Participation in Post-Compulsory Education in England: What Explains the Boom and Bust?

Damon Clark

April 2002

Published by
Centre for the Economics of Education
London School of Economics and Political Science
Houghton Street
London WC2A 2AE

ISBN 07530 1527 7

Individual copy price: £5

The Centre for the Economics of Education is an independent research centre funded by the Department for Education and Skills. The views expressed in this work are those of the authors and do not necessarily reflect the views of the DfES. All errors and omissions remain the authors.

Executive Summary

Participation in post-compulsory education in England increased from 45% in 1988 to 70% in 1993, but has remained at roughly 70% ever since. This slowdown in participation growth has resulted in both a slowdown in qualification attainment and a slowdown in higher education participation. Since it is almost universally accepted that UK economic performance depends strongly on the stock of skills and qualifications possessed by its workforce, it is important to understand the factors underlying this slowdown.

There are two categories of factors commonly assumed to drive participation in post-compulsory education: those that vary at the individual level – such as exam achievement and parental social class – and those that vary at an aggregate level such as local unemployment. Previous work based on cross-sectional data has found strong positive correlations between exam achievements and participation and social class and participation. Yet exam achievement continued to increase after 1993, and there is no evidence of a substantial change in the socio-economic composition of school-leaving cohorts over this period.

A more promising explanation for the slowdown is unemployment. Assuming that school-leavers are more likely to participate when unemployment is high, the increased unemployment associated with the recession of the early 1990s coupled with the subsequent decrease in unemployment post 1993 provides a story that fits the facts. Based on the existing evidence however, the story is not plausible, simply because the correlation found between unemployment and participation is not strong enough to explain the observed participation trends.

This existing evidence is however rather shaky. This stems from the fact that aggregate variables are inherently difficult to identify in cross-sectional data, forcing us to rely on correlations between national-level participation and national-level unemployment observed over time. Although the participation-unemployment relationship estimated in this way is generally found to be weak or non-existent, this may be because other national-level forces are at work, hiding the true nature of this relationship.

In this research we analyse the effects of aggregate variables – including unemployment – on participation using a twenty-year panel of regional-level data. Exploiting the variation in participation and these aggregate variables over time and between regions

should allow us to get a better grip on the effects of these aggregate variables on participation.

The key findings are:

- Local unemployment has a major impact on the participation decision, particularly for boys. The effects are estimated to be at least twice as large as those previously found, and can broadly explain the recent slowdown in participation growth. For girls, the effects are weaker, and so a part of the recent trend remains unexplained.

- Other aggregate level effects of importance are national rates of return to participation, supply constraints (as measured by the size of the school-leaving cohort) and peer group effects (as inferred from the fact that participation in one year is found to depend on participation in the previous year).

- We disaggregate the data by sector and nature of qualification. In particular, we assume that school-leavers first decide whether or not to participate in the school sector (school sixth forms and sixth-form colleges) and pursue academic qualifications. If they decide not to, we assume that they then decide whether or not to participate in the further education sector (further education and tertiary colleges) and pursue vocational qualifications. Considered in this way, we find that unemployment and supply constraint effects have a large impact on the second choice, but not the first.

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Acknowledgements

This paper has greatly benefited from discussions with Steve Nickell, Anna Vignoles, Hilary Steedman, Richard Layard and seminar participants at LSE and DfEE have also provided useful comments. I am very grateful to the DfEE for providing me with data, and to Gavan Conlon, Tanvi Desai, Marco Leonardi, and Jonathan Wadsworth for helping to construct various series.

Damon Clark can be contacted at Postfach 7240, D-53072 Bonn, Germany. Tel: +49 (0)228 3894 306. E-mail: clark@iza.org

1 Introduction

Over the summer of 2000, the British Government ran a media campaign aimed at school leavers with the message 'Don't Quit Now - things are about to get interesting'. It is not clear that they agree. Over the seven years between 1992/93 and 1999/00, participation in post-compulsory education and training among 16 year olds increased only marginally, from 70% to 70.3%.[1]

This slowdown in participation growth has resulted in both a slowdown in qualification attainment and a slowdown in higher education participation. Whilst the Higher Education Funding Council for England (HEFCE) has argued that there would have to be a 'step change' in further education attainment in order to reach the Government's widely publicised target of 50% participation in higher education by 2010,[2] the further educational attainment targets grow ever more distant. Hence whilst the Government has set a target of 85% of young people reaching at least NVQ level 2 or equivalent by 2002[3], the figure for 2000 was 75.3%. Since it is almost universally accepted that the economic performance of the UK is adversely affected by the relatively low levels of skills and qualifications possessed by its workforce (see for example, Nickell and Layard (1999)), it is important to gain an understanding of the factors underlying this slowdown.

We can start by placing these developments in historical context. As can be

[1] Based on data supplied by the DfEE. Includes all school leavers registered in full-time education, as well as 'Youth Trainees' attending further education colleges on a full-time basis (see Appendix A and for a description of post-compulsory education courses and institutions).

[2] As reported in The Economist, June 30th, 2001, p.34. Participation in higher education was 35% in 2001.

[3] See Appendix A for a classification of qualifications by NVQ level.

seen from Figure 1, the slowdown in participation growth post 1993 is exceptional. From 1950 to 1993, participation grew steadily, with particularly rapid growth during the late 1980s. Hence any explanation for the recent bust must also account for this earlier boom.

In searching for explanations, we can start from the assumption that school-leavers participate in post-compulsory education when the benefits (both monetary and non-monetary) from doing so exceed the costs. Then, explanations for the slowdown might include such things as attainment in school, the monetary return to participation (both of which will affect the monetary benefits to participation), parental income and youth unemployment (both of which will affect the monetary - opportunity - costs) and parental social class (which may affect non-monetary considerations). Notice that we can partition these factors into two categories: those that vary at the individual level (attainment in school, parental income, social class), and those that vary at the aggregate level (principally labour market factors such as the economic return to participation).

We already know a good deal about the relationships between the individual factors and participation thanks to a collection of studies that exploit detailed cross-sectional data on the characteristics of school-leavers and their families. These have established the importance of attainment in school and family background as determinants of participation (see Rice (1999), Andrews and Bradley (1997), Micklewright (1989) and Rice (1987)). Since attainment in school (as measured by exam success) increased substantially in the late 1980s, these factors may explain the rapid growth in participation over this period. They can

not however explain the subsequent slowdown in participation growth, since exam attainment continued to increase and there is no evidence of a substantial change in the socio-economic composition of more recent school-leaving cohorts.

This leaves us with factors that vary only at the aggregate level, about which we know far less. In part this is because cross-sectional data are not well suited to analysing these factors. Clearly, with data available for only one cohort of school-leavers, it is difficult to identify the effects of factors that do not vary at the individual level. For this reason, a small number of studies have used time series data to analyse these aggregate factors, including McVicar and Rice (2001), Pratten, Robertson, and Tatch (1997), Whitfield and Wilson (1991) and Pissarides (1981). Between them, they find that increases in the returns to education and in unemployment are both associated with increases in participation. The latter finding is especially interesting, since unemployment increased rapidly in the years before 1993 and decreased rapidly in the years afterwards. However, the unemployment effects found in these papers are not strong enough to counteract the effects of increased exam success and so can not fully account for the slowdown in participation growth.

This is not the end of the story however, since these type of studies suffer a number of drawbacks. First, with data on a limited number of variables, it is difficult to adequately control for all of the individual factors that the cross-sectional literature has found to be important in explaining participation. Moreover, since these data provide us with only a limited number of observations, results may be sensitive to sample period or model specification.

The objective of this paper is to re-examine the relationship between participation and these aggregate factors using a different strategy. Our approach is to use a panel of regional data covering eight English regions for the years 1976-1996. The advantages of panel data over time series data are well known. Since they allow us to exploit variation in participation and these aggregate factors between regions and over time, they will enable us to better control for omitted individual-level variables and provide us with more observations with which to identify robust relationships.

Pursuing this strategy, our key finding is that particularly for boys, local unemployment seems to have a major impact on the participation decision, with effects estimated to be at least twice as large as those found previously. As such, for boys at least, the fall in unemployment over the late 1990s can to a large extent explain the recent slowdown in participation growth. We also find evidence of supply effects, peer group effects and effects operating via the *national* rate of return to participation.

A second important contribution of the paper is to disaggregate the participation rate by sector. As section 3 makes clear, broadly speaking, over the past 20 years, school-leavers in England have faced a choice of participating in the schools sector (school sixth forms and sixth form colleges) and taking academic courses (A levels), or participating in the further education (FE) sector (further education and tertiary colleges) and taking a mixture of academic and vocational courses (such as GNVQs)[4]. Assuming that school-leavers choose whether

[4]These different qualifications are discussed in Appendix A.

or not to participate in the schools sector and, if they leave the schools sector, decide whether or not to participate in the FE sector, we find that the unemployment effects operate almost entirely through the second decision. That is, when unemployment is high, individuals that leave the school sector are far more likely to participate in the FE sector.

The remainder of the paper is organised as follows. Section 2 begins with a discussion of the related literature, before we outline our empirical strategy in section 3. Section 4 describes our data and we discuss our results in section 5. Section 6 concludes with a discussion of the policy implications of our analysis.

2 Related Literature

This section outlines the related literature. Although this is predominantly empirical in nature, we begin by setting out the theoretical framework in order to get a clearer idea of the forces likely to be driving participation. We then examine the cross-sectional and time-series literatures in turn.

2.1 Theoretical Framework

The theoretical starting point is the human capital investment model. In this model, pioneered by Ben-Porath (1967) and Becker (1964), the human capital investment decision is treated in an analogous way to the physical capital investment decision: that is, individuals invest in human capital until the marginal returns exceed the marginal costs. Card and Lemieux (2000) outline a number of extensions to the models of Ben-Porath (1967) and Becker (1964).

In a simple version in which school-leavers care only about income (rather than utility), we can consider an individual with school exam achievement attainment E at the point at which she finishes school (time zero). She chooses the number of years of post-compulsory school S in order to maximise the present discounted value of *expected* lifetime income:

$$V(S) = \int_0^S I(t)e^{-rt}dt + \int_S^\infty W(S, E, t)e^{-rt}dt$$

The term $I(t)$ represents expected income at time t should the individual spend $S > t$ years in post-compulsory education. The term $W(S, E, t)$ represents expected income earned at time t should the individual spend $S < t$ years in school. This depends on S, since more educated labour market entrants can expect to earn higher wages, and on E, since the returns to post-compulsory schooling are likely to be greater for those students with better school exam achievement.

An empirical counterpart to $I(t)$ might be parental income, since some parents may for example be willing/able to subsidise housing costs during post-compulsory education. Empirical counterparts to $W(S, E, t)$ might include rates of return to different levels of S at time 0, and unemployment rates for different levels of S at time 0. The rationale behind the consideration of these quantities at time 0 is that school-leavers make their decisions at time 0, hence this is the best information available to them. If tastes differ over school and work, then these will also affect the choice of S. Empirically, tastes are often captured by

measures of parental social class. Given the optimal value of S, the decision as to whether to participate at all in post-compulsory school (P) is trivially given as:

$$P = \left\{ \begin{array}{lll} 0 & if & S^* = 0 \\ 1 & if & S^* > 0 \end{array} \right\}$$

hence the school-leaver participates whenever the optimal number of years of post-compulsory exceeds zero.

2.2 Empirical Models

Given this discussion, we can consider an empirical model of the following form:

$$P_{irt} = \beta_0 + \beta'_X X_{irt} + \beta'_Z Z_{rt} + \beta'_W W_t + \varepsilon_{irt} \tag{1}$$

where we can partition the explanatory variables into those that vary at the individual level (X), those that vary at the regional level (Z) and those that vary at the national level (W). The β parameters are coefficients to be estimated, P_{irt} takes the value unity if the individual participates and zero otherwise and ε_{irt} is a random disturbance term.

Of course our partition of the aggregate variables into regional and national subsets is arbitrary in at least two senses. First, the local area need not correspond to a region, although we use the term region since our data are at the

regional level. Secondly, there is no theory specifying which factors belong in the set of regional variables and which belong in the set of national variables. This depends how school-leavers form expectations of $I(t)$ and $W(S, E, t)$, which will depend *inter alia* on whether they expect to continue living in the same region. With these caveats in mind, the related empirical literature proceeds in two directions.

Cross-Sectional Studies

The cross-sectional literature focuses on the parameters associated with the individual factors, β_X. That is, these studies typically estimate models of the following form (where we can now drop the time subscripts t):[5]

$$P_{ir} = \widetilde{\beta_0} + \beta'_X X_{ir} + D_r + \varepsilon_{ir}$$

Although the parameters associated with the region-varying variables can be identified from cross-sectional data, unless all of the regional variables in equation (1) are included in the estimated model, there is a danger that estimates of β_X will suffer from omitted variables bias and therefore be inconsistent. Hence these studies typically include region dummy variables to capture the effects of regional variables. This implies that $D_r = \beta'_Z Z_{rt}$, so that the parameters associated with the regional variables can not be separately identified. The

[5] In fact these papers begin from a model of probabilistic choice and estimate probit or logit models rather than the linear probability model that we are implicitly assuming. For the purposes of illustrating the different branches of the empirical literature however, it is convenient to describe the results as if they were estimated from such a model, since we can then ignore aggregation issues.

parameters associated with the national variables W_t can not be separately identified since they are captured by the constant term $\widetilde{\beta_0} = \beta_0 + \beta'_W W_t$.

Regarding the estimates typically obtained by these studies, Rice (1999) is based on the largest sample and offers a representative flavour. Rice finds important effects for school type, ethnicity and parental education, but by far the largest effects come from exam achievement and parental socio-economic group. To consider the magnitudes of these effects, Rice estimates the predicted probability of participating in post-compulsory education for a school-leaver with a given set of other characteristics and different levels of exam achievement. For males (females), the predicted probability of participation increases from 0.084 (0.172) for those with no exam achievements to 0.869 (0.884) for those with greater than five GCSE passes at grades A-C.

The importance of social class is most vividly seen for a school-leaver with given levels of exam achievement. For example, amongst those in the middle exam achievement range (between one and four GCSE grade A-C), the predicted probability of participation increases from 0.277 for those where the head of household is semi-skilled/unskilled, to 0.546 where the head of household is a professional worker. Although there is no income data in the Youth Cohort Study (YCS) data used by Rice, previous studies have examined the effect of income on participation. Using data from the National Child Development Study (NCDS), Micklewright (1989) finds no effect for boys, and only small effects for girls. Using Family Expenditure Data, Rice (1987) finds larger effects for girls, although the Micklewright (1989) results are derived from a model

with a far larger set of individual controls.

An interesting feature of Rice (1999) that is not shared by these other studies is that she has access to three waves of the YCS data, and so can directly estimate a version of equation (1), including regional variables and year dummy variables. Her estimates imply that unemployment has fairly strong effects. For example, based on actual unemployment data for 1991, she calculates predicted probabilities of participation of 71.4% for males and 85.5% for females. Had unemployment stayed at its 1990 level however, the predicted probabilities are 67.7% and 83.6% respectively. One problem with the specification from which these results are derived is that it does not include local area dummy variables. This may lead to inconsistent estimates if other local area effects are important. Moreover, the standard errors associated with the estimated coefficients are not corrected for grouped data bias (see Moulton (1986)).

Time-Series Studies

As noted in the Introduction, a second set of papers (McVicar and Rice (2001), Pratten, Robertson, and Tatch (1997), Whitfield and Wilson (1991) and Pissarides (1981)) use time series data to analyse the effects of aggregate variables. These studies aggregate equation (1) up to the national level, and estimate a model of the following form (where all variables refer to national averages and so individual and region subscripts are dropped):

$$P_t = \beta_0 + \beta'_X X_t + \beta'_Z Z_t + \beta'_W W_t + \varepsilon_t$$

Although these specifications often include a limited number of individual-level variables (typically exam achievement, social class and income), the parameters of most interest are those relating to the regional and national variables. In this respect, results differ across the different studies. Whitfield and Wilson (1991) estimate the model specified by Pissarides (1981) over the period 1957-1996, finding elasticities associated with the returns to participation (as measured by the ratio of manual to non-manual earnings) and unemployment of 0.3 and 0.1 respectively. McVicar and Rice (2001) and Pratten, Robertson, and Tatch (1997) have data over a longer period (1954-1996). In the former case, the estimated elasticities are smaller, perhaps because the specification includes a measure of exam achievement, whilst in the latter case, the estimated elasticity associated with the rate of return is very large, whilst unemployment appears to have no effect[6]. Such dramatic differences across papers using effectively the same data illustrate the problems associated with this type of study.

3 Empirical Strategy

In this section we describe how we will estimate the parameters of interest. We first outline the basic model that we will estimate, and examine a number of issues that we propose to investigate, before going on to outline a sequential choice model of participation that considers participation by sector.

[6] Although neither paper reports elasticities, rough elasticities may be calculated based on the reported coefficient estimates and estimates of the means of the data series graphed in these papers.

3.1 Basic Model

Our primary focus is on the parameters associated with the regional and national variables, β_Z and β_W. Since we have access to a panel of English regional data, our approach is to aggregate equation (1) up to the regional level and estimate:

$$P_{rt} = \beta_0 + \beta'_X X_{rt} + \beta'_Z Z_{rt} + D_r + D_t + \varepsilon_{rt} \qquad (1')$$

where P_{rt} and X_{rt} denote regional averages. We include region and year dummy variables D_r and D_t to capture the effects of any omitted X_{rt} and Z_{rt} variables, as well as national-level variables W_t. Provided that the omitted X_{rt} and Z_{rt} variables do not change across regions and over time, we can estimate both β_X and β_Z consistently in this framework.

We include in our set of X variables both exam results and parental income. The former is clearly a crucial determinant of exam success whilst the latter is interesting since income data at the micro level is limited. We include in our set of Z variables measures of the returns to participation and measures of unemployment. Ideally, we would like to measure unemployment by age and education level, in order to assess the impact of different types of unemployment on participation. In fact, the best that we can do is to estimate a measure of youth unemployment for all education groups, and a measure of unemployment by education level across all age groups. These are discussed further in the next section. One problem with the unemployment rates by education level is that they are derived from survey data and hence subject to sampling error. We

will consider a number of solutions to this problem, but will estimate equation (1') by instrumenting these using their lagged values (which we expect to be correlated with the true component but not the sampling error).

Since P_{rt} represents a proportion, we might consider estimating an equation in which the log odds ratio of P_{rt} was used as the dependent variable. However, to be consistent with equation (1) and to facilitate the interpretation and modeling of the year dummy variables, we choose not to transform the dependent variable and instead estimate equation (1') by weighted (to take account of the different populations across regions) least squares. Experiments show that this strategy has very little impact on our basic estimates. Within the context of this basic approach, we then investigate a number of issues:

Differences by Sex

As noted in our account of the related literature, several factors are found to have different effects for boys and for girls. Since we have data for boys and for girls, our approach is to estimate separate equations by sex.

Supply Constraints

The theoretical framework was predicated on the assumption that the supply of places in further education is perfectly elastic, and that the participation decision is entirely demand-driven. Whilst this is consistent with the law in England, it may not be consistent with the practice, if school-leavers are discouraged from participating in post-compulsory education, or more plausibly, if places on certain post-compulsory education courses are limited.

Peer Group Effects

Peer groups have been found to be important in some studies (see for example, Thomas (2000)), the rationale being that the utility associated with the post-secondary education is higher when more of the peer group also participate. Our approach to this issue is to extend the specification of equation (1') by including a lagged dependent variable, since this captures the extent to which the proportion of school-leavers participating in region r at time t is affected by the proportion participating in region r at time $t-1$. In that case, the other variables can have effects that persist over time.

Regional versus National Factors

As already noted, the distinction between regional and national factors is to some extent an arbitrary one, in that some of what we specify as regional variables may in fact be national variables. For example, school-leavers may base decisions on the *national* return to participation in post-compulsory education rather than simply the *regional* return. We investigate this issue by estimating an equation in which the dependent variable is the estimated year dummy variables from equation (1').

Reduced Form Models

Until this point, our analysis has not considered the possibility that exam achievement may be a choice variable. In that case, it is natural to assume that it will be driven *inter alia* by the expected returns to participation in post-compulsory education. As such, some of the variables in equation (1') may

influence both exam achievement and participation given exam achievement. In order to capture the 'full' effects of the other variables on participation, we estimate 'reduced form' models of participation in which we do not include exam achievement measures.

3.2 Sequential Model

In the basic model set out in equation (1)', we make no distinction between different modes of full-time participation. However, over the period considered, school-leavers in England faced a number of choices regarding the type of post-compulsory education course to pursue, and the type of institution to attend. A first approximation to this choice is as follows. School-leavers could choose either to stay in the schools sector (defined to include school sixth forms and sixth form colleges) and follow an academic course (typically A levels) or leave the school sector and enter the FE sector (further education and tertiary colleges) and pursue a vocational course (GNVQs for example)[7]. The former accounts for approximately two-thirds of all school-leavers participating in further education across our sample period; the latter about one-third.

Of course this distinction is drawn too sharply - some students pursue vocational courses in the schools sector whilst others pursue academic courses in the FE sector. According to Payne (1996) however, our distinction is true historically, and is a reasonable approximation to the system as it exists today. For

[7] See Appendix A for a discussion of the different courses available and institutions operating over the sample period.

example, Payne (1996) reports that in 1992, 86% of all A level students were enrolled in the schools sector, whilst 88% of all those taking only vocational courses were enrolled in the FE sector. Hence we will use the terms school (FE) and academic (vocational) sectors interchangeably.

A natural way of thinking about these choices is to assume that school-leavers first decide whether to stay on in the school sector or leave the school sector. If they choose to leave the school sector, they then decide whether to enter the FE sector or leave full-time education all together. On this basis we therefore estimate two models of participation:

$$S_{rt} = \gamma_0 + \gamma'_X X_{rt} + \gamma'_Z Z_{rt} + D_r + D_t + \varepsilon_{rt} \quad (2)$$

$$\frac{FE_{rt}}{1 - S_{rt}} = \psi_0 + \psi'_X X_{rt} + \psi'_Z Z_{rt} + D_r + D_t + \varepsilon_{rt} \quad (3)$$

where S_{rt} is the proportion of those in the region continuing in the school sector, and FE_{rt} is the proportion continuing in the FE sector.

4 Data

In this section, we describe how we construct our regional panel data. We begin with a description of the dependent variables used, before going on to describe our X and Z variables.

Participation Rates

Appendix B.1 describes how the dependent variables were constructed. These

measure participation as a proportion of the maintained school population. As discussed in Appendix A, the maintained school population essentially consists of students in state as opposed to private sector schools, and this group constitutes about 93-95% of the total number of school-leavers in a given year. Participation rates are measured at the January in the academic year following the year in which the cohort left school. For example, participation amongst the maintained school cohort finishing compulsory schooling in June 1991 is measured as the proportion of this cohort registered in education in January 1992. Since some students will drop out of further education between the start of the academic year (September) and January, these will not be picked up by our measure. Equally, our measure will not be the same as the proportion of students that actually complete courses.

The north-west quadrant of Figure 2 shows the overall level of participation in full-time education amongst 16 year olds in England over the sample period. As is already well known, there were two episodes of sharply increasing participation over this period - the first in the early 1980s and the second in the early 1990s. This graph also breaks down the full-time participation rates by sector. Patterns of participation in the schools and FE sector appear similar, with the exception of the late 1970s and early 1980s, when participation in full-time education appears to have been driven predominantly by an increase in participation in the FE sector. In the north-east quadrant, we plot the proportion of those leaving the schools sector participating in the FE sector. This increases sharply in the early 1980s and early 1990s. Disaggregating by sex, the bottom

graph shows that whilst full-time participation rates are slightly higher among girls than boys, the patterns are broadly similar over the sample period.

Exam Achievement

Appendix B.2 describes how we construct regional series of exam achievement broken down into four mutually exclusive categories: those with greater than five O-level/GCSE passes at A-C level; those with between one and four passes at A-C level; those with one or more passes at D-F level and those with no passes. Figure 3 illustrates various dimensions of exam achievement. The north-west quadrant shows that the increase in exam achievement that occurred in the late 1980s was driven predominantly by an increase in the proportion obtaining five or more higher grade passes and a decrease in the number of those with some lower grade passes. The north-east and south-west quadrants illustrate the superior exam achievements of girls relative to boys.

Parental Income

The other individual variable that we consider is income. We use as our measure of income the average real equivalised household income amongst families with children in every region and every year obtained from the Family Expenditure Survey (FES). Trends in this variable are plotted in the south-east quadrant of Figure 3.

Youth Unemployment

As a measure of the opportunity costs of participation in post-compulsory education, we use a measure of regional youth unemployment. In particular,

we focus on the unemployment rate amongst 18-19 year olds in every region and every year. Appendix B.3 describes how this variable was constructed. Not surprisingly, as seen in the north-west quadrant of Figure 4, this series is strongly cyclical, and increased dramatically during the recessions of the early 1980s and early 1990s. It is also apparent from Figure 4 that the variation of youth unemployment over the cycle is more marked for boys than girls.

Unemployment by Education Level

In order to capture the benefits to participation in terms of lower unemployment, we use the Labour Force Survey (LFS) to construct unemployment rates by education for the whole working age population in each region and each year. The LFS unemployment rates are defined according to the ILO unemployment definition and are the ratios of those in each group actively seeking work to the sum of employed and actively searching workers. Since we do not have data for 1980 and 1982 in the LFS, we average across the years before and after. We wish to compare the unemployment rate amongst those that participated in post-compulsory schooling with that amongst those that did not. Furthermore, for the purposes of estimating the sequential model, we wish to break these down according to whether the person participated in the FE (vocational) sector or the school (academic) sector. Since we only have highest qualification information in the LFS, in order to categorise respondents into the three groups (left school, participated in the school sector, participated in the FE sector), we have to make some assumptions as to which route an individual followed to their highest qualification. These assumptions are outlined in Table 1.

The most problematic group are those that we assume participated in full-time post-compulsory education in the FE sector, given the wide array of vocational qualifications available. Our approach, dictated in part by sample size considerations, is to pool all vocationally qualified people into this one group. Although some of these qualifications can be obtained without participating in post-compulsory education, the aim is to capture the expected return to vocational qualifications in the labour market. Hence it may not be unreasonable to assume for example, that school-leavers view vocational qualifications obtained from the FE sector as close substitutes to apprenticeships, and use the wages of apprentices as a guide to the return to these other qualifications. The north-east quadrant of Figure 3 graphs these three series. As we might expect, unemployment rates are highest amongst the leavers, and lowest amongst those we define as having participated in full-time education in the schools sector. All three series move with the cycle.

Returns to Participation

We obtain an estimate of the return to participation in post-compulsory education using the General Household Survey (GHS). We again proceed by classifying people into those that did not participate in post-compulsory education, those that participated in post-compulsory education in the schools sector and those that participated in the FE sector. Again, we only have information on highest qualification, and so we make some assumptions regarding the route to the highest qualification (see Table 1 again).

We then capture the economic returns to participation in post-compulsory

education by pooling all full-time workers in region r in year t and estimating a log-earnings equation of the following form:

$$\begin{aligned} \ln w_{irt} &= \beta_0 + \beta_1 PART(AC)_{irt} + \beta_2 PART(VOC)_{irt} \\ &\quad + \beta_3 AGE_{irt} + \beta_4 AGE_{irt}^2 + \varepsilon_{irt} \end{aligned}$$

where the leavers constitute the base category and ε_{irt} is a random disturbance term. We also repeat this procedure for males and females separately. The estimated rates of return are plotted in the south-west quadrant of Figure 4. Although the trend is generally upward, returns fluctuate from year to year, at least in part due to sampling variation.

Cohort Size

Our method of constructing the dependent variables entailed the construction of a series for the Maintained School Population (MSP). This is a measure of cohort size and we follow Pratten, Robertson, and Tatch (1997) in using this as a proxy for supply effects. As the south-east quadrant of Figure 4 shows, cohort size fell sharply after 1987 but started to increase again after 1993.

To get a flavour of the differences in these variables by region, Table 2 lists variable means by region calculated over the whole of the sample period 1976-1996. As we might expect, the more prosperous south- and south-east have the highest participation rates in full-time education, with the North having the lowest rate. Also as expected, exam achievement is highest in those regions with the highest participation rate. The returns to participation show no ob-

vious pattern across regions, but the North-South difference in unemployment is marked. The North-South divide is also apparent with respect to household income.

5 Results

In this section we present our results. We consider our basic model first, before going on to discuss the results of our sequential choice model.

5.1 Basic Model

Table 3 presents our estimates of equation (1'). We estimate separate equations for boys and girls, since we expect the estimates to differ across the sexes. The total number of observations (136) for each equation consists of 8 regions for 17 years. We lose three years of data (1976-1978) because our first observations from the LFS data are from 1979, and we lose a further year of data (1979) because we instrument the variables subject to sampling error (income, returns and unemployment by education) using their lagged values. Alternative treatments of these variables might include ignoring the sampling problem, using first differences in these variables, or using moving averages of these variables. The results of estimating models under these different specifications serve as robustness checks on our preferred method, and are presented in Table 4 (to save space, we present only the estimates for boys). In fact, the estimates are close to those presented in Table 3, and so we can be confident that our treatment of these variables does not affect our basic results.

5.1.1 Basic Results

Looking first at columns (1) and (3) of Table 3**,** we find that the effects of exam achievement are positive and significant for both boys and girls, but especially large for boys. For boys, the elasticity of participation with respect to the proportion with five or more higher grade O level/GCSE passes is 0.464[8]. For girls, the elasticity is lower, at 0.331. These estimates are higher than those estimated by McVicar and Rice (2001) but lower than those estimated by Pratten et al (1997).

For boys unlike girls, even improvements in the proportion of school-leavers with GCSE passes at any grade is associated with increased participation. This is consistent with the cross-sectional evidence which finds that participation is noticeably more sensitive to improvements in GCSE grades in the case of young males. For example, Rice (1999) argues that these results suggest a greater willingness on the part of young women to continue in full-time education after age 16 in order to retake qualifications in an effort to improve on past performance. In terms of our other individual (X) variable, household income, we find a positive effect of income for boys but not girls. This runs counter to the findings of the cross-sectional literature, although it should be noted that neither estimate is statistically significant.

Turning to the regional (Z) variables, we find that youth unemployment is strongly correlated with participation for both boys and girls, but with especially strong effects for boys. For boys, the elasticity is 0.239, more than double

[8] Elasticity=$\widehat{\beta}\frac{\overline{P}}{\overline{exam5}} = 0.961 * \frac{24.283}{50.33} = 0.464$

the highest estimate in the time series literature (0.1 in Whitfield and Wilson (1991)). However, the estimated elasticity for girls is much lower, at 0.045. One explanation for this finding is that the claimant count on which these figures are based has more relevance for boys than girls, because of problems of inactivity among young girls. To test this hypothesis, we estimated the girls participation equation using boys unemployment. The results were similar, leaving us to conclude that girls have a greater attachment to post-compulsory education. This is also consistent with the observations of Rice (1999) discussed in the previous paragraph and consistent with the results of Rice (1999).

The coefficients on the unemployment rates by education group are more puzzling. For boys, participation is *positively* correlated with unemployment among the group that participated in the academic sector. This is contrary to what we might expect, as is the finding that participation is *negatively* correlated with the unemployment rate among those that did not participate, although this estimate is statistically insignificant. A possible explanation is that when unemployment among the group who participated is high, school-leavers view the labour market as especially slack, and feel that they need to acquire more education in order to secure a job. For girls, we also find a negative coefficient on the unemployment of those that left, but we now find the expected negative coefficient on the unemployment of those that participated in the academic sector. However, unlike the case for boys, we find a negative coefficient on the unemployment of those that participated in the vocational sector.

This pattern is repeated when we look at the returns to participation in the

different sectors. For boys, the return to participation in the academic sector has a positive effect on participation whilst the return to participation in the vocational sector has a negative impact. The reverse is true for girls. Both this and the previous finding could be rationalised if it were the case that boys associated participation with jobs that require participation in the academic sector, whilst girls associated participation with jobs that require participation in the vocational sector. This is an issue we will return to in our sequential choice modeling.

Turning finally to the cohort size variable, we find that this takes the expected negative sign, with statistically significant estimates for both boys and girls. The elasticities associated with these estimates are 0.096 for boys and 0.074 for girls. These are therefore suggestive of post-compulsory education rationing. As already noted, this does not necessarily imply that school-leavers are not *permitted* to participate in post-compulsory education. Instead, it may be that their preferred courses are over-subscribed. This is another issue we will return to in our sequential model.

5.1.2 Decomposing Trends in Participation

To get a feel for the magnitude of the different effects, Table 5 presents a decomposition of the changes in predicted participation across three in-sample periods and an out-of-sample period. Looking at column (1) of the top panel of Table 5, we see that the actual change in participation among boys over the period 1981-1988 was 3.409. The predicted change based on the estimates

presented in column (1) of Table 3 was 3.962. This can be decomposed into the effects of changes in all of the independent variables. Notable amongst these is the large positive effect (2.327) coming from an increase in the proportion of boys gaining five or more higher grade GCSE passes, the large negative effect (-2.647) operating via a decrease in youth unemployment, small positive effects of increased income and reduced cohort size and a large positive effect (4.415) operating through our estimates of the year dummy variables. For girls, more of the change is accounted for by changes in exam achievement, and less by changes in unemployment. Again, the estimated year dummies are important.

In the second column, we focus on the period of rapid growth: 1988-1993. For boys, the actual increase was a huge 22.864 percentage points, and of the 22.301 percentage points explained by our equation, the bulk operates via improved exam achievement (11.588), increases in youth unemployment (6.318) and increased cohort size (1.233), with the remainder roughly accounted for by the estimated year dummy variables. The participation rate amongst girls increased in a similar fashion, although in this case it was the changes in exam achievement that provided the main driving force. This reflects both the smaller estimated unemployment effects for girls than for boys and the fact that youth unemployment among girls did not change as dramatically as that among boys over this period (see Figure 4).

In the third column we look at the period over which participation rates leveled off. For boys, we see that this was the result of an improved youth labour market canceling out the effects of improved exam achievement. For

girls, the youth unemployment effects are not as strong, and so the factors counteracting the improved exam achievement are captured in the estimated year dummy variables.

Finally, we attempt to explain the out-of-sample participation trend, which has been essentially flat[9]. For boys, we again find that the improving youth labour market is canceling out the effects of improved exam achievement. For girls, since the estimated unemployment effects are much smaller, we predict that participation should have increased over this period. Clearly, the factors subsumed in the year dummies and dragging girls participation down between 1993 and 1996 continued to operate in the later 1990s.

5.1.3 Further Issues

Within the context of this basic model, we now investigate the remaining issues outlined in section 3.

Peer Group Effects

In order to investigate peer group issues, columns (2) and (4) of Table 3 present the results of a dynamic model , including a lagged dependent variable to capture peer effects. Although there are well-known problems with the within-groups estimator in the context of dynamic models, our sample is sufficiently long (T=17) for us to ignore them (see Nickell (1981)).

Our estimate of the coefficient on the lagged dependent variable is 0.54 for

[9] According to the latest estimates (Statistical Bulletin 14/2001, Table 3), participation increased by less than one percentage point between 1996 and 2001.

boys and 0.41 for girls. This is consistent with the importance of peer group effects, and consistent with these effects being larger for boys than for girls (as has been found using cross-sectional data - see Thomas (2000)). The magnitudes of the other effects are generally lower under this specification, although these can now be interpreted as the short-run effects of these variables on the participation rate of the current cohort, with these variables also having long-run effects on the participation rates of future school-leaving cohorts.

Regional versus National

In order to determine whether some variables are more important at the national level, and to get a handle on the estimated time dummies driving some of our decomposition results, we use the estimated year dummy variables as the dependent variable in a time-series regression that includes the national unemployment rates by education as well as the national rates of return as independent variables. The hypothesis here is that school-leavers take their decisions on the basis of national-level information regarding these factors, either because they anticipate that they may leave their region in future, in which case the current region is not the relevant labour market, or because they have more information regarding trends at this level. The results of this exercise are presented in Table 6.

For boys, we find that the estimated return to participation in the academic sector is positively correlated with the estimated year dummy variables. From

the estimate in column (1), we calculate an elasticity of approximately 0.5.[10] This is in line with the 0.3 estimate of Whitfield and Wilson (1991), lower than that implicit in the estimates of Pratten et al (1997) but higher than that implicit in the estimates of McVicar and Rice (2001). For girls the effects are lower and are insignificantly different to zero when we use a three-year moving average instead of instrumenting with the lagged values.

The coefficients on the unemployment variables are signed in exactly the same manner as those estimated in equation (1') and reported in Table 3. This suggests that school-leavers use these variables at the national as well as the regional level in making their choices, although it is again difficult to find an obvious interpretation for these patterns.

That the lagged dependent variable is large and positive might suggest that school-leavers use national participation in the previous year when making their participation choices. Of course a caveat associated with these results is that unlike those estimated in the context of equation (1'), they may suffer from omitted variables bias. Still it is interesting to note that we find a significant positive effect of returns to participation in the academic sector at this level.

Reduced-Form Models

Our final experiment within the context of the basic model is to estimate

[10] Since the dependent variable is measured in percentage point units, the elasticity of the national return to participating in the academic sector with respect to participation for boys is calculated as:

$$59.264 * \frac{\overline{X}}{\overline{P}} = 59.264 * \frac{0.4}{45} = 0.527$$

equation (1') with the exam achievement variable omitted. This is intended to capture the full effects of the other variables in this equation, since these may also operate through the exam achievement variable. In fact, omitting this variable increases the estimates of the other variables only slightly, and so we do not include the results. This is another way of saying that the change in exam achievement over time is picked up almost entirely by the time dummies. The determinants of exam achievement therefore remains an open question.

5.2 Sequential Model

In this subsection, we discuss our estimates of the sequential choice model given by equations (2) and (3). We begin with the results for the proportion of school-leavers participating in the schools sector, before going on to describe the results for the proportion of those not participating in the schools sector that participate in the FE sector.

5.2.1 Participation in the Schools (Academic) Sector

Looking first at columns (1) and (3) of Table 7, we see a very different pattern of results from those presented for the full-time participation rate in Table 3. A common finding is that exam results are an important determinant of the participation rate in schools. The estimated elasticity associated with five or more higher grade passes is 0.540 for boys and 0.518 for girls. The elasticity for girls is much higher than in the basic model, suggesting the importance of the five or more O-level/GCSE hurdle. This is hardly surprising, since this level of

exam achievement is often considered an informal entry requirement for courses in this sector (i.e. A levels). That we obtain smaller effects from the other hurdles may be due to the fact that a small number of those participating in the schools sector will have been re-taking O level/GCSE exams. Often, these school-leavers have some O levels/GCSEs, but wish to obtain more, and/or obtain passes in key subjects like Maths. In terms of the other individual level (X) variable, we again find small positive income effects for boys but not girls, although like in the full-time case, these estimates are generally not statistically significant.

Turning to the regional level (Z) variables, a key result is that we find hardly any effects from youth unemployment for boys or girls. For the unemployment by education variables, we find a similar sign pattern to that obtained in the full-time participation case, although the estimates are generally small in magnitude and statistically insignificant. We find a positive effect for boys on the return to an academic education. This accords nicely with economic theory, although the elasticity (0.03) is small. The negative effect of the return to a vocational education may reflect the fact that for boys, this category acts as a proxy for the returns to not participating in the schools sector. For girls, both of the rates of return variables are negatively signed. Finally, we find no effects of cohort size on participation in the schools sector. This would suggest that if there is any rationing of post-compulsory education, it does not occur within this sector.

Columns (2) and (4) further explore these relationships by including a lagged dependent variable among the regressors to capture the dynamics of participa-

tion in the schools sector. The obvious thing to note about these specifications is the very large positive coefficient on the lagged dependent variable. This implies that participation in the schools sector is very persistent, with participation amongst one cohort heavily dependent on participation amongst the previous cohort. Otherwise, the introduction of the lagged dependent variable does not change the signs of the key results obtained from the static model, although the magnitudes of the estimated exam achievement coefficients are reduced.

5.2.2 Participation in the Further Education (Vocational) Sector

Table 8 presents the results of our analysis of the participation rates in the FE sector among those that have not participated in the school sector. Looking first at the static specifications in columns (1) and (3), we find very large effects of exam achievement for both boys and girls (elasticities 0.887 and 0.818 respectively), although for girls, only the five or more passes at O level/GCSE barrier appears important. We also find much stronger effects of income on participation in the FE sector (elasticities 0.077 and 0.060), suggesting that participation is more likely when the family is able to support the school-leaver along this route.

The biggest contrast with the school sector results however concerns youth unemployment. We estimate very large effects of youth unemployment for both boys and girls, although again, we find much larger effects for boys. For boys, the estimated elasticity is 0.636, whilst for girls it is 0.151. As already discussed, this finding of stronger unemployment effects for boys than girls is consistent with

the previous literature. The sign pattern of the unemployment by education coefficients mirrors that found with respect to the full-time and schools sector participation rate. For girls, there is a significant positive relationship between the economic returns to a vocational education and participation in the FE sector, although this is not the case for boys. Finally, and in contrast to our results for the schools sector, we find a very strong effect of cohort size on participation in the FE sector (elasticities 0.40 for boys and 0.331 for girls). This suggests that places on the most popular FE courses may be rationed. Since the entry guidelines in terms of school-leaving qualifications are less demanding for many vocational courses than they are for A levels, this is intuitively plausible.

In columns (3) and (4) we introduce some dynamics into the equation, in the shape of a lagged dependent variable. Again, the estimated coefficient on the lagged dependent variable is large and positive, suggesting a high degree of persistence in participation in post-compulsory education in the FE sector. Most of the other results are unaffected by the inclusion of a lagged dependent variable, although it should be noted that the estimated coefficients on exam achievement are now much reduced for boys, and the sign of the income effect is reversed. However, the strong youth unemployment and cohort size effects remain.

5.2.3 Decomposing Trends in Participation by Sector

We can use our estimates of equations (2) and (3) to decompose changes in participation rates by sector. We begin by looking at participation trends for

boys, before turning to trends in the participation of girls.

Boys

For boys, as seen from Table 9, changes in participation in the schools sector are driven largely by improvements in exam achievement. Hence the rapid improvement in exam achievement over the period 1988-1993 accounts for almost two-thirds of the increased participation over this period, although there is still a large fraction of the predicted change accounted for by the estimated year dummy variables. This is true across all in-sample periods, but especially this one.

On the other hand, changes in the proportion not participating in the schools sector but participating in the FE sector is driven by exam achievement, youth unemployment and cohort size. This is especially marked in the period of high participation growth (1988-1993), when increased youth unemployment accounted for almost as large a part of the increase as improved exam achievement. Our estimates suggest that out of sample, the fall in unemployment was easily large enough to offset the increase in exam achievement.

Girls

For girls, as seen from Table 10, the bulk of the changes in participation in the school sector are explained by changes in exam results. This obviously leaves unexplained the forces counteracting these effects in the 1993-1996 period (picked up by the year dummy variables) and the out-of-sample period. Regarding the change in participation in the FE sector, in addition to youth

unemployment, an important factor is cohort size. This adds to the huge growth during the boom years of 1988-1993, and contributes to the leveling off post-1993. Indeed for girls, changes in cohort size have effects similar in size to changes in youth unemployment. Again however, the combined effects of these variables are not enough to counteract the effects of improved exam achievement in the 1993-1996 and out-of-sample period. Hence for girls, as found in Table 5, we do not have a complete explanation of why participation rates did not continue to rise after 1993.

5.2.4 Regional versus National Factors

As for overall participation, we can examine the estimated year dummy variables from equations (2) and (3). We do this separately for boys and girls, and find that the estimated pattern is similar to that found for equation (1') across both types of participation. Hence we obtain small positive effects of the returns to academic participation. This could be interpreted as capturing expectations of the general returns to participation, although as already noted, these estimates should be interpreted with caution, as they are potentially contaminated omitted variables bias.

6 Conclusions

We can summarise our results by dividing our sample period into three subperiods. In the first, from 1981-1988, small increases in exam achievement drove small increases in participation in the order of 3 percentage points. In the sec-

ond period, from 1988-1993, large increases in exam achievement and youth unemployment and decreases in cohort size drove twenty percentage point increases in participation. From 1993 to 1996, the continued improvement in exam achievement was counteracted by an improvement in the youth labour market and an increase in cohort size, causing participation rates to level off at around 70%. These forces continued to cancel each other out into the late 1990s, leaving the participation rate stuck at 70%.

Of course there are important elements missing from this basic story. First, it fits the facts much better for boys than for girls, where the estimated effects of youth unemployment and cohort size are not large enough to offset the improvements in exam achievement. Secondly, we find that the bulk of these offsetting effects apply mainly to those school-leavers not participating in the schools sector and making a choice between the further education sector and leaving full-time education all together. This is consistent with recent evidence presented by Payne (2001), who finds very high drop-out rates among students in the further education sector. Finally, we find some effects of rates of return operating through our estimated year dummy variables.

Yet the basic fact remains that it was a mistake to interpret the increased participation of the late 1980s as a generational shift in attitudes towards post-compulsory education. Instead, it was the result of a special combination of forces emanating from a change in the school exam system in 1988 and the severe recession of the early 1990s. Without a repetition of either of these phenomena, securing increases in participation beyond the current level of approximately

70% will be difficult to achieve. This implies that the 30% of school-leavers that persist in leaving full-time education at 16 will remain a key challenge for policy-makers.

A Institutional Environment

This section covers a number of changes thought to affect the participation decision over the time period for which we collect data (1976-1996). The most important of these changes (for our purposes at least) are summarised in Table 1.

A.1 Structure of Compulsory Education

The distinction between 'maintained' and 'non-maintained' schools is an important one, since for reasons of data availability, we calculate participation rates and exam achievements for the maintained sector only. Broadly speaking, 'maintained' schools are those operated by (local or central) Government, whilst 'non-maintained' schools are those operating outside of direct Government control. To get a rough idea of the quantitative importance of each sector, note that in 1975 (one year before our first observation), the non-maintained sector constituted 5.17% of all pupils in secondary schools in England.[11] By the last year in the sample, the figure had increased slightly, to 6.88%.[12]

In other words, we will be focusing on the 95% of pupils that receive their compulsory education in the maintained sector. Of course, data permitting, we would prefer to focus on the broader measure, since we are interested in the participation behaviour of all school-leavers. However, as well as being a small

[11] Data from Regional Trends 1975, Table 61.

[12] *Statistics of Education 1996: Schools*, Table 3. Figures for independent schools cover both primary and secondary schools, hence we use the proportion in secondary schools taken from the data used to construct the proportion in 1974. Although this may have changed slightly over time, any changes will not alter our benchmark estimate of a non-maintained proportion in the region of 5-7%.

group, the excluded category displays much higher participation rates than the group that we focus on. For example, in the first year for which we have data (1976), the participation rate in the schools sector (i.e. the proportion of the maintained school population participating in schools or sixth form colleges but not further education colleges) was 25.7% in the maintained sector and 68.2% in the non-maintained sector.[13] This latter figure is close to the participation rate in both the schools sector and the FE sector for those in the maintained sector at the *end* of the sample period (in 1996, the figure is 71%). Hence not only do school-leavers from the non-maintained sector display very different patterns of participation, but from a policy point of view, if we are interested in increasing participation, then focusing on the maintained sector makes some sense.

A.2 Content of Compulsory Education

Prior to 1988, 16 year old school-leavers sat 'Ordinary level' (O level) and 'CSE' Certificate of Secondary Education (CSE) exams. Over the period covered by our data, O level exams were graded A-E in descending order, with grades A-C considered to be a 'pass'. CSEs were designed for the lower half of the ability distribution and were graded 1-5, grade 1 considered equivalent to a grade A-C O level. In 1988, this system was replaced by one in which students took a new 'General Certificate of Secondary Education' (GCSE) graded A-G, with grades A-C considered equivalent to a higher level pass under the old system. The most significant aspect of the new GCSEs was the emphasis that they placed

[13] See *Statistics of Education 1977: Schools*, Table 10(i)

on assessed coursework, as opposed to evaluating students solely on the basis of a final exam.

A.3 School-Leaving Legislation

Over the period covered by our data (these rules came into effect on 1 September 1972), the minimum school leaving age was defined as follows: if a child's 16th birthday fell in the period 1 September to 31 January inclusive, she was required to stay at school until the end of the spring term (i.e. until the following Easter); if her 16th birthday fell in the period 1 February to 31 August inclusive, she had to stay until the end of the summer term in the same year.[14] As regards participation in post-compulsory education, the 1944 Education Act established the right of all pupils to participate if they so wished, although as already noted, it may be that in practice, certain pupils, particularly less academically able ones, are discouraged from participating.

A.4 Structure of Post-Compulsory Education

Until 1993, a distinction was made between the schools sector and the further education (FE) sector in the provision of full-time education post-16. The schools sector comprised secondary schools and sixth form colleges, and in the FE sector were a number of establishments that we categorise as 'further education colleges'. Hence we consider three types of post-compulsory education provider:

[14] See *Statistics of Education 1979: Schools*, note 26, for a historical perspective on school-leaving age legislation.

1. Secondary schools (including independent schools, city technology colleges and sixth form colleges). These were able to provide both compulsory and post-compulsory education.

2. Sixth form colleges. This provided only post-compulsory education, but were still classified in the schools sector.

3. Further Education colleges (tertiary colleges, colleges of further and higher education).

To get a quantitative feel for the relative importance of these three types, it is worth noting that in 1989, of the total number of 'Year 12' students (broadly, 16 year olds) in post-compulsory education, 54% were in school sixth forms, 13% in sixth form colleges and 33% were in FE colleges. Although these figures change slightly over the early 1990s, by 1994, the proportions remain broadly the same (49%, 15%, 36%)[15].

In 1993, sixth form colleges were transferred from the 'schools' sector into the FE sector. The substantive effect of this change was to change the basis on which sixth form colleges were funded.

A.5 Content of Post-Compulsory Education

An important part of the participation choice relates to the courses chosen to undertake. In this respect, there have been a large number of changes to the options facing school-leavers. These can be considered at three levels: Advanced

[15] Figures from Payne (1996), chapter 2, which in turn in based on Youth Cohort Survey (YCS) data.

(or what is often referred to as National Vocational Qualification (NVQ) Level 3); Intermediate (NVQ Level 2) and Foundation (NVQ Level 1). We consider full-time academic and vocational qualifications in turn.

Academic

Over the period 1975-1988, the academic courses available to school-leavers consisted of O levels at NVQ Level 2 (either new O levels or O level resits) and A levels at NVQ Level 3. After 1988, the situation changed somewhat as GCSEs replaced O Levels and a new AS Level course was introduced at NVQ Level 3.

Vocational

The full-time vocational options were more complex. At the foundation level, NVQ Level 1, over the period 1975-1992, the main courses available were the British Business and Technician Education Council (BTEC) First Certificate and various Royal Society of the Arts (RSA) certificates. In addition to these one-year courses, in 1992, one-year General National Vocational Qualification (GNVQ) Foundation level courses were introduced in five vocational areas: art and design; manufacturing; leisure and tourism; business and health and social care. At the intermediate level, NVQ Level 2, the BTEC First Diploma and RSA diploma also involved one year of full-time education and again, these were supplemented in 1992/93 by the new one-year GNVQ Intermediate qualification. At the advanced level, NVQ Level 3, before 1992, the principal course in this category was the two-year BTEC National Certificate. In 1992/93, a new two-year Advanced level GNVQ qualification was introduced.

A.6 Structure and Content of Post-Compulsory Education

Historically, schools and sixth form colleges provided academic education, whilst FE colleges provided vocational courses and Payne (1996) suggests that these educational institutions still keep their traditional specialisation. For example, in 1992, 86% of all A level students were enrolled in schools or sixth form colleges, whilst 88% of all those taking only vocational courses were enrolled in FE colleges.

B Data Appendix

In this section, we describe how several key data series were constructed.

B.1 Participation Rates

B.1.1 Participation in the School Sector

We define the proportion participating in the school sector as the fraction of the maintained school population of school-leaving age continuing in full-time education in maintained schools.[16] We refer to the participation rate in a given year (say 1989) as the proportion of the cohort of children whose final compulsory academic year is 1988-1989 (and who finish compulsory education some time between the Easter and summer of 1989) that are recorded in education in the following January (1990). The series is constructed as follows:

[16] See the above discussion for a definition of maintained schools.

1976-1979

These proportions are taken directly from '*Statistics of Education: Schools*'.[17] For example, the participation rate for 1978 (taken from '*Statistics of Education 1979: Schools*') is calculated as:

$$\text{Part}^{\text{SCHOOL}}(1978) = \frac{\#\ 16 \text{ in Jan } 1979}{\#\ 15 \text{ in Jan } 1978}$$

and we use the symbol # to denote 'the number aged'. Here, both the numerator and the denominator refer to those whose birthdays fall between January and December, where this is designed to avoid including those aged 16 in January in their final year of compulsory education.

1980-1991

These proportions are taken directly from '*Statistics of Education: Schools*'. They are calculated exactly as above, except that both the numerator and the denominator refer to those aged 15 and 16 at the beginning of the academic year (31 August). Although this introduces a discontinuity into the series, this is not thought to be large. To see this, compare the proportions for the whole of England for 1976-1978 as calculated on the first basis (published in '*Statistics of Education 1976-1979: Schools*') and the second basis (*published in 'Statistics of Education 1980: Schools'*). For example, for 1978, the proportion calculated on the first basis is 24.4, whilst the proportion calculated on the second basis is 24.5.

[17] See 'Data Sources' Appendix for a discussion of how these data are collected.

1992-1993

These proportions are calculated using totals taken from '*Statistics of Education: Schools*' volumes. For example, the participation rate for 1992 is calculated as:

$$\text{Part}^{\text{SCHOOL}}(1992) = \frac{\#\ 16 \text{ in Jan } 1993}{\#\ 15 \text{ in Jan } 1992}$$

where the numerator is taken from *'Statistics of Education 1993: Schools'* and the denominator from '*Statistics of Education 1992: Schools*'.

1994

In this year, the numerator is from data supplied by the DfEE. The denominator is from '*Statistics of Education 1994: Schools'*. Since DfEE data is on a GOR basis, the DfEE number (numerator) is adjusted. This is done by comparing the number of 16 year olds on the old (SSR) basis and on the new (GOR) basis in 1994 (the only year for which we have overlapping data). Hence:

$$\text{Part}^{\text{SCHOOL}}(1994) = \frac{\#\ 16 \text{ in } 1995 \text{ on GOR basis}}{\#\ 15 \text{ in } 1994 \text{ on SSR basis}} * \frac{\#\ 16 \text{ in } 1994 \text{ on SSR basis}}{\#\ 16 \text{ in } 1994 \text{ on GOR basis}}$$

1995-1998

In these years, both numerator and denominator are calculated using data supplied by the DfEE. Again, since the data are on a GOR basis, they need to

be adjusted to be consistent with our earlier data. This is done by adjusting the number of 15 year olds and the number of 16 year olds in the manner described above. The adjustment factor attempts to account for different trends across the newly defined regions. For example, the participation rate for 1996 is calculated as:

$$\text{Part}^{\text{SCHOOL}}(1996) = \frac{\#\text{ 16 in 1997 on GOR basis}}{\#\text{ 15 in 1996 on GOR basis}} * \frac{\frac{\#\text{ 16 in 1994 on SSR basis}}{\#\text{ 16 in 1994 on GOR basis}}}{\frac{\#\text{ 15 in 1994 on GOR basis}}{\#\text{ 15 in 1994 on SSR basis}}}$$

B.1.2 Maintained School Population

In order to calculate some of our other series, we will need a series for the maintained school population (MSP) of school-leaving age. This is calculated as follows:

1990-1994

We take this from '*Statistics of Education: Schools*', volumes 1991-1994.

1995-1996

For 1995-1996, we use data supplied by the DfEE. Although this on a GOR basis, we adjust using data we have for 1994 on both bases (GOR and SSR).

1977-1991

We take this from '*Statistics of Education: School-Leavers Survey*', volumes 1979-1990. Since these figures are collected differently we adjust this series to make it consistent with the 1990-1994 data using data we have on both bases

for 1990.

1976

We do not have data on the MSP for 1976, hence we use data for 1977.

B.1.3 Participation in the FE Sector

We define the proportion participating in the FE sector as the fraction of the maintained school population of school-leaving age continuing in full-time education in the FE sector measured in the November of the same year. This again raises a conceptual issue, in that some of those school-leavers observed in further education may have come from non-maintained schools. However, Payne (1996) shows that only one in five of the students from non-maintained schools moved to an FE college, the vast majority continuing in school. Hence we ignore this problem in analysing the numerators (numbers in FE).

1976-1979

Relevant proportions taken from 'Regional Trends' where the denominator is the 'maintained school population of school-leaving age'.

1981-1982

In these years, the published statistics use as the denominator the 'population aged 16', hence we calculate the numerators by multiplying by the 'population aged 16' figure presented in 'Regional Trends' and use our series for the 'maintained school population of school-leaving age' to derive the correct proportions. Again we ignore the fact that the definition of a 16 year old changed

between 1978 and 1979. Hence:

$$\text{Part}^{\text{FE}}(1981)=\frac{\text{Part}^{\text{FE(RT)}}*\text{Population Aged 16 (1981)}}{\text{Maintained School Population (1981)}}$$

1984-1986

See above.

1988-1993

In these years, the numerators are published in 'Regional Trends', and so we use these and our estimates of the maintained school population of school-leaving age. Hence:

$$\text{Part}^{\text{FE}}(1988)=\frac{\#\text{ in FE (1988)}}{\text{Maintained School Population (1988)}}$$

1980, 1983, 1987

There is no data for these years in Regional Trends. Hence the proportions are a weighted average of those in the year before and the year after, where the weights are calculated using the *number* of 16-18 year olds in further education

taken from *'Statistics of Education: Further Education'*.[18] For example:

$$\begin{aligned} \text{Part}^{\text{FE}}(1987) &= \text{Part}^{\text{FE}}(1986)*\frac{(\#\text{ FE in 1988})\text{-}(\#\text{ FE 1987})}{(\#\text{ FE in 1988})\text{ - }(\#\text{ FE in 1986})} \\ &\quad +\text{Part}^{\text{FE}}(1988)*\frac{(\#\text{ FE in 1987})\text{-}(\#\text{ FE in 1986})}{(\#\text{ FE in 1988})\text{ - }(\#\text{ FE in 1986})} \end{aligned}$$

1994-1996

For these years, we have data on the proportions of interest from 'Regional Trends' 1997, 1998 and 1999. However, these are based on GORs and the proportions are expressed as a percentage of the total population rather than the maintained school population. Hence to make them consistent with our earlier series, we make two adjustments: (a) we use information on the numbers of students in FE by region on both region definitions (SSR and GOR) for 1993/94 (where the data comes from 'Regional Trends' 1997) and (b) we use estimates of the total population in 1993 derived from 'Regional Trends' 1996 to adjust for the fact that the denominators change from the MSP to the total population. For example, for 1995 we have:

$$\text{Part}^{\text{FE}}(1995)=\text{Part}^{\text{FE(GOR)}}(1995)*\frac{\#\text{ FE in 1994 SSR}}{\#\text{ FE in 1994 GOR}}*\frac{\text{total popn (1993)}}{\text{MSP (1993)}}$$

[18] See 'Data Sources' Appendix for a discussion of these data

B.1.4 Disaggregation by Sector

Although we have already constructed separate series for participation in the schools and FE sectors, as a result of the transfer of sixth form colleges from the schools sector to the further education sector in 1993, the data described above do not give us a consistent series by sector. However, we have data provided by the DfEE which break down the participation rates into schools, sixth-form colleges and FE colleges from the period 1993 onwards, and we use these data to adjust our estimates of the participation rates by sector. Since the data we have are on a GOR basis, we describe how we make the adjustments for the regions unaffected by the change in definition (Yorkshire and Humberside, East Midlands, West Midlands and South West) and the regions affected (North, North West, East Anglia, South East).

Regions Unaffected GOR Definition

For these regions, and for 1993-1996, we calculate an adjusted series for the participation rates in the schools and FE sector. Hence:

$$\begin{aligned} \text{Part}^{\text{SCHOOLS (ADJUSTED)}} &= \text{Part}^{\text{SCHOOLS}}(1+\text{ratio}^{\text{SCHOOLS}}) \\ \text{Part}^{\text{FE (ADJUSTED)}} &= \text{Part}^{\text{FE}}(1\text{-ratio}^{\text{FE}}) \end{aligned}$$

where:

$$\begin{aligned} \text{ratio}^{\text{FE}} &= \frac{\#\text{ sixth form}}{\#\text{ FE college}} \\ \text{ratio}^{\text{SCHOOL}} &= \frac{\#\text{ sixth form}}{\#\text{ school}} \end{aligned}$$

where the data supplied by the DfEE are used to calculate these ratios.

Regions Affected by GOR Definition

For these regions, we have ratios on the new GOR basis but not the old SSR basis. Hence we need to aggregate up to the old SSR ratios using the information provided at LEA level. Since LEAs are of different size, we need to weight LEAs differently. We do this using the maintained school population by LEA in 1993 (from Statistics of Education 1993: Exam Achievements). Although this is not strictly correct (we ought to use the population of school-leavers since the data we have refers to this group), we can check the accuracy of our procedure by aggregating up to the GORs that we have information on. In doing this, our method is never more than 0.1 percentage points away from the correct figure. Hence we calculate the ratio^{FE} and ratio^{SCHOOL} in this manner and calculated adjusted series as described above.

B.1.5 Disaggregation by Sex

Until 1993, for the proportions participating in the schools sector, data in each of the sources described is disaggregated for boys and girls. After 1993 however, we do not have data on the numbers of students in sixth form colleges by sex,

hence we make the preceding adjustment and then split by sex according to the proportion of boys and girls calculated for schools only.

Unfortunately, for the proportions participating in the FE sector, we do not have separate data for boys and girls on the figures of interest. We do however, have data on the total numbers of males and females in further education (which is not the same, since we are interested in only 16 year olds). We now describe how we use this data to disaggregate by sex.

Pre-1988

To split the proportion of 16 year olds in FE into seperate proportions for boys and girls, we use data from *'Statistics of Education: Further Education'* on the proportions of boys and girls aged 16-18 studying at FE colleges. This entails two assumptions:

1. That the proportions of boys and girls in the MSP are equal
2. That the proportions of boys and girls in the 16-18 totals mirror the proportions in the age 16 totals that we are interested in.

To assess the validity of the second assumption, we can use national-level data from '*Statistics of Education 1987: Further Education*'. For 1987, the ratio of boys to girls in the age 16 totals for full-time study is 0.75. In the aged 16-18 groups that we actually use, the proportion is 0.76.[19] Hence it would appear that the adjustment is reliable. Taking 1984 as an example, we calculate the

[19] See '*Statistics of Education 1987: Further Education*', Table F3.

proportion of girls participating in the FE sector as:

$$\text{Part}^{\text{FE(GIRLS)}}(1984)=\frac{2*\text{Part}^{\text{FE}}(1984)}{1+\text{ratio}^{\text{bg}}(1984)}$$

where:

$$\text{ratio}^{\text{bg}}(1984)=\frac{\#\text{boys}}{\#\text{girls}}$$

and the proportion of boys as:

$$\text{Part}^{\text{FE(BOYS)}}(1984)=2*\text{Part}^{\text{FE}}(1984)\text{-Part}^{\text{FE(GIRLS)}}(1984)$$

1988-1996

From 1988 we perform the same calculations using a slightly different series published in 'Regional Trends'.[20] To make sure this is consistent with our earlier calculations we adjust this series using overlapping data for the year 1987. Since we do not have any data for 1994 we take a simple average of our calculations for 1993 and 1995. Similarly, we do not have data for 1996 and so we use the proportions calculated for 1996.

[20] See the 'Data Sources' Appendix for a discussion of how the collection of FE information changes in 1988.

B.2 Exam Achievements

We define four mutually exclusive categories of exam achievement - five or more higher grade O levels/CSEs/GCSEs; between one and four higher grade O levels/CSEs/GCSEs; at least one pass at another grade; no graded passes. In what follows, we describe how they are calculated.

B.2.1 Post-1992

1995-1996

These proportions are taken from '*Statistics of Education: Exam Achievements*' and refer to maintained schools only

1992-1994

Since the published proportions are not split by sex, we use data from the DfEE that is split by sex. MSP totals are used to construct weighted averages for the 'South East' from the data given for 'Greater London' and 'Other South East'

B.2.2 Pre-1992

1989-1991

These are calculated from 'Statistics of Education: School-Leavers'. Three issues with these data are:

1. The Tables only provide us with data for school-leavers

2. The Tables refer to both maintained and non-maintained schools

3. The Tables only provide data on the exam achievements of all school leavers without A level passes (which includes GCSE resits and/or A level failures

For 1989, 1990 and 1991, we solve this problem by computing exam achievements as (using >5 GCSEs as an example):

$$\text{GCSE}^5 = \text{Part}^{\text{SCHOOL}} * \text{adj}_1 + (1 - \text{Part}^{\text{SCHOOL}}) * \text{GCSE}^5(\text{Leave})$$

where:

$$\text{adj}_1 = \text{Pr opn}(\text{STAY}) \& \text{GCSE}^5$$

and this data on exam achivements by intended destination comes from 'Statistical Bulletins' 1/91 (1989), 15/92 (1990) and 22/92 (1991). Since these Bulletins do not provide this data by region, we make the same adjustment for each region. Before 1989, we use the adjustment factors found for 1989.

B.2.3 1991 and 1992

Since the figures before 1992 refer to all schools, whereas the figures for 1992 onwards are calculated for maintained schools only, we use data for 1992 on both bases to adjust the earlier series. This data is found in 'Regional Trends'

1994. For example, for 1991 we have:

$$\text{GCSE}^5(1991)=\text{GCSE}^5(1991)^{+}*\frac{\text{GCSE}^5(1992)^{\text{NEW}}}{\text{GCSE}^5(1992)^{\text{OLD}}}$$

where the superscript '+' is used to denote the series being adjusted.

B.3 Unemployment Rates by Age

We calculate an unemployment rate as the ratio of total unemployed to relevant population.

B.3.1 Unemployment Levels

After 1979

From 1980-1996, we calculate the numbers unemployed aged 18-19. In each of these years, 'Regional Trends' breaks down the total claimant count into the proportions in various age groups, including this one. We therefore use this information to calculate our totals.

Before 1979

Before 1979, we have data only for men, and the 18-19 group becomes the under-20 group. We use information from 1979 on the ratio of male to female claimants in each group and the proportions of the under-20 claimants aged 18-19.

B.3.2 Relevant Population

After 1990

After 1990, we have data on the population of 18-19 year olds in each region supplied by the Office for National Statistics (ONS).

1980-1990

Before 1990, we do not have data on the population aged 18-19. To generate this figure, we use the total school-leaving population two and three years ago (from Regional Trends). We do not have this information by sex, hence we impose a 50-50 male/female split.

1976-1979

Before 1980, we do not have data on the total school-leaving population, hence we use data on the maintained school-leaving population instead, adjusting this series using data for both measures in 1980. Again, we do not have this information by sex, hence we impose a 50-50 male/female split.

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Figure 1: Participation in Post-Compulsory Full-Time Education: 1950-2000

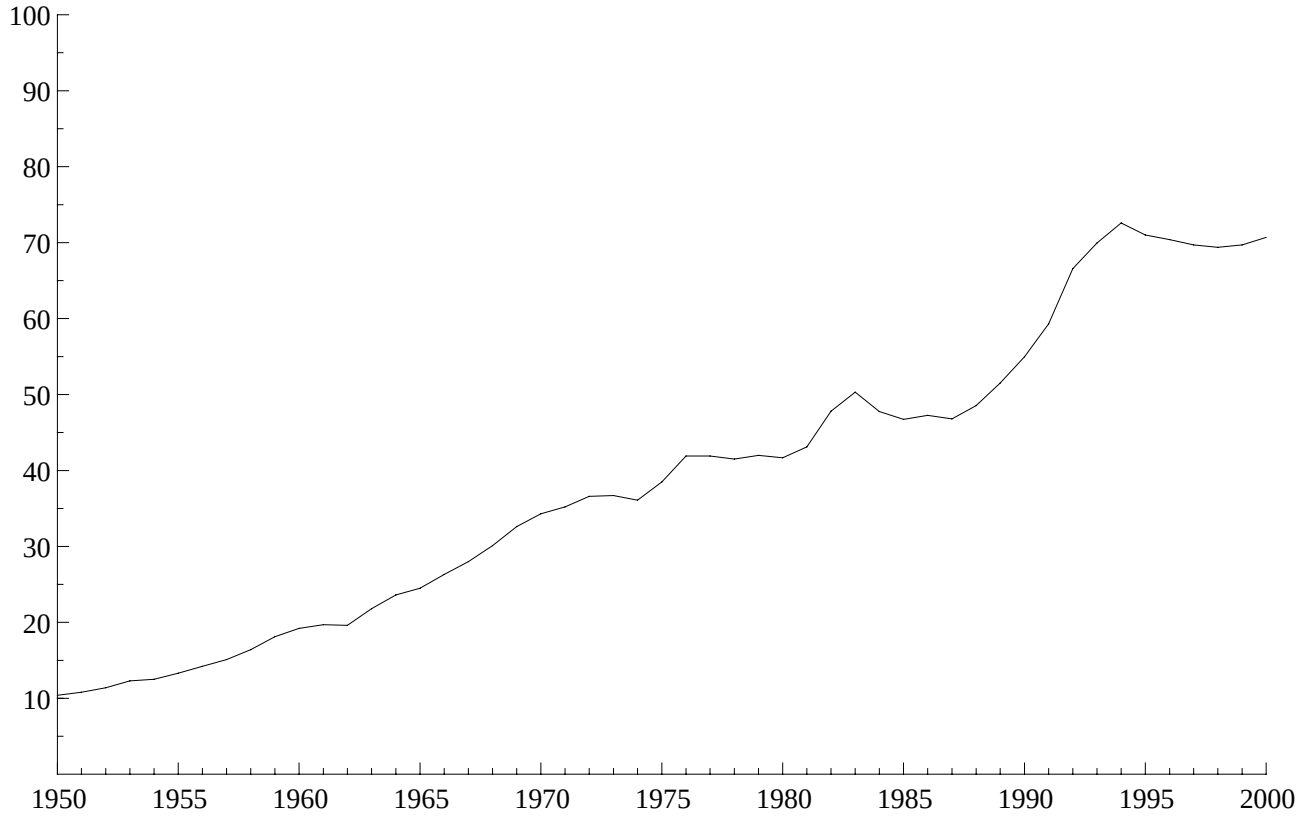

Figure 2: Time Series Participation Data

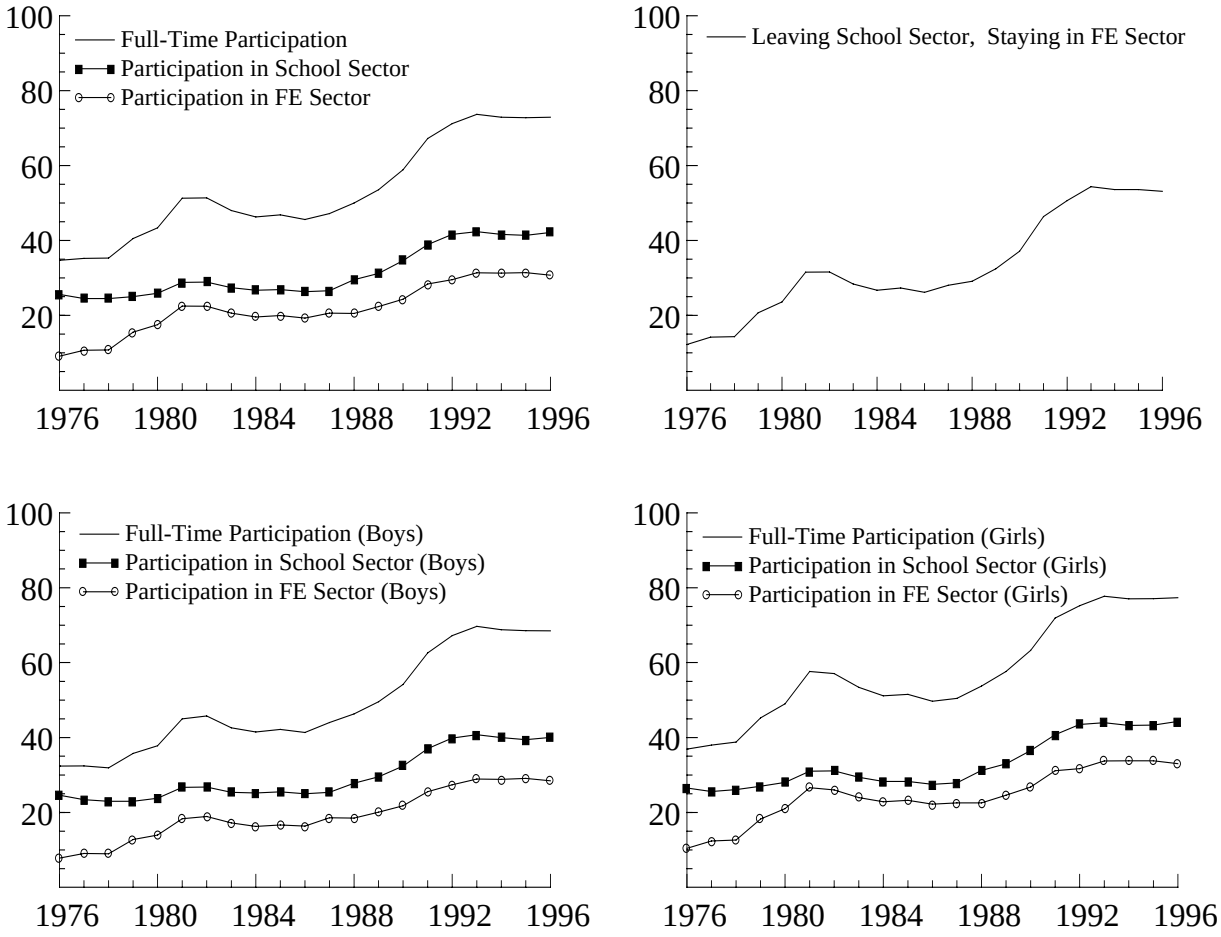

Figure 3: Time Series Exam and Income Data

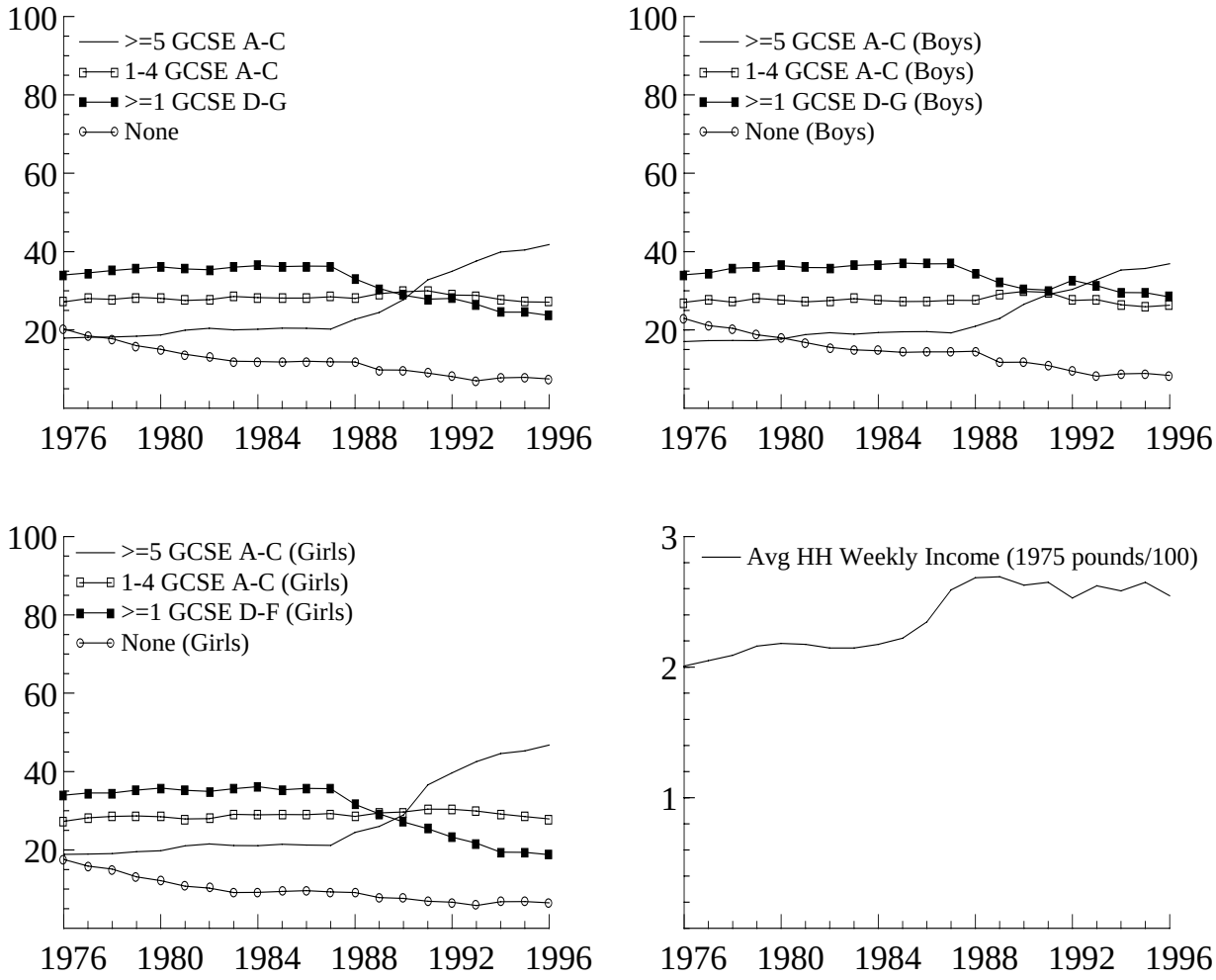

Figure 4: Time-Series Unemployment, Returns and Cohort Size Data

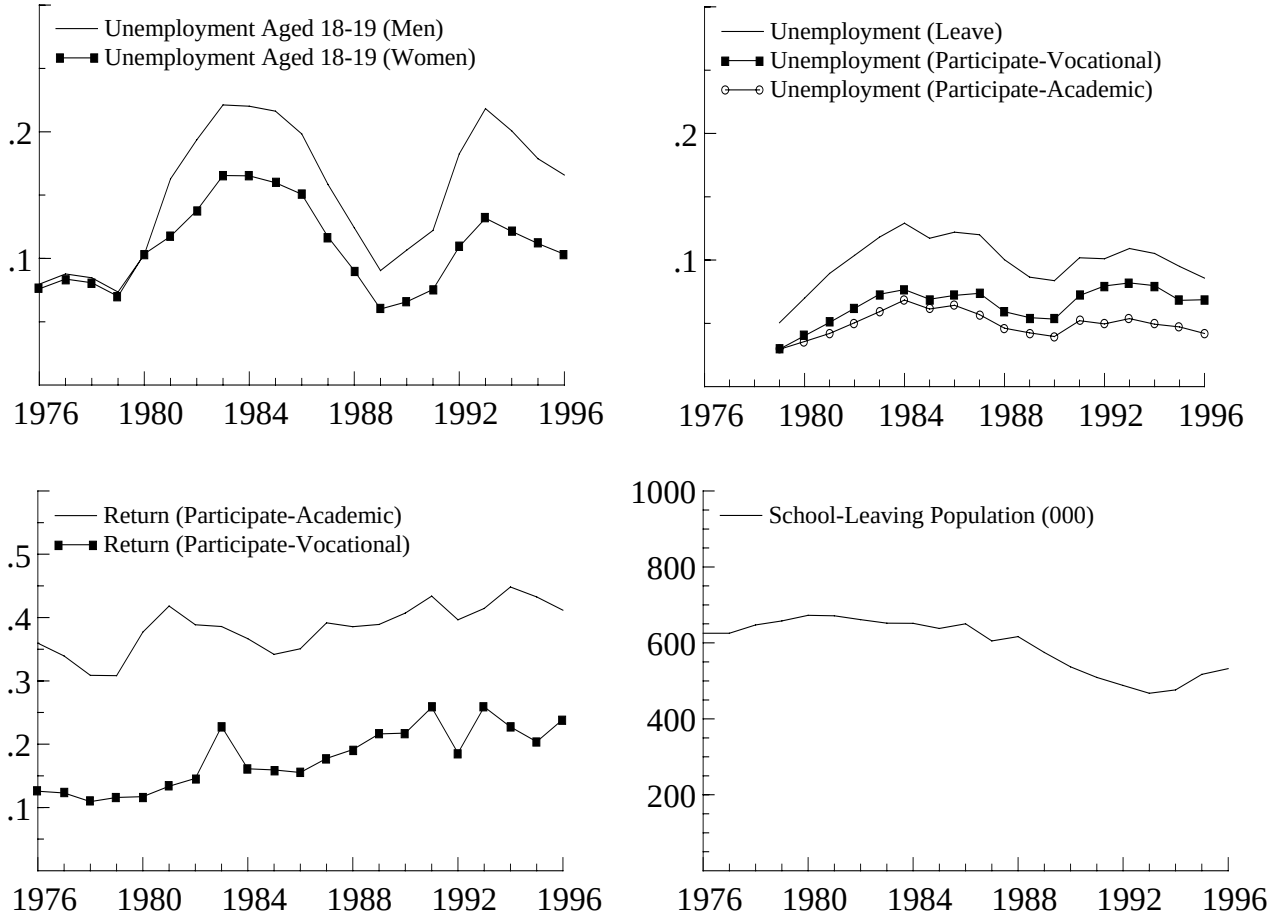

Table 1: Participation Assumptions from Highest Qualification in the LFS & GHS

	Leave	Participate-Vocational	Participate-Academic
GHS	O levels CSE None	HNC/HND; Nursing ONC/OND; RSA equivalent; Apprenticeship	Higher Degree Teaching A levels
LFS 1979-1984	O levels CSE; Still Study; None; Unknown; N/A	Corp/Prof qual; Nursing; HNC/HND; ONC/OND; C&G Other Prof/Voc qual	First/Higher Degree; Teaching (Sec); Teaching (Pri); A level
LFS 1985-1988	See above	Other Degree; Nursing; BTEC Higher/HND/HNC; BTEC Lower/ONC/OND; C&G; Any other Prof/Voc qual	See above
LFS 1989-1991	See above	Other Degree; Nursing; BTEC Higher/HND/HNC; BTEC Lower/ONC/OND; C&G; YTS; Other Prof/Voc qual	See above
LFS 1992	See above	Other Degree; Nursing; BTEC Higher/HND/HNC; BTEC Lower/ONC/OND; C&G; YTS; RSA Other Prof/Voc qual	See above
LFS 1993-1996	GCSE (A-C) GCSE (D-F); CSE; None; Don't Know	Other Degree; Nursing; BTEC Higher/HND/HNC; RSA Higher; RSA Advanced; BTEC Lower/ONC/OND; C&G Ad; CSYS; CSYS; RSA Diploma; C&G Craft; BTEC First; BTEC General; YT; YTP; SCOTVEC; RSA other; C&G other; Other Prof qual	Higher Degree; First Degree; Diploma in HE; Teaching; Other High Qual below degree level; A level; SCE

Notes: GHS = General Household Survey; LFS = Labour Force Survey

Table 2: Variable Means by Selected Regions 1976-1996

	NORTH	YORKS	W-MID	E-ANG	S-EAST	S-WEST
Participation (FT)	44.027	46.696	49.564	49.866	58.214	54.216
Participation (School)	26.062	28.147	27.908	29.933	37.984	28.173
Participation (FE)	18.821	19.432	22.686	20.882	21.195	27.284
>=5 A-C	22.608	22.523	23.106	25.829	27.565	27.131
1-4 A-C	27.799	26.840	28.128	28.693	28.379	29.516
>=1 Pass	35.206	35.462	33.522	32.247	29.156	31.613
No Passes	13.576	14.339	14.521	11.624	11.146	9.381
Avg Household Income	2.130	2.142	2.165	2.323	2.665	2.284
Unemployment (18-19)	0.187	0.149	0.155	0.102	0.102	0.111
Unemployment (Leave)	0.126	0.104	0.111	0.074	0.082	0.079
Unemployment (Part-Voc)	0.085	0.064	0.071	0.054	0.057	0.052
Unemployment (Part-Ac)	0.058	0.048	0.049	0.042	0.047	0.051
Return (Part-Voc)	0.218	0.191	0.173	0.202	0.157	0.212
Return (Part-Ac)	0.367	0.343	0.370	0.380	0.380	0.373
Cohort Size (000)	42.35	65.63	70.32	23.85	202.82	53.77

Notes: Authors calculations.

Table 3: Full-Time Participation

	(1)	(2)	(3)	(4)
	Boys		Girls	
LDV		0.538		0.415
		(0.084)		(0.117)
exam5	0.961	0.473	0.684	0.512
	(0.160)	(0.144)	(0.248)	(0.228)
exam4	0.414	0.027	-0.419	-0.300
	(0.149)	(0.129)	(0.215)	(0.163)
exam1	0.414	0.179	-0.302	-0.194
	(0.151)	(0.128)	(0.221)	(0.170)
Income	0.743	0.243	-0.046	-0.166
	(1.228)	(0.918)	(1.103)	(0.996)
Youth U/e	68.302	41.912	21.873	9.835
	(10.873)	(11.857)	(8.631)	(6.688)
U/e (Leave)	-8.257	-10.843	-17.060	-33.269
	(12.351)	(10.583)	(16.772)	(15.015)
U/e (Voc)	-14.550	-16.647	12.051	15.040
	(15.305)	(12.580)	(11.079)	(8.804)
U/e (Ac)	11.790	-3.194	-15.075	-10.651
	(11.210)	(8.927)	(10.870)	(9.937)
Return (Ac)	1.135	2.019	-0.138	-0.081
	(1.779)	(1.399)	(0.784)	(0.651)
Return (Voc)	-3.112	-4.153	0.904	0.702
	(2.504)	(2.261)	(1.359)	(1.181)
Cohort Size	-0.066	-0.046	-0.061	-0.051
	(0.018)	(0.016)	(0.028)	(0.028)
Observations	136	136	136	136
R-squared	0.99	0.99	0.99	0.99

Robust standard errors in parentheses. Estimates based on equations including a full set of region and year dummy variables. LDV=lagged dependent variable.

Table 4: Robustness Checks: Full-Time Participation (Boys)

	Level	First-Diff.	M.A.2	M.A.3
exam5	1.057	1.036	1.018	1.060
	(0.160)	(0.159)	(0.166)	(0.176)
exam4	0.475	0.471	0.411	0.388
	(0.142)	(0.146)	(0.154)	(0.158)
exam1	0.433	0.492	0.433	0.594
	(0.157)	(0.154)	(0.159)	(0.169)
Income	1.130	0.042	1.442	3.463
	(0.965)	(0.635)	(1.400)	(1.640)
Youth U/e	51.798	62.325	60.078	59.915
	(10.876)	(8.021)	(11.702)	(10.499)
U/e (Leave)	-7.188	8.063	-12.649	-6.135
	(11.647)	(10.974)	(14.568)	(13.909)
U/e (Voc)	12.398	24.773	7.401	2.468
	(15.500)	(12.266)	(19.121)	(24.741)
U/e (Ac)	20.032	7.301	34.928	45.534
	(11.273)	(6.885)	(15.054)	(18.787)
Return (Ac)	-0.204	-0.192	0.118	0.513
	(1.635)	(1.108)	(2.545)	(3.176)
Return (Voc)	-0.975	0.583	-2.813	-5.809
	(1.501)	(1.170)	(2.590)	(2.954)
Cohort Size	-0.056	-0.057	-0.054	-0.032
	(0.022)	(0.015)	(0.023)	(0.023)
Observations	144	136	136	128
R-squared	0.99	0.99	0.99	0.99

Robust standard errors in parentheses. Estimates based on equations including a full set of region and year dummy variables. Differences in specification refer to treatment of variables potentially affected by sampling error. MA2 (MA3) refer to two- (three-) year moving averages.

Table 5: Actual versus Predicted Changes in Full-Time Participation

	1981-1988	1988-1993	1993-1996	*1996-2001*
	Boys			
Exam5	2.327	11.588	3.824	*4.315*
Exam4	-0.045	0.027	-0.685	*-0.254*
Exam1	-0.559	-1.424	-1.126	*-0.878*
Income	0.356	-0.062	-0.011	
Youth U/e	-2.647	6.318	-3.074	*-6.181*
U/e (Leave)	-0.012	-0.249	0.229	
U/e (Voc)	-0.012	-0.530	0.280	
U/e (Ac)	-0.019	0.242	-0.187	
Return (Voc)	-0.276	-0.216	0.105	
Return (Ac)	-0.014	0.059	0.007	
Cohort Size	0.447	1.223	-0.551	*-0.232*
Time	4.415	5.325	0.381	
Total	3.962	22.301	-0.807	*-3.231*
Actual	3.409	22.864	-0.916	*~0*
	Girls			
Exam5	2.607	12.574	2.770	*3.842*
Exam4	-0.283	-0.277	0.804	*1.176*
Exam1	1.199	3.074	0.901	*0.372*
Income	-0.022	0.004	0.001	
Youth U/e	-0.656	0.875	-0.519	*-1.094*
U/e (Leave)	-0.484	0.312	0.188	
U/e (Voc)	0.203	-0.044	-0.045	
U/e (Ac)	-0.192	0.105	0.180	
Return (Voc)	-0.019	0.141	-0.058	
Return (Ac)	0.016	-0.012	0.008	
Cohort Size	0.413	1.130	-0.509	*-0.215*
Time	-3.630	6.093	-3.373	
Total	-0.850	23.975	0.348	*4.082*
Actual	-0.861	24.278	0.223	*~0*

Predicted changes based on columns (1) and (3) of Table 3. Data for change in exam achievement and cohort size from Statistical Bulletins 8/99, Table 1 and Statistical First Release 45/2001, Table 1. Data for change in youth unemployment from Labour Market Trends March 2001, Table 5.21. Italics indicate out-of-sample period. Time=difference in estimated year dummy variables between last and first year of period.

Table 6: Modeling the Estimated Year Dummy Variables

	Levels		MA3	
	Boys			
LDV		0.484		0.503
		(0.243)		(0.411)
Vc	-7.648	-19.577	-0.0955	-0.067
	(17.294)	(16.476)	(0.0774	(0.079)
Ac	59.624	42.753	212.87	100.91
	(29.910)	(27.867)	(30.288)	(96.081)
U/e (Leave)	-460.02	-275.70	-172.53	-100.66
	(88.032)	(121.15)	(68.231)	(88.853)
U/e (Voc)	477.30	266.85	0.323	0.143
	(123.81)	(152.48)	(0.595)	(0.601)
U/e (Ac)	23.361	12.570	-19.523	-8.164
	(13.513)	(13.161)	(17.362)	(19.347)
Observations	17	17	17	17
R-squared	0.915	0.939	0.856	0.875
	Girls			
LDV		0.485		0.433
		(0.171)		(0.335)
Vc	-17.361	-15.350	-0.128	-0.045
	(14.819)	(11.603)	(0.0656)	(0.091)
Ac	30.104	27.865	-35.609	-4.785
	(19.156)	(14.992)	(41.645)	(46.966)
U/e (Leave)	-210.71	-115.49	-225.49	-88.266
	(95.519)	(81.883)	(90.354)	(137.86)
U/e (Voc)	176.70	80.218	0.120	-0.0257
	(126.82)	(104.81)	(0.419)	(0.422)
U/e (Ac)	13.815	13.258	25.008	2.142
	(13.620)	(10.646)	(17.120)	(24.295)
Observations	17	17	17	17
R-squared	0.595	0.775	0.685	0.730

Standard errors in parentheses. Differences in specification refer to the treatment of the rate of return and unemployment variables in the estimated model. MA3 refers to a three-year moving average. LDV=lagged dependent variable.

Table 7: Participation in the Schools (Academic) Sector

	(1)	(2)	(3)	(4)
	Boys		Girls	
LDV		0.799		0.797
		(0.060)		(0.073)
exam5	0.655	0.256	0.587	0.384
	(0.174)	(0.104)	(0.217)	(0.120)
exam4	0.390	-0.048	0.331	0.095
	(0.143)	(0.092)	(0.162)	(0.107)
exam1	0.318	0.059	0.006	0.051
	(0.129)	(0.088)	(0.156)	(0.104)
Income	0.308	0.937	-1.022	-0.031
	(1.050)	(0.565)	(1.137)	(0.706)
Youth U/e	8.429	1.225	-9.149	-11.936
	(10.743)	(7.349)	(5.910)	(4.390)
U/e (Leave)	6.357	2.220	-3.845	-24.554
	(9.807)	(6.265)	(17.002)	(10.507)
U/e (Voc)	-11.286	0.786	-12.294	0.457
	(13.810)	(8.925)	(11.389)	(7.664)
U/e (Ac)	0.298	-17.414	2.714	2.978
	(11.335)	(6.571)	(8.538)	(5.634)
Return (Ac)	3.031	2.801	-0.639	-0.742
	(1.925)	(1.322)	(0.908)	(0.524)
Return (Voc)	-3.739	-2.718	-0.021	-0.829
	(2.394)	(1.852)	(1.469)	(0.874)
Cohort Size	-0.013	-0.012	0.020	-0.022
	(0.015)	(0.011)	(0.020)	(0.016)
Observations	136	136	136	136
R-squared	0.99	0.99	0.98	0.99

Robust standard errors in parentheses. Estimates based on equations including a full set of region and year dummy variables. LDV=lagged dependent variable.

Table 8: Participation in the Further Education (Vocational) sector

	(1)	(2)	(3)	(4)
	Boys		Girls	
LDV		0.698		0.454
		(0.082)		(0.151)
exam5	1.121	0.252	1.173	0.722
	(0.333)	(0.213)	(0.428)	(0.424)
exam4	0.671	-0.077	-0.491	-0.439
	(0.270)	(0.181)	(0.362)	(0.282)
exam1	0.682	0.107	-0.167	-0.220
	(0.276)	(0.175)	(0.374)	(0.291)
Income	1.005	-0.742	1.063	0.290
	(2.082)	(1.386)	(1.872)	(1.691)
Youth U/e	110.902	61.329	51.129	25.277
	(18.385)	(19.129)	(16.572)	(11.213)
U/e (Leave)	-0.979	-22.177	-1.657	-32.588
	(21.146)	(15.885)	(26.187)	(23.178)
U/e (Voc)	-6.591	-26.141	26.304	26.198
	(28.931)	(17.967)	(16.846)	(13.572)
U/e (Ac)	15.051	6.703	-30.120	-23.764
	(19.256)	(12.821)	(17.743)	(17.217)
Return (Ac)	-1.196	1.014	0.221	0.364
	(3.052)	(2.012)	(1.196)	(0.993)
Return (Voc)	-1.992	-4.765	1.907	2.213
	(4.141)	(3.016)	(1.782)	(1.700)
Cohort Size	-0.168	-0.090	-0.189	-0.129
	(0.034)	(0.038)	(0.045)	(0.058)
Observations	136	136	136	136
R-squared	0.98	0.99	0.98	0.99

Robust standard errors in parentheses. Estimates based on equations including a full set of region and year dummy variables. LDV=lagged dependent variable.

Table 9: Actual versus Predicted Changes in Participation by Sector (Boys)

	1981-1988	1988-1993	1993-1996	*1996-2001*
	School Sector			
Exam5	1.587	7.901	2.607	*2.942*
Exam4	-0.042	0.025	-0.646	*-0.240*
Exam1	-0.429	-1.093	-0.865	*-0.674*
Income	0.147	-0.026	-0.005	
Youth U/e	-0.327	0.780	-0.379	*-0.763*
U/e (Leave)	0.010	0.192	-0.176	
U/e (Voc)	-0.009	-0.411	0.217	
U/e (Ac)	0.000	0.006	-0.005	
Return (Voc)	-0.332	-0.260	0.126	
Return (Ac)	-0.037	0.156	0.020	
Cohort Size	0.091	0.248	-0.112	*-0.047*
Time	0.680	5.049	-1.585	
Total	1.337	12.567	-0.801	*1.218*
Actual	1.750	12.799	-0.883	*~0*
	Further Education Sector			
Exam5	2.715	13.518	4.461	*5.033*
Exam4	-0.073	0.044	-1.111	*-0.412*
Exam1	-0.921	-2.348	-1.857	*-1.448*
Income	0.481	-0.084	-0.016	
Youth U/e	-4.297	10.258	-4.991	*-10.037*
U/e (Leave)	-0.001	-0.030	0.027	
U/e (Voc)	-0.005	-0.240	0.127	
U/e (Ac)	-0.024	0.310	-0.238	
Return (Voc)	-0.177	-0.138	0.067	
Return (Ac)	0.015	-0.062	-0.008	
Cohort Size	1.146	3.134	-1.412	*-0.595*
Time	4.049	-2.355	3.932	
Total	2.906	22.007	-1.018	*-7.458*
Actual	2.788	22.003	-0.889	*~0*

Predicted changes based on column (1) of Table 7 (school) and Table 8 (FE). Data for change in exam achievement and cohort size from Statistical Bulletins 8/99, Table 1 and Statistical First Release 45/2001, Table 1. Data for change in youth unemployment from Labour Market Trends March 2001, Table 5.21.Italics indicate out-of-sample period. Time=difference in estimated year dummy variables between last and first year of period.

Table 10: Actual versus Predicted Changes in Participation by Sector (Girls)

	1981-1988	1988-1993	1993-1996	*1996-2001*
	School Sector			
Exam5	2.235	10.780	2.375	*3.294*
Exam4	0.224	0.219	-0.636	*-0.930*
Exam1	-0.025	-0.064	-0.019	*-0.008*
Income	-0.489	0.086	0.016	
Youth U/e	0.274	-0.366	0.217	*0.457*
U/e (Leave)	-0.109	0.070	0.042	
U/e (Voc)	-0.207	0.045	0.046	
U/e (Ac)	0.035	-0.019	-0.032	
Return (Voc)	0.000	-0.003	0.001	
Return (Ac)	0.073	-0.056	0.037	
Cohort	-0.137	-0.375	0.169	*0.071*
Time	-0.825	2.416	-1.778	
Total	1.049	12.732	0.439	*2.885*
Actual	1.298	12.851	0.426	*~0*
	Further Education Sector			
Exam5	4.466	21.542	4.746	*6.583*
Exam4	-0.332	-0.324	0.943	*1.379*
Exam1	0.664	1.703	0.499	*0.206*
Income	0.509	-0.089	-0.016	
Youth U/e	-1.534	2.045	-1.214	*-2.556*
U/e (Leave)	-0.047	0.030	0.018	
U/e (Voc)	0.443	-0.096	-0.099	
U/e (Ac)	-0.384	0.210	0.360	
Return (Voc)	-0.041	0.297	-0.122	
Return (Ac)	-0.025	0.019	-0.013	
Cohort	1.286	3.519	-1.586	*-0.668*
Time	-7.624	-1.577	-3.585	
Total	-2.619	27.279	-0.069	*4.943*
Actual	-2.417	27.168	-0.029	*~0*

Predicted changes based on column (3) of Rtable 5 (school) and Rtable 6 (FE). Data for change in exam achievement and cohort size from Statistical Bulletins 8/99, Table 1 and Statistical First Release 45/2001, Table 1. Data for change in youth unemployment from Labour Market Trends March 2001, Table 5.21. Italics indicate out-of-sample period. Time=difference in estimated year dummy variables between last and first year of period.

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