (4.48) |
| FAED | -0.055 (2.72) | -0.053 (2.50) | -0.017 (1.20) | -0.106 (4.35) |
| MOED | -0.028 (1.32) | -0.024 (1.02) | -0.029 (2.00) | -0.065 (3.92) |
| IGPA | -0.614 (15.12) | -0.615 (15.12) | -0.429 (15.51) | -0.433 (15.74) |
| VOC | 0.756 (5.62) | 0.749 (5.52) | 0.205 (1.95) | 0.246 (2.36) |
| COMM | 0.160 (1.43) | 0.158 (1.41) | -0.040 (0.49) | -0.037 (0.46) |
| INTERCEPT | 2.569 (15.99) | 2.634 (11.58) | 3.124 (29.33) | 1.604 (4.54) |
| λ | — | -0.051 (0.40) | — | 0.957 (4.52) |
| R ² | .24 | .24 | .16 | .17 |
| \bar{R}^2 | .24 | .24 | .16 | .16 |
| N | | 1,578 | | 1,853 |

Given these two estimates of (9b) and the two estimates of (9e), in Table 3.7, it follows that we will have a number of estimates of d_{1b5} , the indirect school effect. The maximum and minimum estimates are given in Table A3. As noted in the text, allowing for the indirect effects associated with Community/Comprehensive schools leads to very little change over allowing only for direct effects.

Table A3: *Minimum and maximum estimates of direct, indirect and total effects of school type on senior cycle performance*

| | <i>Boys</i> | | <i>Girls</i> | |
|---------------------------------|-------------|------------|--------------|------------|
| | <i>Max</i> | <i>Min</i> | <i>Max</i> | <i>Min</i> |
| Vocational Schools: | | | | |
| Direct | .019 | .004 | -.182 | -.197 |
| Indirect | -.027 | -.035 | -.008 | -.011 |
| Total | -.008 | -.031 | -.190 | -.205 |
| Community/Comprehensive: | | | | |
| Direct | -.058 | -.067 | .063 | .058 |
| Indirect | -.006 | -.007 | .002 | .001 |
| Total | -.064 | -.074 | .064 | .060 |

Appendix 3

INDIRECT EFFECTS ASSOCIATED WITH CLASS ORIGINS

As with the school effects discussed in Appendix 2, so class effects (SOCLASS and Cultural Capital) have indirect effects in addition to their direct effects. In this case, however, the indirect paths are much more complex, as Equations (9a) to (9e) show. Fortunately the indirect paths are the same for SOCLASS and Cultural Capital: they are as follows:

SOCLASS (or Cultural Capital) → JOB → Senior Cycle Performance (1)

SOCLASS (or CC) → School Type (SEC or COMM) → JOB → Senior Cycle Performance (2)

SOCLASS (or CC) → School Type (SEC or COMM) → Senior Cycle Performance (3)

The total effect on senior cycle performance of SOCLASS or Cultural Capital is thus the direct effect plus these estimates of the indirect effects. Referring back to Equations (9a) to (9e) it can be seen that the indirect effects of SOCLASS are given by:

$$\begin{aligned} & d_1 b_5 && \text{(from (1) above)} \\ & + c_1 d_4 b_5 && \text{(from (2) above: } c_1 d_5 b_5 \text{ for Vocational students)} \\ & + c_1 (b_3 - a_6) && \text{(from (3) above: } c_1 (b_4 - a_7) \text{ for Vocational students)} \end{aligned}$$

Bearing in mind that we are now using the sheaf coefficient derived from the coefficients for FAED and MOED to represent Cultural Capital effects, the relevant indirect effects are given by:

$$\begin{aligned} & [d_2^2 + d_3^2 + 2d_2 d_3 r]^{1/2} b_5 && \text{(from (1) above)} \\ & + [c_2^2 + c_3^2 + 2c_2 c_3 r]^{1/2} d_4 b_5 && \text{(from (2): } d_5 \text{ replaces } d_4 \text{ for Vocational students)} \\ & + [c_2^2 + c_3^2 + 2c_2 c_3 r]^{1/2} (b_3 - a_6) && \text{(from (3): } (b_4 - a_7) \text{ replaces } (b_3 - a_6) \text{ for Vocational students),} \end{aligned}$$

where r is the correlation between FAED and MOED.

The direct effect of SOCLASS is a_1 and of Cultural Capital is given by:

$$[(b_1 - a_2)^2 + (b_2 - a_3)^2 + 2(b_1 - a_2)(b_2 - a_3)r]^{1/2}$$

In estimating these effects standardised coefficients were used, rather than unstandardised, and the relevant coefficients are shown in Table A4. These are derived from the unadjusted estimation procedures: the coefficients from Equations (9a) and (9e) when adjusted for sample selection bias are available from the author.

Table A4: *Standardised coefficients (unadjusted) used in computing direct and indirect effects of SOCLASS and cultural capital*

| <i>Effect</i> | <i>Coefficient</i> | <i>Boys</i> | <i>Girls</i> |
|---------------------|--|-------------|--------------|
| SOCLASS→JOB | d_1 | .115 | .092 |
| SOCIASS→VOC | c_1 | .086 | .016 |
| SOCLASS→COMM | c_1 | .047 | .012 |
| JOB→PERFORMANCE | b_5 | -.063 | -.047 |
| VOC→JOB | d_5 | .135 | .043 |
| COMM→JOB | d_4 | .032 | -.011 |
| VOC→PERFORMANCE | $(b_4 - a_7)$ | .006 | -.048 |
| COMM→PERFORMANCE | $(b_3 - a_6)$ | -.021 | .020 |
| CC→JOB | $(d_2^2 + d_3^2 + 2d_2d_3r)^{1/2}$ | -.106 | -.075 |
| CC→VOC | $(c_2^2 + c_3^2 + 2c_1c_3r)^{1/2}$ | -.272 | -.141 |
| CC→COMM | | .130 | .078 |
| SOCLASS→PERFORMANCE | a_1 | .024 | -.014 |
| CC→PERFORMANCE | $[(b_1 - a_2)^2 + (b_2 - a_3)^2 + 2(b_1 - a_2)(b_2 - a_3)r]^{1/2}$ | .077 | .011 |

CC = Cultural Capital

Appendix 4

ALTERNATIVE MODELS OF SCHOOL EFFECTIVENESS

A number of supplementary analyses of senior cycle school type effectiveness were carried out in order to check the reliability of the results obtained in Chapter 3. It will be recalled that our central finding was that, among males, no statistically significant variations in the senior cycle effectiveness of Secondary, Vocational and Community/Comprehensive schools could be discerned, while, among females, a slight negative effect was associated with Vocational schools. However, the magnitude of this was of the order of about 0.3 of a grade point (comparing Vocational with Community/Comprehensive schools) or roughly two points, overall, under the scoring system adopted here.

One supplementary analysis undertaken in the light of these results follows the methodology used by Willms and Cuttance (1985). As applied to our data, this involved estimating separate senior cycle performance equations for each school type. That is, we estimated the equation:

$$\Delta = g_1 + g_2 \text{SOCLASS} + g_3 \text{FAED} + g_4 \text{MOED} + g_5 \text{SIBS} + g_6 \text{BIRTH} + g_7 \text{JOB} + u \quad (1)$$

three times for each sex — once for Secondary pupils, once for Vocational, and once for those in Community/Comprehensive schools.

This method differs from that used in Chapter 3 in two respects: first, it takes no account of sample selection bias, and, second, it allows not only for additive school type effects (in the form of dummy variable coefficients) but lets the effect of variables such as JOB differ, depending on the kind of school the pupil is in. Thus, Equation (1) applied to the three sub-samples of pupils at different school types, is equivalent to the much larger model applied to the whole sample which includes not only dummy variables for VOC and COM but also the interactions between VOC and COM and the other variables in the model. This yields a single equation with 20 variables. To some extent this may help to offset any bias that arises from not having explicitly tried to take into account sample selection problems.

Rather than presenting the coefficient estimates we show, in Table A5, the estimated LCGPA obtained by inserting the sample means in place of each of

the variables included in (1). By this method we obtain separate estimates for each school type, and the difference between them is an estimate of the school type effect. Among boys, there is virtually no difference in the estimates and thus no discernible school type effect, whereas among girls, there appears to be a negative effect of roughly 0.5 of a grade point associated with attendance at a Vocational school.

These results are substantively identical with those obtained in Chapter 3, though here the negative effect associated with Vocational education among girls appears a little stronger. Again, however, in terms of overall performance it amounts to a maximum of about $3\frac{1}{2}$ points.

Table A5: *Estimated LCGPA for average pupil in each school type, using results for Equation (1)*

| | <i>Boys</i> | <i>Girls</i> |
|-------------------------|-------------|--------------|
| Secondary | 4.92 | 4.70 |
| Vocational | 4.88 | 4.27 |
| Community/Comprehensive | 4.85 | 4.78 |

ESRI PUBLICATIONS

Books:

- Economic Growth in Ireland: The Experience Since 1947*
Kieran A. Kennedy and Brendan Dowling
- Irish Economic Policy: A Review of Major Issues*
Staff Members of ESRI (eds. B. R. Dowling and J. Durkan)
- The Irish Economy and Society in the 1980s (Papers presented at ESRI Twenty-first Anniversary Conference)*
Staff Members of ESRI
- The Economic and Social State of The Nation*
J. F. Meenan, M. P. Fogarty, J. Kavanagh and L. Ryan
- The Irish Economy: Policy and Performance 1972-1981*
P. Bacon, J. Durkan and J. O'Leary
- Employment and Unemployment Policy for Ireland*
Staff Members of ESRI (eds., Denis Conniffe and Kieran A. Kennedy)
- Public Social Expenditure - Value for Money? (Papers presented at a Conference, 20 November 1984)*
Peter Bacon
- Medium-Term Outlook: 1986-1990. No. 1*
Peter Bacon

Policy Research Series:

1. *Regional Policy and the Full-Employment Target* M. Ross and B. Walsh
2. *Energy Demand in Ireland, Projections and Policy Issues* S. Scott
3. *Some Issues in the Methodology of Attitude Research* E. E. Davis *et al.*
4. *Land Drainage Policy in Ireland* Richard Bruton and Frank J. Convery
5. *Recent Trends in Youth Unemployment* J. J. Sexton
6. *The Economic Consequences of European Union*
A Symposium on some Policy Aspects
D. Scott, J. Bradley, J. D. FitzGerald and M. Ross

Broadsheet Series

1. *Dental Services in Ireland* P. R. Kaim-Caudle
2. *We Can Stop Rising Prices* M. P. Fogarty
3. *Pharmaceutical Services in Ireland*
assisted by Annette O'Toole and Kathleen O'Donoghue
4. *Ophthalmic Services in Ireland* P. R. Kaim-Caudle
assisted by Kathleen O'Donoghue and Annette O'Toole
5. *Irish Pensions Schemes, 1969* P. R. Kaim-Caudle and J. G. Byrne
assisted by Annette O'Toole
6. *The Social Science Percentage Nuisance* R. C. Geary
7. *Poverty in Ireland: Research Priorities* Brendan M. Walsh
8. *Irish Entrepreneurs Speak for Themselves* M. P. Fogarty
9. *Marital Desertion in Dublin: An Exploratory Study* Kathleen O'Higgins
10. *Equalization of Opportunity in Ireland: Statistical Aspects*
R. C. Geary and F. S. Ó Muircheartaigh
11. *Public Social Expenditure in Ireland* Finola Kennedy
12. *Problems in Economic Planning and Policy Formation in Ireland, 1958-1974*
Desmond Norton
13. *Crisis in the Cattle Industry* R. O'Connor and P. Keogh

14. *A Study of Schemes for the Relief of Unemployment in Ireland*
with Appendix R. C. Geary and M. Dempsey
E. Costa
15. *Dublin Simon Community, 1971-1976: An Exploration* Ian Hart
16. *Aspects of the Swedish Economy and their Relevance to Ireland*
Robert O'Connor, Eoin O'Malley and Anthony Foley
17. *The Irish Housing System: A Critical Overview*
T. J. Baker and L. M. O'Brien
18. *The Irish Itinerants: Some Demographic, Economic and Educational Aspects*
M. Dempsey and R. C. Geary
19. *A Study of Industrial Workers' Co-operatives*
Robert O'Connor and Philip Kelly
20. *Drinking in Ireland: A Review of Trends in Alcohol Consumption, Alcohol Related Problems and Policies towards Alcohol* Brendan M. Walsh
21. *A Review of the Common Agricultural Policy and the Implications of Modified Systems for Ireland* R. O'Connor, C. Guiomard and J. Devereux
22. *Policy Aspects of Land-Use Planning in Ireland*
Frank J. Convery and A. Allan Schmidt
23. *Issues in Adoption in Ireland* Harold J. Abramson

Geary Lecture Series

1. *A Simple Approach to Macro-economic Dynamics* (1967) R. G. D. Allen
2. *Computers, Statistics and Planning-Systems or Chaos?* (1968) F. G. Foster
3. *The Dual Career Family* (1970) Rhona and Robert Rapoport
4. *The Psychosonomics of Rising Prices* (1971)
H. A. Turner
5. *An Interdisciplinary Approach to the Measurement of Utility or Welfare* (1973)
J. Tinbergen
6. *Economic Forecasting from Lagged Relationships* (1973) M. G. Kendall
7. *Towards a New Objectivity* (1974) Alvin W. Gouldner
8. *Structural Analysis in Sociology* (1975) Robert K. Merton
9. *British Economic Growth 1951-1973: Success or Failure?* (1976)
R. C. O. Matthews
10. *Official Statisticians and Econometricians in the Present Day World* (1977)
E. Malinvaud
11. *Political and Institutional Economics* (1978) Gunnar Myrdal
12. *The Dilemmas of a Socialist Economy: The Hungarian Experience* (1979)
János Kornai
13. *The Story of a Social Experiment and Some Reflections* (1980)
Robert M. Solow
14. *Modernisation and Religion* (1981) P. L. Berger
15. *Poor, Relatively Speaking* (1983) Amartya K. Sen
16. *Towards More Rational Decisions on Criminals* (1984) Daniel Glaser

General Research Series

1. *The Ownership of Personal Property in Ireland* Edward Nevin
2. *Short-Term Economic Forecasting and its Application in Ireland* Alfred Kuehn

- | | | |
|-----|---|---|
| 3. | <i>The Irish Tariff and The E.E.C.: A Factual Survey</i> | Edward Nevin |
| 4. | <i>Demand Relationships for Ireland</i> | C. E. V. Leser |
| 5. | <i>Local Government Finance in Ireland: A Preliminary Survey</i> | David Walker |
| 7. | <i>The Irish Woollen and Worsted Industry, 1946-59: A Study in Statistical Method</i> | R. C. Geary |
| 8. | <i>The Allocation of Public Funds for Social Development</i> | David Walker |
| 9. | <i>The Irish Price Level: A Comparative Study</i> | Edward Nevin |
| 10. | <i>Inland Transport in Ireland: A Factual Study</i> | D. J. Reynolds |
| 11. | <i>Public Debt and Economic Development</i> | Edward Nevin |
| 12. | <i>Wages in Ireland, 1946-62</i> | Edward Nevin |
| 13. | <i>Road Transport: The Problems and Prospects in Ireland</i> | D. J. Reynolds |
| 14. | <i>Imports and Economic Growth in Ireland, 1947-61</i> | C. E. V. Leser |
| 15. | <i>The Irish Economy in 1962 and 1963</i> | C. E. V. Leser |
| 16. | <i>Irish County Incomes in 1960</i> | E. A. Attwood and R. C. Geary |
| 17. | <i>The Capital Stock of Irish Industry</i> | Edward Nevin |
| 18. | <i>Local Government Finance and County Incomes</i> | David Walker |
| 19. | <i>Industrial Relations in Ireland: The Background</i> | David O'Mahony |
| 20. | <i>Social Security in Ireland and Western Europe</i> | P. R. Caim-Caudle |
| 21. | <i>The Irish Economy in 1963 and 1964</i> | C. E. V. Leser |
| 22. | <i>The Cost Structure of Irish Industry 1950-60</i> | Edward Nevin |
| 23. | <i>A Further Analysis of Irish Household Budget Data, 1951-52</i> | C. E. V. Leser |
| 24. | <i>Economic Aspects of Industrial Relations</i> | David O'Mahony |
| 25. | <i>Psychological Barriers to Economic Achievement</i> | P. Pentony |
| 26. | <i>Seasonality in Irish Economic Statistics</i> | C. E. V. Leser |
| 27. | <i>The Irish Economy in 1964 and 1965</i> | C. E. V. Leser |
| 28. | <i>Housing in Ireland: Some Economic Aspects</i> | P. R. Kaim-Caudle |
| 29. | <i>A Statistical Study of Wages, Prices and Employment in the Irish Manufacturing Sector</i> | C. St. J. O'Herlihy |
| 30. | <i>Fuel and Power in Ireland: Part I. Energy Consumption in 1970</i> | J. L. Booth |
| 31. | <i>Determinants of Wage Inflation in Ireland</i> | Keith Cowling |
| 32. | <i>Regional Employment Patterns in the Republic of Ireland</i> | T. J. Baker |
| 33. | <i>The Irish Economy in 1966</i> | The Staff of The Economic Research Institute |
| 34. | <i>Fuel and Power in Ireland: Part II. Electricity and Turf</i> | J. L. Booth |
| 35. | <i>Fuel and Power in Ireland: Part III. International and Temporal Aspects of Energy Consumption</i> | J. L. Booth |
| 36. | <i>Institutional Aspects of Commercial and Central Banking in Ireland</i> | John Hein |
| 37. | <i>Fuel and Power in Ireland: Part IV. Sources and Uses of Energy</i> | J. L. Booth |
| 38. | <i>A Study of Imports</i> | C. E. V. Leser |
| 39. | <i>The Irish Economy in 1967</i> | The Staff of The Economic and Social Research Institute |
| 40. | <i>Some Aspects of Price Inflation in Ireland</i> | R. C. Geary and J. L. Pratschke |
| 41. | <i>A Medium Term Planning Model for Ireland</i> | David Simpson |
| 42. | <i>Some Irish Population Problems Reconsidered</i> | Brendan M. Walsh |
| 43. | <i>The Irish Brain Drain</i> | Richard Lynn |
| 44. | <i>A Method of Estimating the Stock of Capital in Northern Ireland Manufacturing Industry: Limitations and Applications</i> | C. W. Jefferson |
| 45. | <i>An Input-Output Analysis of the Agricultural Sector of the Irish Economy in 1964</i> | R. O'Connor with M. Breslin |

46. *The Implications for Cattle Producers of Seasonal Price Fluctuations* R. O'Connor
47. *Transport in the Developing Economy of Ireland* John Blackwell
48. *Social Status and Inter-Generational Social Mobility in Dublin* Bertram Hutchinson
49. *Personal Incomes by County, 1965* Miceal Ross
50. *Income-Expenditure Relations in Ireland, 1965-1966* John L. Pratschke
51. *Costs and Prices in Transportable Goods Industries* W. Black, J. V. Simpson, D. G. Slattery
52. *Certain Aspects of Non-Agricultural Unemployment in Ireland* R. C. Geary and J. G. Hughes
53. *A Study of Demand Elasticities for Irish Imports* Dermot McAleese
54. *Internal Migration in Ireland with Appendix* R. C. Geary and J. G. Hughes
C. J. Gillman
55. *Religion and Demographic Behaviour in Ireland with Appendix* B. M. Walsh
R. C. Geary and J. G. Hughes
56. *Views on Pay Increases, Fringe Benefits and Low Pay* H. Behrend, A. Knowles and J. Davies
57. *Views on Income Differentials and the Economic Situation* H. Behrend, A. Knowles and J. Davies
58. *Computers in Ireland* F. G. Foster
59. *National Differences in Anxiety* Richard Lynn
60. *Capital Statistics for Irish Manufacturing Industry* C. W. Jefferson
61. *Rural Household Budget - Feasibility Study* Silé Sheehy and R. O'Connor
62. *Effective Tariffs and the Structure of Industrial Protection in Ireland* Dermot McAleese
63. *Methodology of Personal Income Estimation by County* Miceal Ross
64. *Further Data on County Incomes in the Sixties* Miceal Ross
65. *The Functional Distribution of Income in Ireland, 1938-70* J. G. Hughes
66. *Irish Input-Output Structures, 1964 and 1968* E. W. Henry
67. *Social Status in Dublin: Marriage, Mobility and First Employment* Bertram Hutchinson
68. *An Economic Evaluation of Irish Salmon Fishing, I: The Visiting Anglers* R. O'Connor and B. J. Whelan
69. *Women and Employment in Ireland: Results of a National Survey* Brendan M. Walsh assisted by Annette O'Toole
70. *Irish Manufactured Imports from the UK in the Sixties: The Effects of AIFTA* Dermot McAleese and John Martin
71. *Alphabetical Voting: A Study of the 1973 General Election in the Republic of Ireland* Christopher Robson and Brendan M. Walsh
72. *A Study of the Irish Cattle and Beef Industries* Terence J. Baker, Robert O'Connor and Rory Dunne
73. *Regional Employment Patterns in Northern Ireland* William Black and Clifford W. Jefferson
74. *Irish Full Employment Structures, 1968 and 1975* E. W. Henry
75. *An Economic Evaluation of Irish Salmon Fishing II: The Irish Anglers* R. O'Connor, B. J. Whelan and A. McCashin
76. *Factors Relating to Reconviction among Young Dublin Probationers* Ian Hart
77. *The Structure of Unemployment in Ireland, 1954-1972* Brendan M. Walsh

78. *An Economic Evaluation of Irish Salmon Fishing. III: The Commercial Fishermen*
B. J. Whelan, R. O'Connor and A. McCashin
79. *Wage Inflation and Wage Leadership*
W. E. J. McCarthy, J. F. O'Brien and V. G. Dowd
80. *An Econometric Study of the Irish Postal Service*
Peter Neary
81. *Employment Relationships in Irish Counties*
Terence J. Baker and Miceal Ross
82. *Irish Input-Output Income Multipliers 1964 and 1968*
J. R. Copeland and E. W. Henry
83. *A Study of the Structure and Determinants of the Behavioural Component of Social Attitudes in Ireland*
E. E. Davis
84. *Economic Aspects of Local Authority Expenditure and Finance*
J. R. Copeland and Brendan M. Walsh
85. *Population Growth and other Statistics of Middle-sized Irish Towns*
D. Curtin, R. C. Geary, T. A. Grimes and B. Menton
86. *The Income Sensitivity of the Personal Income Tax Base in Ireland, 1947-1972*
Brendan R. Dowling
87. *Traditional Families? From Culturally Prescribed to Negotiated Roles in Farm Families*
Damian F. Hannan and Louise Katsiaouni
88. *An Irish Personality Differential: A Technique for Measuring Affective and Cognitive Dimensions of Attitudes Towards Persons*
E. E. Davis and Mary O'Neill
89. *Redundancy and Re-Employment in Ireland*
Brendan J. Whelan and Brendan M. Walsh
90. *A National Model for Fuel Allocation - A Prototype*
E. W. Henry and S. Scott
91. *A Linear Programming Model for Irish Agriculture*
Robert O'Connor, Miceal Ross and Michael Behan
92. *Irish Educational Expenditures - Past, Present and Future*
A. Dale Tussing
93. *The Working and Living Conditions of Civil Service Typists*
Nóirín O'Broin and Gillian Farren
94. *Irish Public Debt*
Richard Bruton
95. *Output and Employment in the Irish Food Industry to 1990*
A. D. O'Rourke and T. P. McStay
96. *Displacement and Development: Class, Kinship and Social Change in Irish Rural Communities*
Damian F. Hannan
97. *Attitudes in the Republic of Ireland Relevant to the Northern Problem: Vol. I: Descriptive Analysis and Some Comparisons with Attitudes in Northern Ireland and Great Britain*
E. E. Davis and R. Sinnott
98. *Internal Migration Flows in Ireland and their Determinants*
J. G. Hughes and B. M. Walsh
99. *Irish Input-Output Structures, 1976*
E. W. Henry
100. *Development of the Irish Sea Fishing Industry and its Regional Implications*
R. O'Connor, J. A. Crutchfield, B. J. Whelan and K. E. Mellon
101. *Employment Conditions and Job Satisfaction: The Distribution, Perception and Evaluation of Job Rewards*
Christopher T. Whelan
102. *Crime in the Republic of Ireland: Statistical Trends and Their Interpretations*
David B. Rottman
103. *Measure of the Capital Stock in the Irish Manufacturing Sector, 1945-1973*
R. N. Vaughan
104. *A Study of National Wage Agreements in Ireland*
James F. O'Brien

105. *Socio-Economic Impact of the Construction of the ESB Power Station at Moneypoint, Co. Clare.* R. O'Connor, J. A. Crutchfield and B. J. Whelan
106. *The Financing of Third-level Education* A. C. Barlow
107. *An Input-Output Analysis of New Industry in Ireland in 1976* E. W. Henry
108. *Social Insurance and Absence from Work in Ireland* Gerard Hughes
109. *The Distribution of Income in the Republic of Ireland: A Study in Social Class and Family-Cycle Inequalities* David B. Rottman, Damian F. Hannan, Niamh Hardiman and Miriam M. Wiley
110. *The Economic and Social Circumstances of the Elderly in Ireland* B. J. Whelan and R. N. Vaughan
111. *Worker Priorities, Trust in Management and Prospects for Workers' Participation* Christopher T. Whelan
112. *The Impact of Energy Prices on the Irish Economy during 1973-1981* E. W. Henry
113. *Schooling and Sex Roles: Sex Differences in Subject Provision and Student Choice in Irish Post-Primary Schools* D. Hannan, R. Breen and B. Murray, D. Watson, N. Hardiman, K. O'Higgins
114. *Energy Crops, Forestry and Regional Development in Ireland* Frank J. Convery and Kathleen Dripchak
115. *Aggregate Supply, Aggregate Demand and Income Distribution in Ireland: A Macrosectoral Analysis* John Bradley and Connell Fanning
116. *Social Mobility in the Republic of Ireland: A Comparative Prospective* Christopher T. Whelan and Brendan J. Whelan
117. *Attitudes towards Poverty and Related Social Issues in Ireland* E. E. Davis, Joel W. Grube and Mark Morgan
118. *A Study of New House Prices in Ireland in the Seventies* Ian J. Irvine
119. *Education and the Labour Market: Work and Unemployment Among Recent Cohorts of Irish School Leavers* Richard Breen
120. *Payroll Tax Incidence, the Direct Tax Burden and the Rate of Return on State Pension Contributions in Ireland* Gerard Hughes
121. *Crime Victimisation in the Republic of Ireland* Richard Breen and David B. Rottman
122. *Medium-term Analysis of Fiscal Policy in Ireland: A Macroeconometric Study of the Period 1967-1980* John Bradley, Connell Fanning, Canice Prendergast and Mark Wynne
123. *The Irish Wealth Tax: A Case Study in Economics and Politics* Cedric Sandford and Oliver Morrissey
124. *Aspect of Freight Transport in Ireland* Jack Short
125. *Small-Scale Manufacturing Industry in Ireland* Kieran A. Kennedy and Tom Healy (assisted by J. Bergin, T. Callan and P. McNutt)
126. *Irish Medical Care Resources: An Economic Analysis* A. Dale Tussing
127. *Employment in the Public Domain in Recent Decades* Miceal Ross
128. *Multisector Modelling of the Irish Economy with Special Reference to Employment Projections* E. W. Henry
129. *Subject Availability and Student Performance in the Senior Cycle of Irish Post-Primary Schools* Richard Breen