EUROPEAN UNIVERSITY INSTITUTE
Department of Economics

Young People In and Out of the Labour Market

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Thesis submitted for assessment with a view to obtaining the Degree of Doctor of the European University Institute

Florence, March 1995

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For Pasquale

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Wages," Discussion Paper no. 9, Centre for Labour Economics (CELPE), Salerno University, 1993. Chapter five, more or less in its present form, is also in the process of being produced as a CELPE Discussion Paper under the title, "Less Than Zero: YTS, Human Capital Formation and Reservation Wages."

CHAPTER ONE: INTRODUCTION

During the late 1970's and, above-all, in the early 1980's the nature of the youth labour market in Britain altered radically. Unemployment, and particularly youth unemployment rose rapidly. By July 1982, unemployment rates for sixteen and seventeen year olds were up to two and a half times the overall figure. The response by the government was the introduction and rapid expansion of direct intervention in the youth labour market. In 1978, the Youth Opportunities Programme (YOP) was introduced. This offered a period of up to six months work experience primarily with private employers. Over the period 1978-83, the scheme rapidly expanded until it was replaced by the Youth Training Scheme (YTS) in April 1983. YTS initially provided a one year period of work experience with an employer including at least thirteen weeks off-the-job training. The employer received a government grant to cover the young person's basic wage (which could be increased by employers if they so wished) and a fixed contribution towards the cost of training.

If there is a central theme running through this thesis, it is that of youth unemployment, or more accurately, youth non-employment. In the context of the two phenomena noted above - the rapid increase in unemployment and the expansion of government training schemes - the labour market for young people changed substantially during the seventies and eighties. Movement from school to employment became an exception rather than the rule. Whereas in January 1975, 95% of male, and 96% of female, sixteen year-old school-leavers were in employment, the corresponding figures for ten years later were 32% and 35% respectively[1]. It is the purpose of the thesis to analyse some of the consequences of these changes. The study concentrates on a group of young people reaching the minimum school-leaving age of sixteen in the academic year 1983/84. It considers some aspects of their experiences over the following two-year period. The central issues dealt with are the determinants of the school-leaving decision in the context of high unemployment, and the impact of YTS on the employment prospects and wages of participants.

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1 The figures given for both years are likely to be overestimates, in as much as they are based on data published periodically by the Department of Employment on the Education and Labour Market Status (ELMS) of 16-18 year olds (see, for example, DE Gazette, September 1987, pp. 459-464). The DE data gives employment as a residual category also including those outside the labour force. It is plausible that the number of discouraged workers leaving the labour force was larger in the later period in the context of higher unemployment. If this is true, the relative change would actually be greater than the figures suggest. See also the notes to figure 1.5.

It is evident that in dealing with the experiences of individuals, much of the larger picture is left implicit. It is the purpose of this chapter to provide a discussion of some of the broader issues. With regard to the analysis of school-leaving, it is possible to compare the findings presented in chapter three with previous studies of school-leaving in periods of relatively low unemployment, such as Rice (1987) and Micklewright (1989). The analysis of YTS does not allow such direct comparison. YTS was introduced precisely as a means to deal with the problem of youth unemployment, therefore comparison with a period of low unemployment is of little value. Consequently, it is important to provide an initial discussion of some of the wider issues. Analysing the impact on individuals of participation on a training scheme leaves aside the question of the macro-level effects. In particular, the relative roles of aggregate demand and labour costs in determining the level of unemployment are of central importance in an assessment of whether the scheme played, or could have played, a role in reducing unemployment. If unemployment is caused by excessive labour costs, then any measure which leads to a reduction of such costs will have a beneficial macroeconomic impact. On the other hand, if unemployment is caused by inadequate demand, the potential for beneficial macro-level effects is more limited. In this context, it is likely that the existence of a widespread temporary employment and training subsidy is likely to have some positive effects on the overall demand for labour, however, in the absence of a generalised expansion of aggregate demand, it seems probable that any improvement in the employment prospects of YTS participants would be achieved principally at the expense of those who did not choose to join the scheme, or of older workers who did not have the opportunity to do so.

Section 1.1 provides some background information on the evolution of the situation facing youths in Britain during the 1970's and 1980's. This allows a first consideration of the some of the underlying issues. Section 1.2 considers the question of youth unemployment in more detail, providing a review of studies analysing the causes. The central question here regards the relative importance of aggregate demand and relative youth wages in determining the level of youth unemployment. It is shown that while all the studies considered find an important role for aggregate demand, the contribution of high relative youth wages is by no means demonstrated. On the other hand, it is evident that the government's thinking was more sympathetic to analyses placing stress on the importance of wages. The section also discusses both why youth unemployment should

constitute a particular cause for concern, and why it was seen to do so. As regards the first aspect, attention is focused on the long-term loss of productive potential implied by unemployment early in a person's life. It is also suggested that the reasons why youth unemployment *was* considered a serious problem had more to do with the short-term destructive potential of disaffected youth. Section 1.3 goes on to consider some of the issues underlying the government's response to youth unemployment. The implementation of exclusively micro-level policies such as YTS is consistent with the government's view that excessive wages and wage expectations were to blame for the problem. In discussing the development of the scheme, however, it is also important to recognise that YTS was part of a wider strategy. It was not *just* a means of improving the employment prospects of young people. In section 1.4, an outline of the thesis is provided, drawing out the implications for the rest of the study of the considerations provided in this chapter.

Section 1.1 - Youths In and Out of the Labour Market: an overview.

The study presented here was principally motivated by a concern for the remarkably high levels of unemployment, and more specifically youth unemployment, observed in Britain in the early 1980's. In common with other Western economies[2], unemployment in Britain rose rapidly in the late seventies and early eighties following the two oil price shocks. An important characteristic of this increase was its uneven distribution across different age-groups. In particular, it was the young who bore the brunt of the increase in terms of the level of unemployment rates. Figures 1.1 and 1.2 show unemployment rates by age over the period 1971-93 for males and females respectively. The figures report annual moving averages (based on quarterly data) in order to smooth out seasonal variation, the numerous changes in the compilation of unemployment statistics since 1979, and the constant revision of estimates of the size of the labour force by age. In interpreting the figures, it should also be observed that from September 1988 onwards, young people under the age of eighteen were no longer eligible for supplementary benefit. Since, in Britain, unemployment statistics are compiled on the basis of those registering to receive benefit, this change in the law effectively removed this age-group from measured unemployment. Following this date, statistics of unemployment rates for 16-17

2 Numerous studies have considered the increases in unemployment in Europe, and more generally in Western economies, in this period. See, in particular, Bean, Layard & Nickell (1986)

year olds were no longer published, although registered unemployment amongst this group did not entirely disappear[3], as is evident from figure 1.3 on unemployment duration presented below.

The greater cyclical variation in the unemployment rates of the younger age-groups is evident from the figures. The picture is fairly similar for both males and females, although the unemployment rates of females tend to be somewhat lower than for males. From 1983 onwards, the unemployment rates of 16-17 year olds was surpassed by that of 18-19 year olds. A part of the explanation for this may be sought in the expansion of government schemes which, until at least 1986, were aimed ever increasingly at the youngest labour market participants. This may have had the effect of shifting unemployment from 16-17 year olds to the 18-19 year old age group in two ways. Firstly, through the direct substitution of 18-19 year old employees by 16-17 year old YTS participants, and, secondly, through the delayed entry of YTS participants into unemployment. Finally, the 16-17 year old population reached a peak in 1982, after which it gradually declined. For obvious reasons, the 18-19 year old age-group followed the same pattern two years later, and the unemployment rates also reflect this demographic change to some extent.

Given the amount of manipulation which the underlying data have gone through, both before and after they reached me, one should not take the interpretation of the figures too far. The central point that the unemployment rates of young people rose much more than those of adults, however, is not in doubt. From a situation in which there was very little difference between unemployment rates across age-groups in the early 1970's, during the late 1970's and early 1980's, youth unemployment rates rose to at least two and a half times the levels of adults.

The second important characteristic of unemployment regards duration. Figures 1.3 and 1.4 provide figures on uncompleted unemployment duration for males under eighteen and for males of all ages over the period 1971-1993. The figures suggest that for both groups, increasing unemployment arose out of a reduction in outflows indicated by the lengthening of unemployment spells rather than through variations of the inflows into unemployment proxied by uncompleted durations of less than a week which remained virtually constant over the period[4]. The principal difference between the two

3 There were a few exceptions to the disqualification of 16-17 year olds. These are detailed in Unemployment Unit/Youthaid (1989).

4 Pissarides (1986) demonstrates this point with regard to overall levels of unemployment using aggregate flow data. In the case of the younger age-group, a slight variation in inflow-rates is observable. From 1983 to 1987 the rate remained at a noticeably higher rate than previously. Subsequently, there was a rapid falling off in the rate coinciding with the exclusion of under-eighteens from supplementary benefit.

figures is the much larger proportion of the "all males" group remaining in unemployment for over a year. The impression gained from the four figures taken together is that whilst the incidence of unemployment was much higher for young people, the duration of unemployment was greater for adults. The figures may, however, overstate the case. Jobless seventeen year olds remaining in unemployment for a substantial period of time necessarily become unemployed eighteen year olds. That is, exit from long-term unemployment of 16-17 year olds will, in part, be due to movement into another age-group and not exit from unemployment. Secondly, exits from the unemployment figures not due to age did not necessarily imply entry to employment. One may observe that unemployment inflow rates for 16-17 year olds *increased* from 1982 onwards and remained relatively high until 1988 when young people were effectively disqualified from claiming social security benefit. At the same time, overall unemployment in this group was falling. Part of the explanation for this may be found in the increasingly compulsory nature of YTS participation. That is, over this period, refusal to take up the offer of a YTS place was increasingly considered sufficient to disqualify social security claimants on the grounds that they were not actively seeking work[5]. Thus, exit from registered unemployment did not necessarily mean entry into a job.

The statistics on unemployment may be put in the wider context of the education and labour market status (ELMS) of young people. Attention here is focused on sixteen year olds. Figures 1.5 and 1.6 present information on the ELMS of sixteen year olds over the period 1974-89 for males and females respectively. The transformation of the ELMS of young people over the period is immediately obvious. The principal change which emerges clearly from the figures is the drastic reduction in the proportion of sixteen year olds in employment[6]. This was followed by a stabilisation of the percentage in employment towards the mid-1980's. The reduction came about in two main phases. During the 1970's there was a relatively gradual decline of the numbers finding work, which was followed in the early 1980's by a rapid fall. For males, the first phase corresponds to the period 1974-80, during which time the percentage in employment fell from 62% to 51%. Between 1980 and 1983, this percentage dropped sharply from 51% to 23%, following which the percentage continued to fall but at a much reduced rate until 1988 when the employment of sixteen year old males showed

5 See, for example, Finn (1988). A necessary condition for the award of social security and (insured unemployment) benefit for the unemployed was that the recipient actively sought work. Refusal of a job offer (or a YTS placing) could be taken to imply that the recipient was not fulfilling this condition.

6 The considerations of note 1 above might be borne in mind.

some signs of recovering. As regards females, the percentage in employment fell from 60% in 1974 to 42% in 1980. between 1980 and 1983, this percentage precipitated from 42% to 16% after which it started to rise gradually.

The fall in employment was accompanied by increases in unemployment, participation in post-compulsory education, and, after 1978, participation on government schemes. It is not possible to draw many inferences about the direction of causation between these interrelated phenomena, however, one or two observations are pertinent. The first is obvious and regards unemployment and government intervention. The fall in employment was accompanied by increases in unemployment in the early seventies and by rapid increases in both unemployment and participation on YOP in the early eighties. As regards the latter aspect, it is not possible to say what would have happened in the absence of the government scheme. On the one hand, YOP (discussed in more detail below) was a programme for unemployed people, therefore prior unemployment was a necessary condition for joining. On the other, the scheme undoubtedly involved a substantial degree of displacement of jobs which would have existed even in its absence[7]. What is evident from the figure is that by 1983 YOP, and subsequently YTS, had replaced employment as the principal labour market experience of sixteen year-olds.

A rather clearer impression emerges from the consideration of participation in further education. The potential effects of unemployment (and government programmes) on participation in further education is considered in chapter three. As is noted there, the effects are not entirely straightforward, particularly when it comes to operationalising the underlying concepts. This is reflected in the empirical analysis which does not provide conclusive evidence as to the direction of the effects. On the one hand, unemployment will lead to a lowering of the opportunity cost of further education and thereby encourage participation. On the other, it *may* reduce the *expected* returns from education and, therefore, reduce it[8]. There is some support for the opportunity cost argument that increasing unemployment rates lead to a rise in post-compulsory participation rates between 1974 and 1976. In this period, unemployment of sixteen year olds rose from 4% of males and 3% of females to 7% of both groups. At the same time, educational participation rose from 34% to 39% for

7 I am not aware of any studies of the displacement effects of YOP. For YTS, estimates vary from between a total displacement effect of between about 40% (Deakin & Pratten, 1987) and 80% (Begg et. al., 1991).
8 I add the italics because much depends on the modelling of expectations, and the differential between the unemployment rates of sixteen year old school-leavers and those obtaining post-compulsory qualifications.

males and from 37% to 42% for females[9]. After 1976, the pattern diverged somewhat between boys and girls. The participation rate of boys remained more or less stable between 1976 and 1981. This was despite a sharp increase in their unemployment rates between 1980 and 1981. This provides some support for the idea that the rapid expansion of YOP had the effect, at least initially, of dampening the positive influence of unemployment on post-compulsory participation in education. The subsequent increase in participation rates (from 38% in 1981 to 44% in 1983), whilst unemployment was rising relatively little but government programmes continued to expand rapidly, might be justified by the growing disillusion expressed by young people at the failure of YOP to improve post-programme employment prospects (e.g. Finn, 1984). Between 1983 and 1984 participation once again dropped, reflecting, perhaps, both the fall in unemployment and renewed faith in government intervention with the introduction of YTS. The participation rate subsequently remained stable, rising slightly in 1989 following the disqualification of sixteen year olds from claiming social security benefit in October 1988. The pattern of educational participation of females follows much more closely movements in unemployment. Participation increased as unemployment rates rose, and decreased when unemployment rates fell.

These types of argument should not be pushed too far on the basis of the rather superficial evidence presented in this section. It is clear, however, that there is a case to be made for the influence of labour market influences on participation rates in further education. In chapter three, the analysis of school-leaving returns to these issues. In particular, modelling problems arising from attempts to identify the various influences operating are dealt with in some detail. The discussion continues below with a consideration of the causes and consequences of youth unemployment.

1.2) Youth Unemployment: Causes and Consequences

Two questions regarding youth unemployment immediately arise. Firstly, why were unemployment rates so much higher for youths than adults ? Secondly, does it matter ? Answers to both questions are important in understanding the appropriate policy response as well as putting the

9 Using aggregate data, Payne & Payne (1985) compare the influence of qualifications on the chances of finding work between a period of low unemployment (1974/5) and high unemployment (1976/81). They find that the differential rose. That is, that the gains to education increased. In this case, the future gains and opportunity cost effects should move in the same direction.

policy actually implemented into perspective. Attempts to reply to the first question have centred around the relative importance of aggregate demand and youth relative wages. The answer to the second, depends, in part, on the response to the first. In order to understand the nature of the policy response, it is also important to answer the questions, what were the causes of youth unemployment perceived to be ? And, why did it matter to policy makers ? These issues are taken up in the discussion of the policy response in section 1.3.

1.2.1) The Causes of Youth Unemployment

There are a number of reasons why one might expect youth unemployment to be particularly sensitive to changes in aggregate demand. On the supply side, it is often argued that young people are more likely voluntarily quit their job than older workers. The opportunity cost of doing so is lower for younger people. They will tend to have fewer skills and lower wages, and are less likely to "need" a job to support a family. Indeed, many will be living with their parents and, consequently, will tend not to be the principal income earner in the household. If voluntary quitting behaviour is less cyclically sensitive than job availability, one consequence will be that when the labour market tightens, unemployment will rise more amongst those groups with a higher likelihood of quitting. Whilst it is likely that voluntary quits will fall during a recession, Moser (1986) shows that, in the USA, voluntary quits fall off markedly with age and are less cyclically volatile than "fires" by firms. The implication is that young people are more likely to quit jobs and that this behaviour is less sensitive to changes in aggregate demand than the demand for labour by firms, as measured by layoffs.

Perhaps more important are demand-side considerations. Firstly, the opportunity cost of firing young people is lower than for older workers. Being less skilled, they embody lower levels of investment by firms in training and consequently involve a smaller loss to firms making them redundant. Furthermore, young people will be less likely to be subject to employment protection legislation. This became increasingly true in Britain following successive modifications of the law after 1979. In particular, the qualifying period spent with one employer necessary before employment protection legislation could be invoked was raised from six months to two years. This measure affected young people disproportionately for obvious reasons. Indeed, the change in the law

effectively excluded the youngest (16-17 year old) age group from employment protection. The expansion of youth training and employment programmes had the effect of reinforcing this movement away from legislative protection for young people. Almost all participants on YTS (and YOP) were classified for legal purposes as "trainees" and were therefore not subject to employment protection legislation[10]. Taken in conjunction with the "two-year rule" mentioned above, this implies that large numbers of 18-19 year olds were also placed outside the aegis of this legislation[11]. This again implies that young people would be cheaper to fire. Finally, one may point to the oft-cited industrial relations practice of "first-in-last-out" (Lynch & Richardson, 1982)[12]. Once again, the implication for young people is obvious. Thus, there are a series of reasons for which one might expect unemployment amongst young people to be particularly responsive to variations in the overall demand for labour.

The second principal explanation of youth unemployment centres around the purportedly high relative rates of pay. This point of view is much associated with the idea that unemployment is essentially a voluntary phenomenon, reflecting an inability of wage-rates to adjust sufficiently to changes in demand. From this perspective, youth unemployment is due to the fixing of artificially high relative wages for youths by trade unions, the high levels of social security benefits, and so on.

A number of analyses were undertaken in the first half of the 80's to consider the issue. The studies may be differentiated according to their underlying assumptions concerning market clearing. The simplest approach taken was based on the assumption, either implicitly or explicitly, that labour markets cleared. Examples of this approach are provided by the studies of Makeham (1980) and Lynch & Richardson (1982). In such an analysis, supply and demand considerations are entered into an unemployment equation. Employing this methodology, Makeham (1980) finds an important role for aggregate demand and none for relative wages. On the other hand, Lynch & Richardson (1982) find that the influence of relative wages, in the case of young males, depends on the variable employed to capture aggregate demand. That is to say, they find a statistically significant effect of the relative wages of young males when they included vacancies as their demand index. However,

10 They were also excluded from much health and safety at work legislation. See, for example, the considerations below and those presented in Lang (1983).

11 That is to say, following the period of work experience and/or training, YOP/YTS participants would have had to work with a single employer for a further two years before claiming protection under this legislation.

12 This is not independent of the first point. Indeed, the lower opportunity costs of making young people redundant from the point of view of both workers and firms was presumably a prime mover in establishing the practice.

the significance of the wage variable collapses when they use adult unemployment rates to capture demand. For young females, they find a statistically significant influence of relative wages in both cases.

Whilst one might quibble with the definition of particular variables in these studies, the principal objection concerns the market-clearing assumption. Studies which explicitly consider the possibility of non-market clearing have found the hypothesis to be supported, both at an aggregate level, and when the labour market is subdivided by age[13].

Layard (1982) implicitly, and Hutchinson, Barr & Drobny (1984) explicitly incorporate the assumption of excess supply in the youth labour market. Consequently, both studies estimate demand for labour equations. Apart from the omnipresent influence of aggregate demand factors, Layard finds a high degree of substitutability between young and adult workers. The results of Hutchinson et. al. suggest both substitutability and complementarity between young male workers and various other groups. Using an employment function approach, Hutchinson et. al. estimate a partial adjustment labour demand equation of the form:

$$L_{yt} = (1-k)L_{yt-1} + k\left(\alpha_0 + \alpha_1 Q + \alpha_2 t + \alpha_3 t^2 + \alpha_4 H_y + \sum_{i=1}^{n} \beta_i \frac{W_y}{W_i}\right) \qquad (1.1)$$

Where H_y is the average number of hours worked by young males, included to allow for adjustments in the level of utilisation of youth labour; t is a time trend to incorporate exogenous technical change and the $\frac{W_y}{W_i}$ terms represent youth wages relative to other groups in the labour market. Using this approach, they find that while young males are substitutes for adult females with $\left(\frac{\partial L_y}{\partial W_y/W_i} < 0\right)$, they are complementary to adult males so that $\left(\frac{\partial L_y}{\partial W_y/W_i} > 0\right)$.

Although this analysis represents an improvement on the rather ad hoc approach adopted by, for example, Lynch & Richardson, the assumption of excess supply over the entire period of analysis (1949-69 for Layard, 1952-72 for Hutchinson et. al.) is problematic. Indeed, many writers would

13 See, in particular, Andrews (1983) and Andrews & Nickell (1986) on the aggregate labour market, and the paper by Rice (1986) on young people considered below.

argue that this period was more often characterised by excess demand. If true, this obviously implies that the authors are observing points on a supply rather than a demand curve.

Wells (1983), in a much publicised piece of work[14] on male and female youth unemployment, allows for periods of both excess supply and excess demand. On the basis of *a priori* assumptions on the date of the switch from excess demand to excess supply, he estimates labour supply equations during periods of excess demand (1953-69 for males, 1953-71 for females) and labour demand equations for the succeeding period (until 1981). Wells finds an important role for both aggregate demand and relative labour costs for both females and males in explaining the period of excess supply. There are a number of problems with Wells' analysis as regards the definition and interpolation of crucial explanatory variables. Also, whilst Wells tests his model against a continuous market clearing one in which both labour supply and demand curves are identified, he does not consider the possibility of a switch from excess demand to supply at any other time. Junankar & Neale (1985) carry out various tests of specification, stability and robustness using Wells' data. They argue on this basis that Wells' model is poorly specified and his results not robust, breaking down completely when the more reliable New Earnings Survey data was employed in the place of the October (Earnings) Enquiry data used by Wells[15].

A more satisfactory approach to the estimation of non-market clearing regimes was undertaken by Rice (1986). Rice estimates a model which: a) does not impose *a priori* assumptions on the timing of the switch from one regime to another (to determine this she uses the maximum likelihood procedure suggested by Maddala & Nelson (1974)); and, b) is based on rigorous theoretical considerations. She estimates unemployment equations separately for juvenile males and females allowing for a distinction between apparent and effective supply of labour. That is to say, a distinction between voluntary and involuntary unemployment. The study once again finds that aggregate demand plays an important role in determining the level of unemployment. Beyond this, her results indicate that juvenile males are substitutes for both adult males and adult females. On the other hand, juvenile females are substitutes for adult males but are complementary to adult females. These results, although based on a more satisfactory model, are counterintuitive in as much as one

14 See, for example, the article in the Times (20/12/83) headlined, "Pay Cuts Would Create Jobs for Young People."
15 It may be noted that all the studies considered here, apart from that undertaken by Junankar & Neale, employ the October Enquiry data.

would expect to find much more substitutability between juveniles (both male and female) and adult females with (perhaps) complementarity between juvenile and adult males, at least in occupations with a higher than average skills level. That is, one would expect complementarity between skilled and unskilled workers. In as much as adult males have, on average, higher skills levels than adult females, one would tend to expect complementarity between adult males and young people whilst adult females might more easily be substituted by younger workers.

The analysis undertaken by Rice marks an improvement on earlier attempts to model youth unemployment, however, a number of problems remain. She does not, for example, allow for the possibility of sectoral shifts which, independently of aggregate demand and relative wage factors may alter the structure of labour demand, particularly with the decline of manufacturing and the expansion of service industries. One might further mention that in her analysis, the possibility of capital substitution is ignored[16]. Finally, as with the Wells (1983) study, wage data is taken from the October Inquiry. Although similar tests of the robustness of Rice's findings using NES data have not, to my knowledge, been undertaken, the use of the less reliable source does cast some doubt on the results.

To summarise, the studies of the causes of youth unemployment in Britain considered here have all found that aggregate demand plays an important role. The findings on relative wage levels are mixed although there is some evidence to support the view that relatively high levels of youth wages have contributed to the disproportionately high levels of unemployment amongst young people. It might reasonably be suggested that both factors have been at work, although modelling and, more importantly, data problems have prevented unequivocal identification of the relative importance of wages. On the basis of the evidence reported here, the potential effectiveness of a micro level policy, in isolation, may be questioned. That is, without a substantial increase in the level of economic activity in the economy, the potential for the enhancement of the employment prospects of youth through the provision of training and work experience will necessarily be limited. Evidently, the government did not share this point of view. It is hoped that the considerations presented in the following section throw some light on why such emphasis was placed on the youngest labour market entrants.

16 As noted above, whilst Hutchinson et. al. deal with this problem rather unsatisfactorily, they do at least recognise its existence.

1.2.2) The Consequences of Youth Unemployment

It is pertinent at this point to consider whether the disproportionately high levels of youth unemployment should be a cause for concern. Does it matter that young people faced higher unemployment rates than adults ? It is possible to argue that, although young people faced particularly high levels of unemployment in the late seventies and throughout the eighties, the consequences of joblessness were likely to be less devastating for this group than for adults, particularly older adults (Bell et al., 1982).

The central point underlying such an argument regards unemployment duration. It is plausible to suggest that the adverse consequences of unemployment rise more than proportionately with the duration of the spell. Material hardship, physiological and psychological damage due to unemployment are all likely to increase more than proportionately with duration (Fagin & Little, 1984, Smith, 1987)[17].

Figures 1.3 and 1.4 support the view (with some qualification) that unemployment spells tend to be shorter for young people. Explanations for this may be sought in the same type of argument used above to substantiate high youth unemployment rates. Just as young people are cheaper to fire, so they will be cheaper to hire. Furthermore, they will be less affected by structural changes in the patterns of employment since they are less skilled and, more generally, more adaptable than older workers who are likely to be less able and willing to learn new trades. From this perspective, youth unemployment is essentially a temporary phenomenon which will tend to disappear once the economy picks up again. The demographic trends noted above, will also contribute to reducing the numbers of young unemployed.

On the other hand, two types of argument have commonly been used to justify special treatment of young people. Firstly, unemployment early in a person's 'working' life may permanently impair his or her productive capacity. Human beings are, by their nature, more flexible and therefore more easily trained when they are young. The corollary to this is that patterns established at an early point in their "working" lives will tend to persist later on. Thus, whilst high aggregate levels of youth

17 Clark & Oswald (1994), on the other hand, offer some evidence to suggest that the negative effect of unemployment on mental well-being *decreases* with duration, although differences in the effect of unemployment due to duration are not statistically significant.

unemployment may be a temporary phenomenon, falling "naturally" through demographic change and a increase in economic activity in the economy[18], the consequences for the specific cohort going through a sustained period of unemployment are decidedly not. The unemployed young person may suffer permanent damage to his or her employment prospects as a result of a period of unemployment. The person's actual and potential human capital will be reduced resulting in lower expected lifetime earnings.

Whilst such a reduction in human capital has direct consequences for the individual concerned, the implications for society as a whole are perhaps more important in understanding the institutional response to youth unemployment. If a large number of people have a permanently impaired productive capacity, if and when work becomes readily available they may not be able to fit into normal work patterns. Malinvaud (1982) argues along these lines, although using rather different language. Seen from a slightly different perspective, in relation to the adverse consequences from long-term unemployment, it is now commonly argued[19] that, for these type of reasons, long-term unemployment has led to a rise in the 'natural' or 'Non-Accelerating-Inflation' rate of unemployment. It might be noted that this type of argument is by no means new. Similar arguments had been used in the 1930's. Thus, for example,

> "it is hardly too much to say that, by exposing this generation of industrial workers to the most deadly effects of the present depression we are storing up elements which threaten to perpetuate depression by striking at the quality of future labour resources," (Jewkes & Winterbottom, 1933, p.5).

A second concern is with the consequences for society of the large scale alienation of youth. This type of argument has frequently been used in political debates. From this point of view, the consequences for society of prolonged spells of unemployment are more serious when the unemployed are young. From the individual's perspective, to remain unemployed for a long period of time is likely to have serious deleterious effects irrespective of age. However, whereas unemployed youths tend towards a violent and/or antisocial expression of their alienation, older people are more prone to less disruptive expressions of discomfort such as chronic depression, ill-health and suicide. Thus, concern, as expressed by policy-makers tends to focus on the potential threat posed by

18 One might question the extent to which this is true or would have been true in the UK without massive state intervention. See the comments to figures 1.5 and 1.6 above.
19 See, for example, Layard & Nickell (1987).

alienated youth to the smooth-running (or even the existence) of society. G. Oakes, then Minister for Education in the Labour Government, speaking at a conference of educationalists expressed concern that rising youth unemployment implied that,

> "a growing number of youngsters are bound to develop the feeling that society has betrayed them. Such feelings can easily lead to crime and, even more sinister, can provide a fertile ground for the breeding of various kinds of political extremism. I do not think it is exaggerating to say that these factors pose a threat to the fabric of society as serious as that of armed conflict between nations," (quoted in Adams, 1978).

Again, the suggestion of a link between unemployment, crime and social conflict had been expressed previously. In the 1930's it had been argued that,

> "unemployment, giving rise to lack of pocket money, often persuades young people into the path of crime. In order to obtain amusement and diversion from their idleness, these offenders turn to pilfering for funds to buy cigarettes, attend the cinema, etc.. Once the first step is taken in this direction, an early escape from detection encourages a repetition of this easy means of acquiring the desired money or petty luxuries," (County Borough of Newport, 1933, p.3).

Also,

> "enforced idleness leads ultimately to demoralisation, to loss of pride in one's person and appearance, to envy of those better placed in society, and envy leads in the last resort to social conflict," (Meara, 1936, p.19).

The extent to which such sentiments express reality has been the subject of some debate (Carr-Hill & Stern, 1983, Mungham, 1983, Jackson, 1986), however, in the context of widespread rioting throughout Britain, above-all in 1981 at the time that plans for YTS were being developed, it is not unreasonable to suggest that fears of social unrest associated with youth unemployment had a strong conditioning effect on the design of policy.

On the basis of the first argument outlined above, it is possible to argue that the consequences of youth unemployment *should* be a legitimate object of particular concern. The permanent reduction in (potential and realised) human capital arising from unemployment early in life implies a vast wastage of resources. On the other hand, it is not immediately obvious that the short-run social costs associated with unemployment arising from demoralisation of the unemployed are

greater for the young than for the old. The second argument is important, however, in that it helps to explain why youth unemployment became the subject of such acute government attention.

1.3) The Policy Response: YTS

The Youth Training Scheme was introduced in April 1983, becoming fully operational in September of that year. The scheme provided work experience and training lasting one year. The programme was intended to be principally private-employer based (mode A schemes), although a significant number of schemes were run by local authorities, voluntary organisations and, in some cases the Manpower Services Commission (MSC) itself (mode B schemes)[20]. Employers received a government grant to cover the training "allowance" paid to participants and a fixed contribution to training costs. In return employers were obliged to provide at least 13 weeks "off-the-job" training during the year. In the case of Mode B schemes, the MSC also funded the running costs of schemes. The level of the allowance paid to participants was fixed centrally, although this could be increased by employers if they so wished. The level of the weekly allowance was, in 1985, £26.25 which might be compared to average (gross) weekly earnings for 16-17 year olds at the time which were £69.50 for young men and £64.70 for young women. On the other hand, the basic rate of social security benefits paid to the unemployed in this age-group was £17.30 per week.

1.3.1) The Context of YTS: special programmes for young people

In 1974, the Manpower Services Commission (MSC) was created. Its role was,

> "To make such arrangements as it considers appropriate for the purpose of assisting persons to select, train for, obtain and retain employment." (Employment and Training Act, 1973, section 2)

Funded by the government but formally independent of it, the MSC introduced and oversaw a series of special employment and training measures. Young people, and particularly 16-17 year olds

20 The proportion of participants on Mode B schemes was 31% in 1983/4. This fell to 21% by 1985/6 (Gray & King, 1986).

increasingly became the principal target-group for these programmes, at least until 1985/6. Subsequently, attention began to be focused also on the long-term unemployed (e.g. Maynard, 1988), although, in absolute terms, support for the youngest age-group was not reduced.

In September 1976, the first initiative aimed directly at young people, the Work Experience Programme (WEP), was introduced. This provided a period of work experience with an employer to give a small number of young people under nineteen a positive alternative to unemployment.

In April 1978, WEP was superseded by the Youth Opportunities Programme (YOP). This programme involved, most usually, a period of six months work experience and/or training with an employer. Some projects were sponsored by local authorities and short induction courses were also run by colleges of Further Education. Once again, the programme was open to under nineteen's who were paid an allowance by their sponsor funded by the MSC. Initially, the allowance was £20.55, rising to £25 per week by the time YOP was replaced by YTS in 1983.

During its existence, YOP was increasingly the object of criticism. It was argued that YOP simply provided free temporary labour for employers without giving anything of lasting benefit to the young people participating on the scheme. In particular, the lack of training content was pointed to as a major failing of the scheme. In the face of this criticism, and in the presence of ever increasing levels of youth unemployment, the MSC introduced the Youth Training Scheme (YTS) based on the DE and MSC documents published under the blanket heading 'a New Training Initiative' (DE, 1981, MSC, 1981).

In essence, YTS differed from YOP in as much as it was a one year (rather than six month) scheme incorporating a compulsory three-month period of off-the-job training. Much effort was expended in stressing the differences between YTS and its predecessor. YTS was put forward as a permanent training programme available to all school-leavers, a "permanent bridge to work". On the other hand, YOP had been proposed as a temporary employment programme for the young unemployed.

In April 1986, YTS was extended to become a two-year scheme for sixteen year-old school leavers (with one year for unemployed seventeen year-olds). The minimum period of off-the-job training was extended from 13 to 20 weeks (13 in the first year and 7 in the second) and the allowance was paid at different rates during the first and second years.

Two other initiatives aimed at young people bear mentioning. The first of these is the Young Workers Scheme (YWS), introduced by the DE in 1982[21]. Aimed explicitly at reducing the wages of young people, the YWS took the form of a £15 per week wage subsidy to employers who took on 16-17 year olds at a wage of £40 per week or less and £7.50 for those paying under £45. In 1984, this was modified to fit in more closely with YTS. The scheme became available only to employers taking on unemployed seventeen year olds and the upper limit on earnings was raised to £50 per week. In March 1985, 64% of young people supported by the scheme had previously participated on YTS thereby reinforcing the idea that YWS was acting as a complement to YTS. In April 1986, once again to fit in with YTS, the subsidy (still £15) was renamed the New Workers Scheme (NWS) and was paid to employers taking on 18-19 year olds at a wage of less than £55 per week, the idea presumably being that these would mainly be YTS graduates, and 20-year olds paid under £65 per week.

Finally, a rather different form of intervention was the Technical and Vocational Education Initiative (TVEI). Introduced in September 1983 on an experimental basis, TVEI was rapidly expanded. By September 1987, more than half the local education authorities in Great Britain were running pilot TVEI projects (MSC, 1988). The initiative was aimed at promoting vocational courses in schools for 14-18 year olds. Schools received financial support to run the projects, whilst the MSC took over central control of the curriculum. The initiative is important in as much as it represented a direct alternative for those who were otherwise likely to participate on YTS[22].

1.3.2) The Aims of YTS

The principal aim of YTS which is examined in chapters 4 and 5 below concerns its role in enhancing the employment prospects of young people. Thus, YTS was to provide,

> a solid base for a comprehensive and lasting system for a more effective transition from education to employment," (Atkinson, 1985, p. 32).

21 The YWS was actually funded by the DE but administered by the MSC.

22 Whether TVEI was a competitor or a complement to YTS rather depends on the eye of the beholder. The MSC, not unnaturally, stress its complementarity, whilst Finegold & Soskice (1988) note the conflict between TVEI and YTS. Following Dale (1983), Finegold & Soskice identify the conflicting nature of the two schemes as the result of faction fighting within the Conservative party.

Given its ideological underpinnings, it is not unnatural that the Conservative government sought explanations of unemployment in terms of individual characteristics rather than deficient aggregate demand. The problem of youth unemployment arose due to an inadequately trained youth labour force and excessively high youth wages. The strategy to improve young people's employment prospects consequently focused on these two objectives. The first of these was repeatedly stressed in connection with the YTS. For example,

> "YTS is designed to give school-leavers a range of practical, transferable skills to enable them to compete more effectively in the labour market," (HC papers, 1982/3, 335-i, p.1).

As regards the second of these objectives, the encouragement of employment through the reduction of youth wages was the explicit aim of YWS and, subsequently, NWS. This type of role for YTS was less often emphasised, however, the fact that the remuneration of YTS participants was less than half the average wage of 16-17 year olds and only slightly above the level of social security benefit[23] point to this role also for YTS. In his March 1985 budget speech, the Chancellor of the Exchequer, Nigel Lawson made this explicit saying,

> "Since it was first launched in 1983 the Youth Training Scheme has proved to be a very successful bridge between school and work. *It has also helped to make young people's pay expectations more realistic*," (my italics, quoted in Main, 1987a).

The aim of improving young people's employment prospects was only part of the picture. A number of other (more or less explicit) purposes underlying YTS may be identified. Firstly, improving the quality and adaptability of the workforce (as well as reducing youth wages) was also important from the point of view of employers. Thus, some emphasis was placed on providing,

> "a better educated, better trained and *more adaptable* workforce," (my italics, DE, 1981, para. 5)

and, more specifically, YTS was,

23 In some cases the YTS allowance would have been lower than social security benefit. Whilst social security benefit was based on a concept of need, and therefore could be increased in certain circumstances, the level of the YTS allowance was fixed. In particular, young people receiving social security benefit and not living with their parents could claim support for rent payments.

> "to equip....young people to adapt successfully to the changing demands of employment; to have a fuller appreciation of the world of industry, business and technology in which they will be working; and, to develop basic and recognised skills which employers will require in the future," (DE, 1981, para. 24).

The adaptability of the workforce was to be enhanced by the removal of legislative constraints on employers. YTS participants were removed form the aegis of Wage Councils, and, unless they were amongst the small numbers on the scheme accorded employee status, they could not have recourse to employment protection legislation. The importance accorded to the requirements of employers as opposed to young people is evident from the way in which the scheme was implemented. Initially, potential sponsors of YTS were to be obliged to satisfy eight criteria in order to be allowed to run schemes[24]. In the face of employer resistance, seven of the eight criteria were dropped, the exception being the provision of "off-the-job" training. Furthermore, the low-level of monitoring of YOP schemes was further reduced for YTS. The high accident rate of YTS (Finn, 1988) tends to suggest that employers often took advantage of the absence of monitoring also to evade the requirements of Health and Safety legislation. Even by its own criteria, one third of YTS schemes did not fulfil the minimal MSC standards in the first year (MSC memo quoted in Finn, 1986, p.60).

It was noted above that there was much concern with the destructive potential of unemployed youth. Thus, some emphasis was placed on the socialising role of YTS. In this regard, Peter Morrison, the Employment Minister responsible, said of YTS in a commons debate in July 1983,

> "the scheme is not a social service. Its purpose is to teach youngsters what the real world of work is about. This means arriving on time, giving of their best during the working day, and perhaps staying on a little longer to complete an unfinished task," (quoted in Finn, 1984).

A further issue regards the political management of the unemployment "problem". It is pertinent to ask how it is possible that the Conservative Government was re-elected in 1983 losing only 1.5% of its 1979 vote when unemployment had risen from around one million in 1979 to three million in 1983 whilst, at the same time, opinion polls were consistently showing that unemployment

24 These included: three months off-the-job training; training in planning, diagnostic and life-skills; guidance and counselling throughout; and, a training 'contract' between the sponsor and the trainee.

was considered to be the most important problem facing the country. Moon & Richardson (1985) argue reasonably that the answer lies, at least partly, in the ability of the government to separate in people's minds the importance of unemployment as a problem and the government's responsibility for it. They argue that the schemes played an important role in the successful political and social management of the unemployment problem. That is to say, the existence of the schemes fulfilled the role of being seen to be doing something about unemployment.

The importance of this aim was certainly recognised by the government. In a Downing Street Policy Unit paper from early 1981 one finds,

> "we all know that there is no prospect of getting unemployment down to acceptable levels within the next few years. [Consequently] we must show that we have some political imagination, that we are willing to salvage something - albeit second best - from the sheer waste involved," (quoted in Finegold & Soskice, 1988)

In this regard, YTS also had the effect of officially removing young people the labour force and, therefore, from the published unemployment statistics.

The purpose of the analysis of YTS undertaken in chapters four and five is to establish the impact of the scheme on the chances of finding employment and the post-programme wages of participants. It is well to bear in mind, when considering the results, that YTS represented rather more than simply a means to improve the employment prospects of young people.

1.4) Conclusions

In this chapter I have provided an overview of some of the trends in the situation facing young people in and out of the labour market during the seventies and eighties in Britain. It is clear that the nature of the teenage labour market underwent a fundamental transformation during this period. The rise in unemployment was accompanied by a collapse in traditional employment, which was, to a large extent replaced by YTS as the initial labour market experience of young people. In the overview, the emphasis was on the problem of unemployment, its causes, consequences and the

policy response. The emphasis is not accidental. In chapters three to five I return repeatedly to the role of unemployment.

As regards the remainder of the thesis, chapter two provides an introduction to the principal data source employed, the first England and Wales Youth Cohort Study (YCS). A description of the YCS is provided and the advantages, and more importantly, limitations of the study are considered. The discussion also allows a first consideration of the sample's experiences over the two years subsequent to reaching the minimum school-leaving age.

Chapter three provides an analysis of the factors influencing the school-leaving (or staying-on) decision at sixteen. That is, the chapter analyses the choice between staying-on and leaving full-time education faced by young people reaching the minimum legal school-leaving age of sixteen. The chapter also provides a fairly lengthy consideration of the modelling issues involved. In particular, problems associated with the treatment of expectations and the further complications implied by the introduction of unemployment and government intervention into such models are analysed. The empirical analysis undertaken in the chapter finds that a wide variety of factors influence the choice at sixteen. Terms are introduced in an attempt to capture the role of expectations. Limitations in the data employed to represent expectations, however, prevent a fully satisfactory treatment. In this context, more emphasis is placed on other factors in the analysis and on the insight that can be gained indirectly on the influence of labour market factors on the school-leaving decision through comparison of the results presented here with those of Rice (1987) and Micklewright (1989) who analyse the decision in a period of low unemployment. It is further suggested that family background plays an important role in determining the choice in a direct way influencing "preferences" for further education and not just through its influence on ability and labour market opportunities. This chapter, in contrast to previous studies, also explicitly considers and models the problem of heteroscedasticity.

Chapter four takes up the issue of the effectiveness of YTS in improving "employment prospects" of young people. Specifically, the chapter considers the impact that participation on the scheme had on the probability of finding employment. Initially, a single equation probit model is proposed and estimated. This allows a comparison with previous analyses of the impact of YTS undertaken by Main & Shelley (1990) for Scotland and Whitfield & Bourlakis (1990, 1991) for

England & Wales. Both of these studies found a small but statistically significant positive impact of YTS on the probability of finding work. This finding is confirmed in the simple one equation framework. The chapter goes rather further than previous work, however, in as much as it considers problems arising from heteroscedasticity and sample selection bias, neither of which have been considered by previous studies. Both are found to be present and influential on the results obtained. A series of models are considered and formally compared. A switching bivariate probit model (with a correction for heteroscedasticity) is proposed and estimated. This model controls for sample selection bias in the determination of employment and allows the identification of which groups gained more or less from participation on the scheme. The results suggest that previous studies have underestimated both the average size of the effect and its variability across different types of individual.

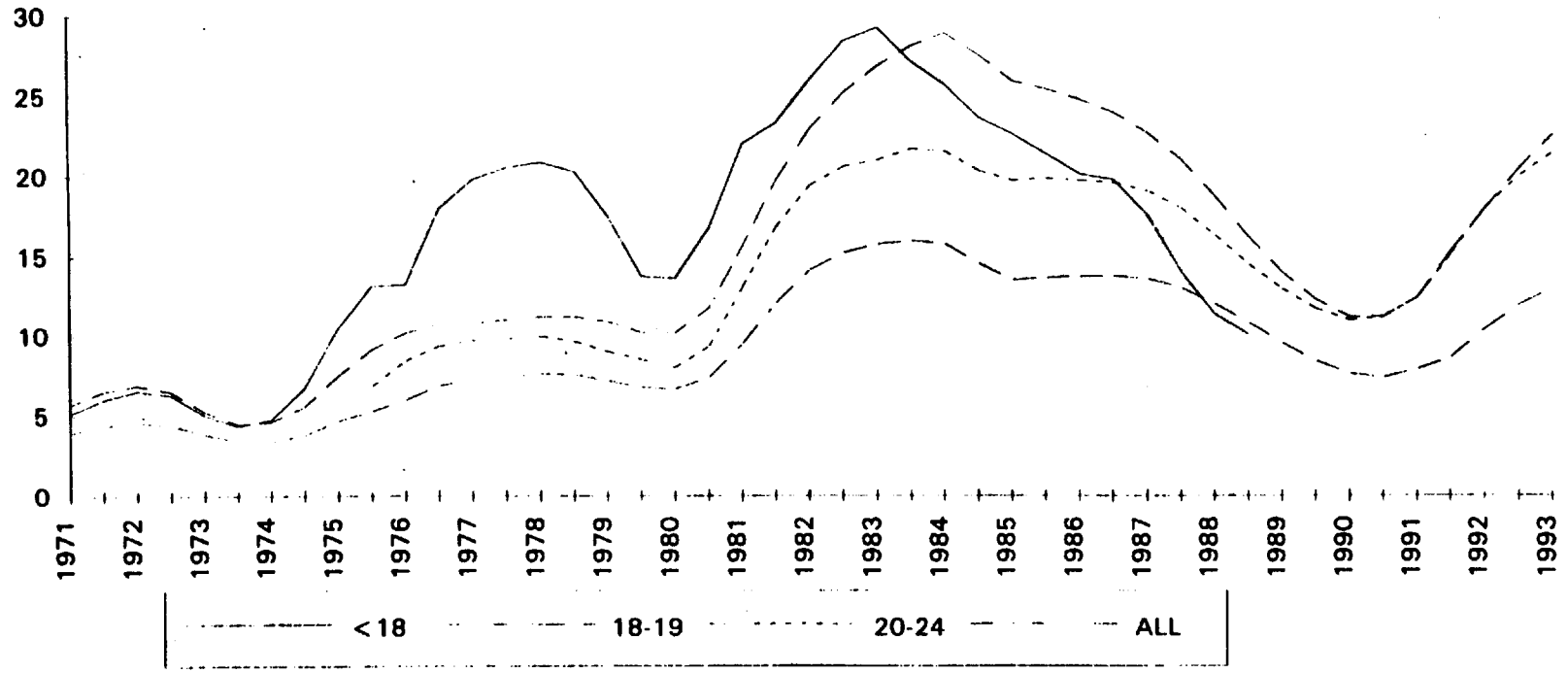
Chapter five goes on to consider the impact of YTS on the wages of the employed and the expected and reservation wages of the unemployed. The effects of YTS on the wages of participants comprises two principal components. Firstly, through an increase in the human capital of participants, their productivity and, therefore, their wages might be expected to increase. On the other hand, through an increase in the probability of finding employment, YTS would tend to reduce the observed earnings of participants. This negative effect of YTS on observed wages is identified as being comprised of the negative influence of YTS on the reservation wage (both directly, through a preference formation effect, and indirectly through the lowering of expected and, consequently, reservation wages), and the positive influence of YTS on the chances of receiving a job offer. The principal finding of the chapter is that YTS had no positive influence on wages due to an increase in participants' human capital, but did influence both the reservation wages of participants and their probability of receiving a job offer. The lowering of reservation wages and, of principal importance, the increase in the probability of receiving a job offer are thus also proposed as plausible explanations of the increase in employment probabilities of YTS participants found in chapter four. The results of the chapter confirm the basic findings of previous studies[25] that YTS participation had a small but

25 Main & Shelley (1990), Whitfield & Bourlakis (1990, 1991) and Dolton et al. (1994a, 1994c). There are slight differences in the findings reported by the different studies. In particular, Whitfield & Bourlakis don't directly treat the problem of sample selection bias. They limit themselves to reporting that it was not found to be statistically significant. Dolton et al., on the other hand, find a statistically significant negative impact of YTS on the earnings of females, even in the presence of controls for sample selection bias.

statistically significant negative influence on earnings which tends to disappear when sample selection bias was accounted for. The chapter goes further than these analyses, however, in that two sources of sample selection bias are identified and controlled for, and a simple theoretical framework lacking from the aforementioned studies is provided. The simple job search model proposed allows a coherent interpretation of the effects of YTS referred to above in terms of its influence on individual behaviour rather than relying on recourse to the "statistical problems" which Main & Shelley use to explain their results.

Finally, chapter six provides some concluding comments on the findings of the thesis.

Figure 1.1: Unemployment Rates by Age in Great Britain, 1971-1993 - Males.



Source: DE Gazette, various issues

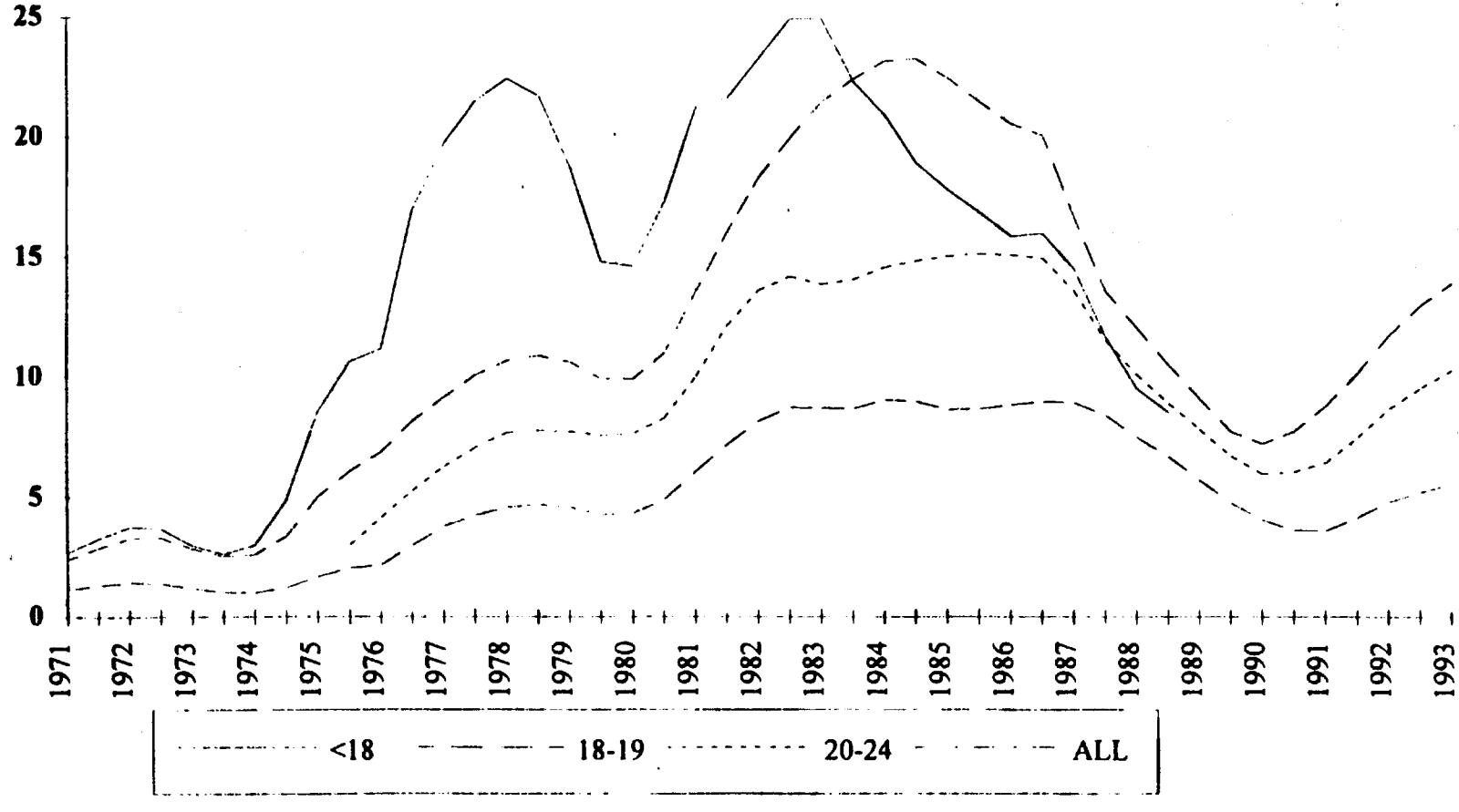
Notes:

1) The graph is expressed in terms of annual moving averages in order to smooth out seasonal variation and repated changes in the compilation of unemployment statistics and the estimated size of the labour force by age. The series is based on quarterly data. Linear interpolation was employed to derive figures for the period (1971-78) for which quarterly data was not available. From 1971 to 1974 figures were published annually (in January); 1975-77, every six months (January and July); and, in 1978 three data were published (January, July, and October).

2) Figures for the 20-24 age-group were not available prior to 1975.

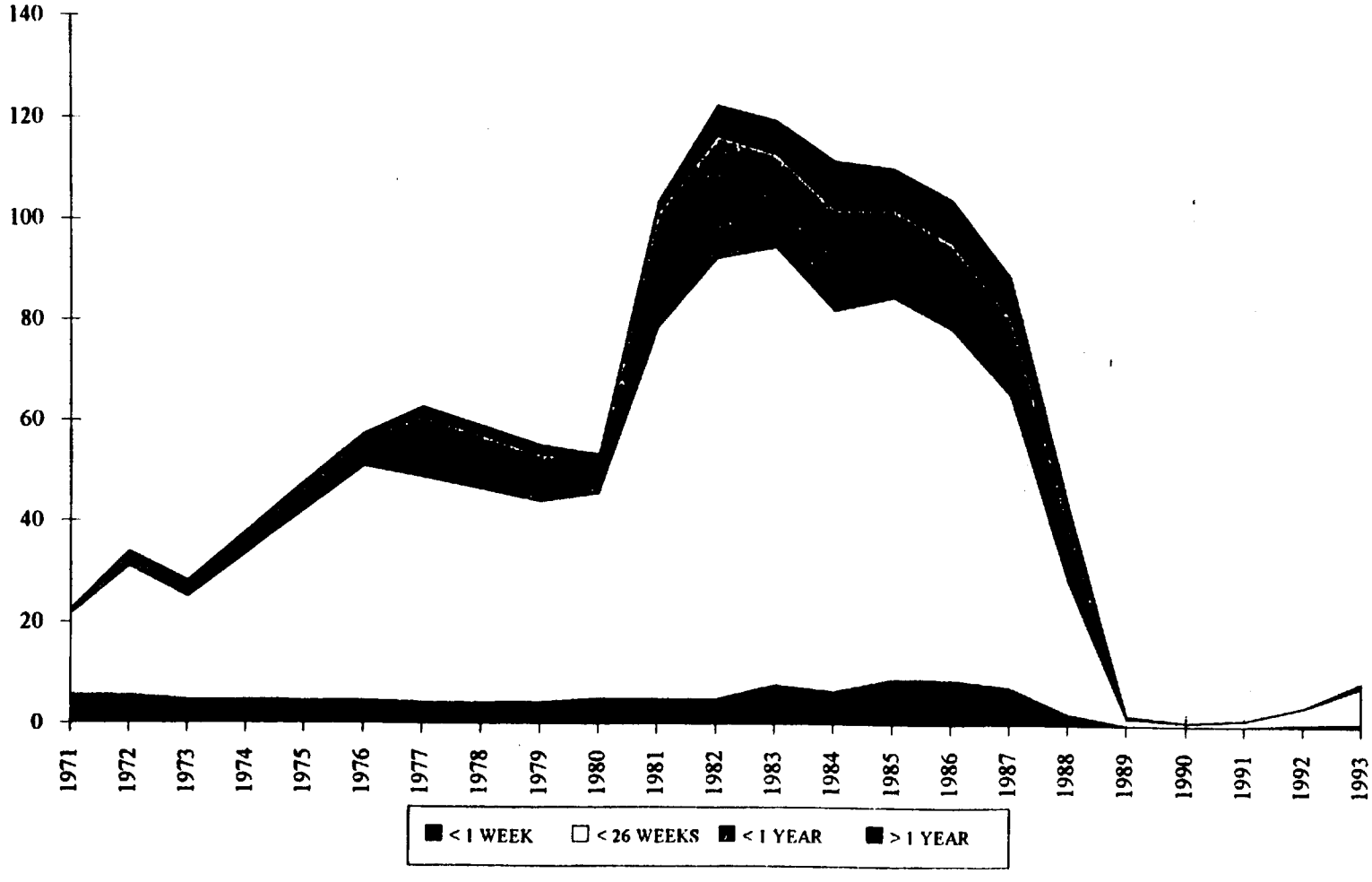
3) From September 1988 onwards, young people under eighteen were no longer eligible for supplementary benefit and, therefore, virtually (but not entirely) disappeared from measures of registered unemployment. After this date unemployment rates for this age-group were no longer published.

Figure 1.2: Unemployment Rates by Age, Great Britain, 1971-1993 - Females.



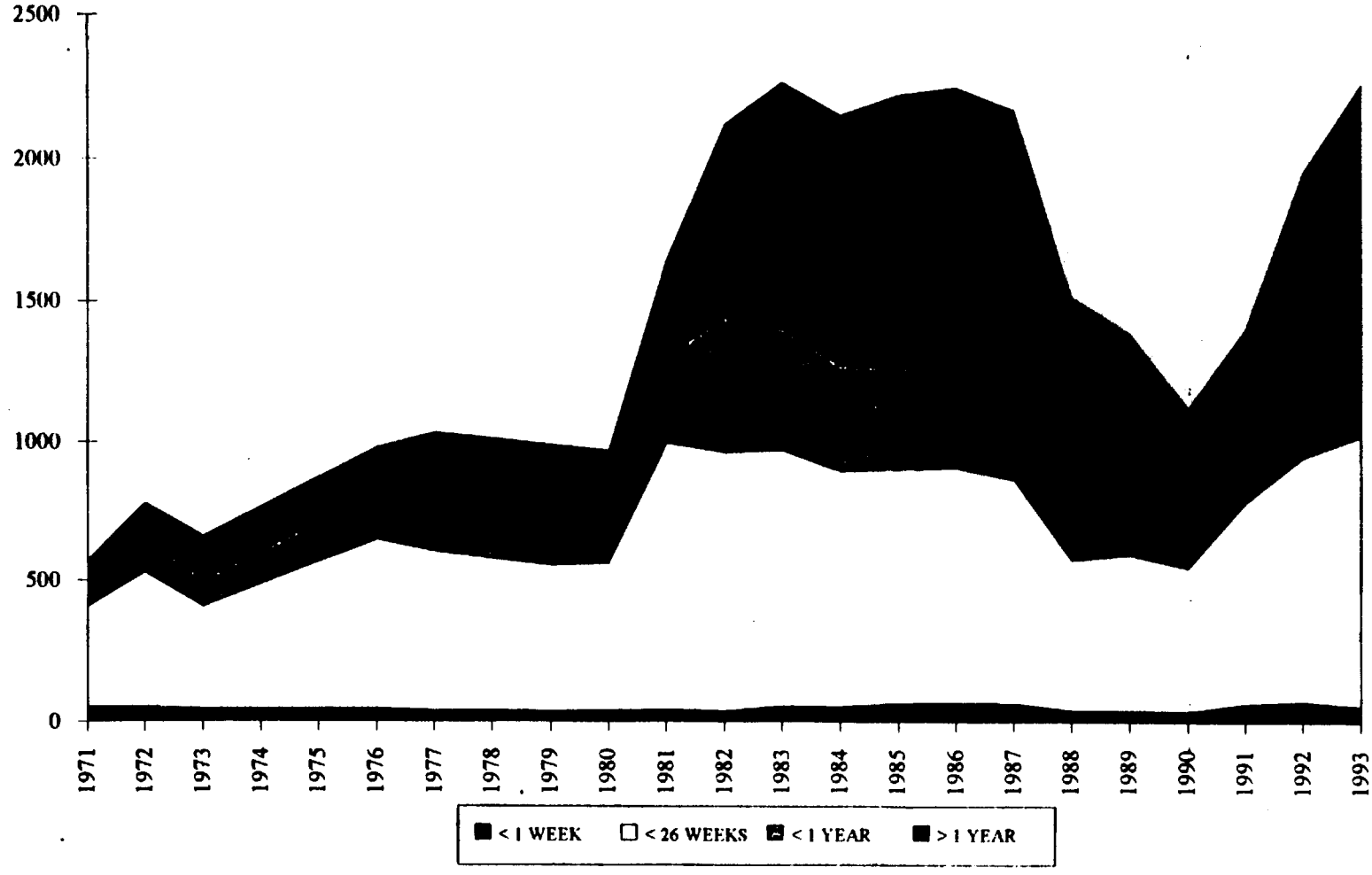
Source: DE Gazette, various issues

Note: See notes to figure 1.1



Source: DE Gazette, Various Issues
Note: Figures are for July each year. Data for 1974/5 are missing.

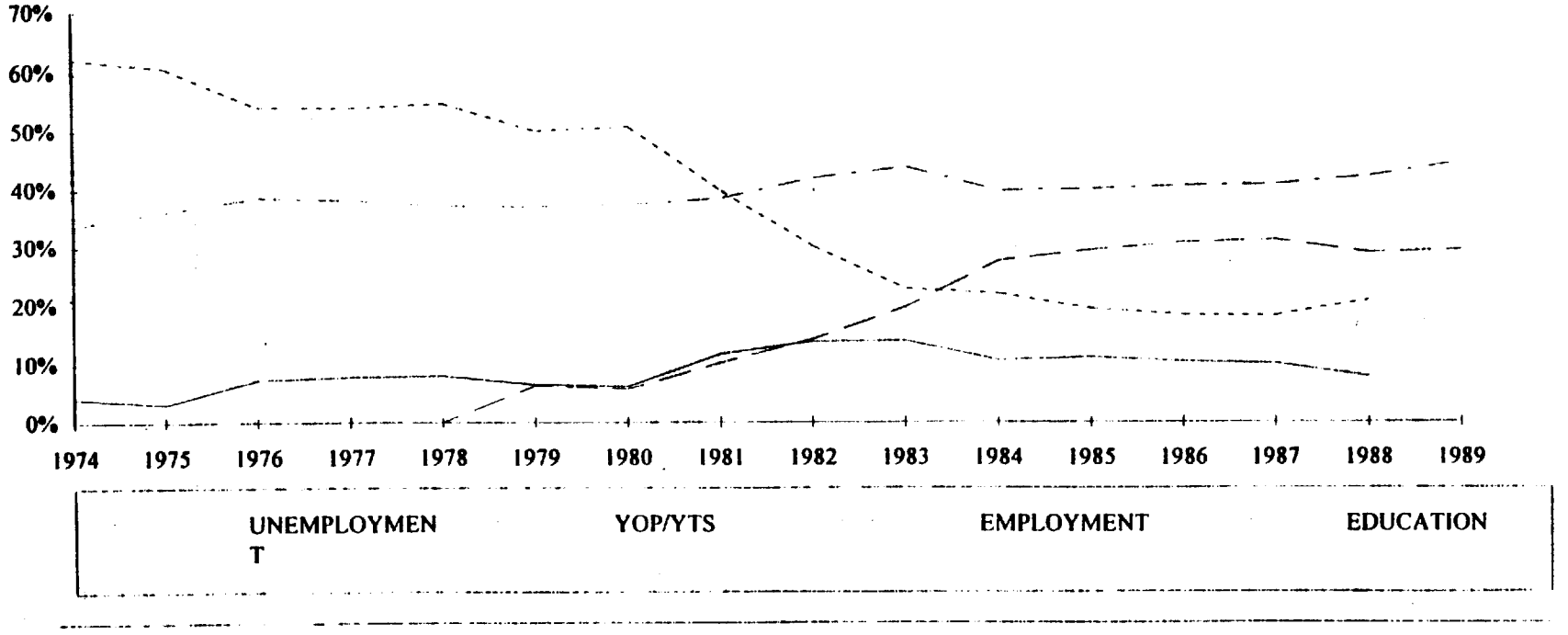
Figure 1.4: Uncompleted Unemployment Duration: All Males (000's).



Source: DE Gazette. Various Issues

Note: Figures are for July each year. Data for 1974/5 are missing.

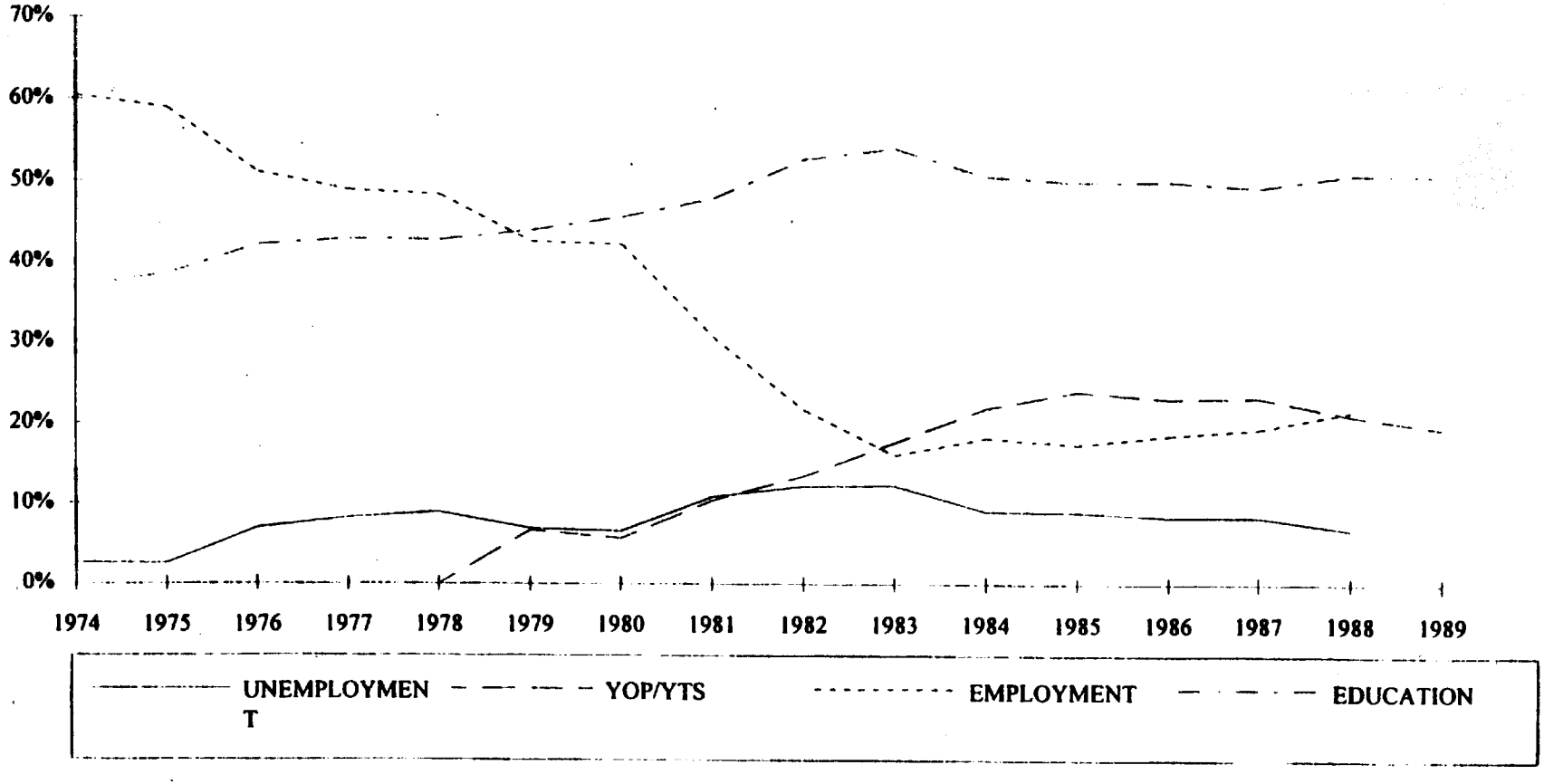
Figure 1.5: Education and Labour Market Status of Sixteen Year Old Males, 1974-1989



Source: DE Gazette, various issues

Notes:
1) The graphs are based on Department of Employment (DE) data reporting the status in January of each year of young people who were sixteen on the previous August 31.
2) The "Employment" category is in fact a residual group composed of those not classified elsewhere. The DE states that this group is mainly comprised of those in employment but also includes those outside the labour force.
3) The DE data does not contain figures for "Employment" and Unemployment for 1989. It was noted above that 16-17 year olds were effectively removed from the unemployment figures in September 1988. Including the unregistered unemployed in the "Employment" group would provide an exceedingly misleading impression. It may be noted that this residual group comprised 26% of males and 30% of females in January 1989.
4) The Youth Opportunities Programme was the forerunner to YTS. In Operation from 1978-83, it involved a government funded period of upto six months work experience primarily with private employers. Both schemes are discussed further in the text.

Figure 1.6: Education and Labour Market Status of Sixteen Year Old Females, 1974-89



Source: DE Gazette, various issues.

Note: 1) See notes to figure 1.5 above.

CHAPTER TWO: THE YOUTH COHORT STUDY

The empirical analyses presented in chapters three, four and five are based almost exclusively on data contained in the first two sweeps of the first England and Wales Youth Cohort Study (YCS)[1]. The YCS comprises longitudinal survey data on the experiences of young people reaching the minimum school-leaving age (sixteen) during the academic year 1983/4. As well as containing detailed information on individual characteristics and family background, the study provides a rich source of information on the experiences of young people in and out of the labour market over the two years, 1984-86.

Section 2.1 provides an introduction to the study, describing the nature of the sample, data collection methods and the information collected. Section 2.2 provides a discussion of the advantages and disadvantages of the survey as well as briefly mentioning other studies employing this data source. Section 2.3 employs the YCS to provide a descriptive picture of the education and labour market status of young people over the two year period covered by the study. After considering the aggregate picture, the source of YTS entrants and the destination of YTS leavers are briefly considered. Movements between states are also analysed, the principal impression gained being that, whilst YTS provided a sounder basis than unemployment for subsequent labour market experience, it was not an adequate substitute for early employment experience. Section 2.4 provides some concluding comments.

2.1) Description of the Survey

2.1.1) Sample Design

The population from which the sample was constructed consisted of young people in state schools in England and Wales who reached minimum school-leaving age in the academic year 1983/4. That is, young people in state schools who were aged 16 on 31 August 1984. A 25% random sample of schools in England & Wales was passed by the Department of Education and

[1] Where relevant, data on regional unemployment and wages based on published DE statistics and the New Earnings Survey were also used.

Science (DES) to the Social and Community Planning Research (SCPR), the organisation responsible for conducting the survey.

The sample of schools received by the SCPR consisted of 833 English and 57 Welsh schools. Of these, 847 actually took part. The remaining 43 schools (2 in Wales) did not participate for the following reasons: 17 schools provided a written refusal; 9 schools had no eligible pupils; 4 schools had closed down; and, 13 schools were believed to have not forwarded mail to selected pupils[2]. Within each participating school a 10% sample of eligible pupils was constructed by selecting young people born on the 5th, 15th and 25th of each month.

Prior consent of pupils was legally required before the schools could furnish their names and addresses[3]. In order to obtain this consent, pupils were divided into two groups, stayers and leavers. Stayers were defined as those pupils in the selected sample who were on the school register in January 1985. In this case, the schools concerned were asked to seek the consent of the relevant pupils and, consequently, to pass on their names and addresses to the SCPR. The SCPR then mailed out questionnaires and information about the survey directly to the 3952 young people identified in this way. Leavers were defined as those who had left school during the academic year 1983/4 or who had changed schools at the end of that year. In this case, the DES sought the schools agreement to forward survey documents to the relevant ex-pupils at their last known address. The names of 8502 leavers were passed onto the SCPR. Questionnaires and information were then returned to schools which forwarded them to the ex-pupils' last known addresses[4].

2.1.2) Data Collection and Response

Questionnaires for the first sweep were sent out in the early Summer 1985[5]. In all, 8064 usable replies were received. Of the 12454 individuals identified, 11764 (94.5%) effectively received the questionnaire. That is, 690 questionnaires did not reach the intended recipients. Of these, 274 were not sent out by the SCPR because: the school refused to participate (181); the school had closed down (40); or, the address was not supplied by the school (53). The remaining 416

[2] This refers to the leavers group defined below.
[3] The Secretary of State for Education declined to use his powers to waive this requirement.
[4] The Inner London Education Authority responsible for schools in London insisted that all young people be treated as leavers. That is, packages were forwarded by schools to London pupils rather than being contacted directly by the SCPR.
[5] The vast majority of the questionnaires (98%) were sent out between May 16 and June 10. See note 14 below.

questionnaires were mailed by SCPR but did not reach the (ex-) pupil because: they were not forwarded by schools to leavers (145); they were returned by the post office (144); or, they were withdrawn as ineligible due to the wrong birthday (127). The initial failure to contact young people concerned 1.5% (59) of stayers and 5.8% (496) of leavers.

Of the 11764 questionnaires effectively mailed to individuals, 8064 (68.5%) were returned. These comprised 84.6% (3179) of stayers and 61.0% (4885) of leavers. The higher response rate of stayers is attributable, in part, to the lower propensity to respond among those with a low level of academic qualifications. It is also probable that some questionnaires were not mailed out by schools, although this was not reported to the SCPR[6]. The response rate to the first sweep of the second cohort, for which questionnaires were sent out to individuals directly by the SCPR was 75%, which supports the idea that some schools found it impossible to send out questionnaires for the first cohort. The date of response to the first sweep was spread over the Summer 1985. By the end of June 1985, the majority of questionnaires (63.2%) had been returned. By the end of July this figure was 90.0%, 97.4% were returned by the end of August, whilst the last reply was received during the first week of October.

As regards the second sweep, questionnaires were sent out in February 1986 to which 6075 usable replies were received. 7633 questionnaires were mailed out to first sweep respondents. The remaining 431 (5.3% of first sweep respondents) were not contacted either because of inadequate addresses or because they stated at the time of the first sweep that they did not wish to participate in further sweeps. Of the questionnaires sent out, 46 were returned by the post office, 43 were returned with a refusal by respondents whilst 1469 did not reply[7]. The sample actually responding to both sweeps therefore comprised 75.3% of those replying to the first sweep (8064) and 51.6% of the questionnaires effectively mailed to individuals at the time of the first sweep. The date of response was spread over a shorter period than for the first sweep. 59.9% of the questionnaires arrived during March (none were received during February), and 97.7% of responses had arrived by the end of April. The last questionnaire to be received arrived on June 9.

[6] That is, they were recorded as part of the 11764 questionnaires effectively sent to individuals but were never in fact mailed.

[7] For both sweeps the procedure for data collection comprised, apart from the initial mailing, two postal reminders (complete with questionnaires and information on the survey) and a telephone follow up where possible.

2.1.3) Information Collected

The questionnaires contained a series of questions regarding individual characteristics and family background. Some individual characteristics were available from school records. These comprised sex, age and the region where the respondent lived, as well as the type of school attended and exam results at sixteen. Other information regarding experiences during the period of obligatory schooling (e.g. whether the individual had had a part-time job or work experience, and whether and by whom the person had been advised to stay on in school) was collected at the time of the first sweep. Also at this time, information concerning the occupation of respondents' parents, the size of family and type of accommodation was solicited[8]. At the time of the second sweep, information regarding the individual's ethnic origin and whether the person suffered from a disability was collected. The fact that this information was available only at the time of the second sweep largely determined the use of full two sweep data for the school-leaving analysis in chapter three, rather than employing sweep one. This point is discussed further in section 2.2.

Respondents were asked to provide information on what they were currently doing at the time of each sweep. This information is used to define key variables in the analysis below. Participation in post-compulsory education (used in chapter three) was defined as those people in full-time education at the time of the first sweep. Labour market status (employed, unemployed etc.,) at the time of the second sweep is used in chapters four and five. In addition, information on the expected and reservation wages of the unemployed and the wages, hours and other job characteristics of the employed are used in chapter five. Specifically, the questions asked were:

a) What is your take-home pay, after any stoppages but including bonuses or overtime?

b) How many hours do you usually work each week ?

The unemployed were asked for information on their expected and reservation wages. The exact form being:

a) How much weekly take-home pay do you expect to earn in your next job ?

b) What is the lowest take-home pay you would consider ?

[8] I am informed by John Gray that questions regarding parental occupation were not well received by respondents' parents. The SCPR received a rash of telephone calls from parents of the form (excluding superfluous adjectives) "its all very well you asking about what our [child's name] is up to but why do you want to poke your nose into my business".

Young people were also asked what they had been doing in each month over the period September 1984 - May 1985 (first sweep) and May 1985 - February 1986 (second sweep). This provided a more complete record of young people's status in and out of the labour force for each month between September 1984 and February 1986. The information collected on the basis of these "diary" questions is used in the analyses below to identify YTS participants (chapters four and five), young people with early employment experience and/or some experience of further education (chapter four) and the duration of employment, unemployment and further education used in chapter five[9].

2.2) Advantages and Disadvantages of YCS

2.2.1) Advantages

The first, and most obvious advantage of YCS is that it is the only source of detailed panel data charting the experiences of a representative sample of sixteen year olds in England & Wales over a two year period[10]. Detailed information is collected on a month-by-month basis concerning the experiences of young people throughout the period. In comparison to the other similar survey data of young people, the Scottish Young People's Survey (SYPS), the principal advantage of YCS is the existence of this month by month information used to construct the YTS variable for the analyses of chapters four and five. The corresponding SYPS data contained questions concerning the respondent's status at six monthly intervals, rather than every month. This implies that, in examining YTS participation, SYPS was likely to miss short-term YTS participants[11]. That is those who joined and left YTS between the dates for which information was collected. The diary question also allowed the construction of employment, unemployment and educational duration variables. Another important characteristic of YCS is that it contains accurate information concerning exam performance. Basing the identification of young people on school records, it was not necessary to

[9] Full information on the definition of variables used in the analysis and their sources are given in an appendix at the end of the thesis.

[10] In the thesis information is used from the first two of the three sweeps comprising the YCS. In principle, use of the third sweep would allow analysis of the experience over a three year period. The use of the second sweep reduces the problem of panel attrition but at the same time allows a sufficient period to analysis the effects of YTS. The period covered is the same as that analysed by Main & Shelley (1990) considered in more detail in chapter four.

11 This problem has now been mitigated to some extent, in as much as the SYPS comprises a diary question in the first sweep of the data (sent out in March).

rely on young people's self-reports. This allowed the construction of a integer index of exam success at sixteen which is used throughout the thesis.

As regards the school-leaving decision analysed in chapter three, a useful characteristic of YCS is that the cohort is defined by birth date. In combination with the uniformity of the dates for which information is collected, this obviates problems in identifying whether or not young people had reached school-leaving age associated with studies using Family Expenditure Survey (FES) data to analyse the decision (Rice, 1987, Micklewright et al., 1990). The interviews constituting the FES are spread throughout the year. The analyst does not have sufficient information to identify whether or not the young person on whom information was collected had actually reached minimum school-leaving age[12]. Rice (1987) ignores this issue, whilst Micklewright et al. (1990) take some account of the problem, weighting the probability of leaving by the estimated probability that the individual concerned is legally unconstrained in their choice.

Also of importance to the analysis conducted below was the collection of detailed information on individuals' status at the time of the second sweep. As noted above, detailed information is available on the wages, hours and other job characteristics for those in employment and direct information is collected on the expected and reservation wages of the unemployed. The latter information is not collected in the SYPS. This information allows additional light to be thrown on the effects of YTS on wages considered in chapter five.

2.2.2) Disadvantages

With regard to the drawbacks of the survey, one obvious problem is its postal nature. In particular, with a postal survey response rates are, for obvious reasons, lower than they would be with a personal interview. The effective response rate with respect to the sample base of 11764 was 68.5% for the first sweep and 51.6% for the second sweep (comprising 75.3% of those replying to the first sweep).

At least as important as the response rate in itself was the lack of balance in non-response. It is evident from the information presented above that the leavers group was under-represented in the sample. Courtenay (1988a) suggests that this depended on two factors, the indirect means (via

[12] See Micklewright et. al (1990) for details. It might also be noted that the FES contains no information on individual ability or qualifications likely to be important in determining the choice.

schools) employed to track these young people down, and, the greater tendency of people with low qualifications to not respond. Table 2.1 attempts to shed some light on this issue, comparing percentages obtained from the YCS with the figures produced by the DE which were used to construct figures 1.5 and 1.6 above. It is evident from the table that the percentage of young people in further education is overestimated, even taking into account possible differences in the school-leaving pattern of Scottish young people who are included in the DE data but not in the YCS. The left-hand side of the table also compares labour market status in more detail. Whilst the numbers on YTS or in employment are well within a confidence interval of two standard errors, the percentage in unemployment is clearly underestimated. Although unemployment rates in Scotland were higher than the British average, this is not sufficient to explain the difference here. The table therefore supports the idea that poor performers at school who were, consequently, likely to be poor performers in the labour market are under-represented here.

Having noted the presence of a non-random sample, there is, however, little that one can do to rectify the situation. The information required to estimate the likelihood of non-response is not available for non-respondents to the first sweep. One approach would be to weight responses. The YCS includes a weighting variable for this purpose, based on a comparison between the population and the sample in terms of exam performance, region and sex. This variable is not employed in the analyses carried out below. Firstly, the use of such a variable does not resolve the problem in as much as it ignores unobserved characteristics. That is, the assumption would have to be made that young people were alike in unobserved characteristics. It is very likely to be precisely these characteristics which differ between, for example, unemployed respondents and non-respondents. Secondly, and to some extent consequently, introducing weights changes the results very little[13]. As regards the school-leaving chapter, most of the variables used were available in the first sweep surveys, which should suffer slightly less from this potential source of bias. The first sweep is not employed, however, because information on two important individual characteristics were only collected at the time of the second sweep. These were ethnic origin and the possession of a disability. The inclusion of these is important, both because these variables are likely to play an important role

[13] The probit model employed in the thesis differs from the logit model in this respect, in as much as the parameter estimates do vary slightly, whereas, with the logit, the only difference arising from the use of weights regards the intercept term (Maddala, 1983).

in the decision, but also because they enrich the discussion of the indirect inferences to be drawn on the effect of labour market experiences on the school-leaving decision.

A second issue regards the use of diary questions. It may be noted that the level of non-response for these ranged from 0.4% to 2.7% over the period with a mean of 1.9%, the largest number of non-responses arising somewhat unsurprisingly over the period, June-August 1985 when many of those who subsequently continued in full-time further education were on holiday and, therefore, may have been in doubt as to how to respond. That is, they were not physically going to school in that period, not because they had left, but simply because the school had closed for the summer. As regards the status question at the time of each of the two sweeps there were no non-usable replies.

A second, and perhaps more important, problem with the diary information concerns response *error*, as opposed to non-response. Information for May 1985 was collected at the time of both the first and second sweeps allowing some consideration (although no remedy) of the problem[14]. Table 2.2 provides a cross tabulation of the replies given at the time of the two sweeps. Table 2.2a reports the absolute numbers, whilst, table 2.2b gives the information in terms of row percentages. That is, the status reported at the time of the second sweep is reported as a percentage of the those reporting particular states at the time of the first sweep[15]. Thus, for example, the first

[14] One possible source of the discrepancy between the sweeps might arise from the date on which the questionnaires were answered. Courtenay (1988a) reports that 24% of the questionnaires were sent out on May 16, whilst the majority (74%) went out between May 27 and June 10. The remaining 2% were not sent out until after July 1. The staggered mailing of the survey was due to the late receipt by the SCPR of the addresses of many of the young people in the sample. 17.3% of the questionnaires were returned during May 1985. It is possible that some of those receiving the questionnaire shortly after May 16 and replying immediately may have subsequently spent a majority of that month (May 1985) in a different activity. If, for example, the person spent the first ten days of May in unemployment and subsequently became employed, at the time of replying to the first sweep they would have spent a majority of the month in unemployment. If they remained in employment from May 10 until the end of the month, in retrospect (i.e. when they replied to the second sweep) they would have spent the majority of May in another activity (employment). It does not, however, seem plausible to attribute a large proportion of response error to this phenomenon. The questionnaires were sent out after the middle of the month, therefore, a person remaining in the same state from May 1 until May 16 will necessarily have spent the majority of the whole month in that activity, even if they changed states on May 17. Secondly, even if they did change states on or around May 10 and replied immediately, they presumably would form the reasonable expectation that they would spend the rest of the month in the new state. Assuming this to be true, i.e. in the context of the example given above, they were not fired on their first day (or week) of work, the status reported correctly at the time of the first sweep would correspond to that given at the time of the second sweep. In the absence of individual specific information in the YCS data-set on the date of mailing and receipt of questionnaires, it seems reasonable, in as much as it affects the procedure adopted, to presume that discrepancies arose through recall error at the time of the second sweep. The procedure adopted also implies that those changing states during the early part of the month who, being unsure as to their status for the month, did not reply to the status question at the time of the first sweep, but replied *correctly* at the time of the second one, would have been appropriately coded using the procedure adopted here.

[15] It should be noted that the reference here to the first sweep regards the 6075 people who responded to **both** sweeps.

row gives the status of young people in May 1985 given at the time of sweep two as a percentage of those reporting themselves as being unemployed in May 1985 in the first sweep. The leading diagonal of the tables, therefore, gives the number (table 2.2a) or percentage (table 2.2b) of consistent replies. The overall mean percentage of consistent replies was 87.5%, although this rises to 89.1% when non-response and the something else category are excluded. In order to minimise the potential influence of this problem, as well as that of non-response, the full potential of the diary information was not exploited[16]. In practice, use of the "diary" is limited to the definition of variables representing YTS participation, early employment experience and the duration of employment, unemployment and further education. Recall error and non-response are, therefore, unlikely to have made any significant difference to the analysis undertaken here. As regards the analyses in later chapters, and the figures on status reported below, the responses employed for May 1985, except in the case of non-response, were taken from the first sweep, since the length of time which had passed following that date was less. In the case of non-response to the first sweep and a usable response to the second sweep, the latter information was employed.

A further question concerns the date of response. This is of particular concern as regards the first sweep, since the replies were spread over a longer time period, and, there is no information in the second sweep data on the date of response to the first, therefore, no direct control can be made. On the one hand, the majority of young people staying on in school would be doing so for two years, taking exams at eighteen. On the other, those staying on for one year are likely to have left by the end of June 1985, since State organised examinations generally take place during that month. By the end of June, 36.8% of responses had not yet been received. Thus, it is possible that a few of those who stayed on for one year after leaving school are coded, in the analysis of chapter three, as having left school. In the second sweep data, the date of response to the first sweep is not included, and so there is no direct means to control for this problem. As regards the date of response to the second sweep, almost all the questionnaires (97.7%) were received during March and April 1986. The remainder arrived during May and the first nine days of June. Exploratory analyses to consider the possibility that the date of the reply to the survey influenced results of chapter four and five were

[16] For example, the possibility of undertaking an analysis of the impact of YTS on exits from unemployment using a hazard function approach was thus precluded. Recently, just such an analysis has been undertaken by Dolton et al. (1994b) using a later Cohort of the YCS. This paper, as well as the other analyses by these authors are discussed further below.

carried out. In addition to the explanatory variables, dummy variables were introduced to control for the week in which the questionnaire was received. In no case did the inclusion of these dummies influence in any significant manner the parameter estimates associated with the other explanatory variables.

Other drawbacks with the survey concern, in particular, the analysis of the school-leaving decision. Firstly, there is no parental income data. Given the level of hostility (demonstrated by parents) to questions regarding their characteristics one might doubt the usefulness of asking young people for this information. A second issue which is, in principle, easier to resolve regards parental education. It is reasonable to suppose that tastes for further education will depend to a substantial degree on the level of parental education in itself. This will, to some extent, be picked up by other variables employed to represent social class, however, variables representing parental education would have made a useful addition to the analysis. A further issue regards geographical location. The breakdown of young people by travel to work area, for example, would have allowed a more accurate assessment of the employment prospects actually facing young people than is possible through the use of the ten standard regions reported in the first YCS. It might also be observed that a larger sample would have allowed a more subtle breakdown of some of the effects analysed in the thesis than is presented here.

Finally, all the analyses presented here would have gained from a longer time-scale. That is, information on the cohort's experiences at present (in 1994) would enrich greatly the potential of the analyses. This would allow a longer term perspective on rates of return from education, and their role in the school-leaving decision, and any longer-run effects of YTS participation.

Many of the drawbacks of the first YCS have been resolved, or at least mitigated by the later cohort studies[17]. The sample base has been increased to around 20,000 young people and the problems associated with contacting school-leavers resolved. This does not remove the sample selection problem, but it reduces the number of potential sources of non-response. Information is available on parental education and a higher degree of geographical subdivision was employed in later YCS cohort studies. It would be interesting, in the future, to compare the results presented here with those produced by an analysis of future cohorts. There are, to my knowledge, no plans to

[17] YCS studies have been carried out for people reaching minimum school-leaving age in 1984/5, 1985/6 and, subsequently every two years.

recontact young people at a later date. This, however, would be fraught with difficulties. In particular, one might expect an exceedingly high level of panel attrition.

2.2.3) Previous Studies using YCS

A number of studies have been carried out using YCS data. Of most immediate relevance to the thesis is the analysis of the impact of YTS on employment prospects and wages of participants carried out by Whitfield & Bourlakis (1990,1991). More recently, analyses of the two-year YTS have been carried out using the third YCS[18] (Dolton et al., 1993, 1994a, 1994b, 1994c). Detailed discussion of these analyses is deferred to the relevant chapters (four and five)[19]. Studies have also been carried out to examine, at a more qualitative level, participation in further education (Gray et al., 1989, Gray & Sime, 1990, Jesson & Gray, 1990, Jesson et al., 1991, Ashford & Gray, 1992), unemployment amongst school-leavers (Sime, 1991), the transition from school to the labour market (Sime et al., 1990, Roberts et al. 1991) experiences of YTS (Clough et al., 1988) and of those who turned down the scheme (Clough et al., 1987).

2.3: The YCS and Young People's Experiences

2.3.1) YCS and the Education and Labour Market Status of Young People

Figure 2.1 shows young people's status, in and out of the labour market on a monthly basis over the period, September 1984-February 1986 drawn from YCS[20]. The over-representation of participants in further education, noted above, is evident from the figure. Apart from this, the numbers in full-time education remain almost constant over the period September 1984 - May 1985. In June the numbers start to decline, with a sharp fall during July and August. Some of those leaving education at this time entered the labour market, however, a substantial proportion of this group considered their holidays from school or college as "doing something else" as is indicated by the

[18] The third YCS tracks the paths of young people reaching minimum school-leaving age in the academic year 1985/6.

[19] The chapters also discuss the other important study of the issue undertaken by Main & Shelley (1990) using SYPS data.

[20] It should be noted that the figures presented in this section take no account of sampling error. This is particularly important, given the reduced sample size, of the discussion of entries and exits to YTS. Thus, the figures presented should be seen as indicative rather than numerically accurate.

corresponding rise in the "Else" category during those two months. In September, the numbers increase, although not to their previous levels. The school-leaving decision, analysed in chapter three, is seen in terms of the choice between staying on until at least May 1985[21] and leaving before that date. In the analyses of YTS contained in chapters four and five, those entering the labour market in the Summer 1985 are also included. That is, those who left further education after one full year. In the analyses, differences arising out of the inclusion of this group are controlled for. The group is included so as to allow comparison between participation on YTS and in full-time further education as a basis for subsequent labour market experiences.

Table 2.3 provides further information on the status of young people over the period. The table shows the numbers of young people with experience of the various possible states. Thus, for example, the table indicates that 45% of young people had at least one months experience of a full-time job between September 1984 and February 1986. The mean number of states experienced by young people over the eighteen months was of the order of 1.8 as is indicated by the final row of the table. The Column on the right gives the median length of time spent in particular states for those people having some experience of the state. This provides a further insight into the nature of the experiences of young people. Further education was evidently the most stable state with relatively little movement from education into the labour market. Also, although the proportion of people having some experience of unemployment (26.6%) was almost as large as for YTS participation (28.4%), the median length of time spent in YTS was nine months as opposed to three in unemployment. That is, almost the same number of young people had some experience of unemployment as YTS, however, unemployment tended to be a more transitory experience. It will be observed that the median duration of YTS of nine months was significantly below the full length of the scheme (12 months). There are two principal explanations for this. Firstly, many schemes would have started before the diary questions. That is, many schemes would have begun between June and August 1984, whereas the diary information begins in September 1984. Thus, a scheme starting in June 1984 would finish in May or June of the following year. The YCS data would record even a completed scheme under these circumstances as having lasted only nine or ten months. The second

[21] The considerations noted above concerning the date of receipt of the questionnaire by the SCPR should be borne in mind.

important explanation lies in the early exit of young people from the scheme. Reasons for this are discussed further below in the consideration of exits from YTS.

Figure 2.2 provides similar information to that contained in figure 2.1, differing in that it is restricted to young people in the labour market, allowing a clearer picture of variations in unemployment, YTS and employment. The figure shows a steady increase (with a slight variation in June 1985) in the proportion of young people in full-time employment. The complement to this, is the steady decrease in YTS participation (after a small initial rise) until May 1985. That is, there was a steady movement out of YTS and into employment until May 1985. The importance of YTS in the labour market in this period is indicated by the fact that in September 1984, 52% of labour market entrants were on the scheme. In July and August 1985 there was a sharp fall in YTS participants, followed in September by a return to the steady decline. The sharp fall may be attributed to the fact that many schemes started in July and August of the previous year would have come to an end. That is to say, whereas exits from YTS up to that time were, for the most part, due to young people leaving the scheme early, largely because they had found work, in July and August a number of schemes came to an end, thereby forcing young people to leave whether or not they had found a job in the meantime. This interpretation is further supported by the increase in unemployment, otherwise more or less constant, during those two months. Thus, for those young people entering the labour market, the predominant experience, initially, was YTS participation. As time went on, there was a movement out of YTS and into employment or unemployment.

2.3.2) Entry to and Exit from YTS

Table 2.4 summarises the status of YTS participants in the month immediately preceding the period of participation whilst figure 2.3 shows the source of entries to YTS on a month-by-month basis. Some caution should be exercised in interpreting this information. The figures are subject to a substantial degree of sampling error (see note 20 above). Secondly, a substantial proportion of YTS participants (1180 young people or 19.4% of the sample) were already on the scheme by September 1984, and, therefore, no information is available on their previous status. Having said this, however, some broad impressions may be gained by consideration of the table and figure. From table 2.4, it is immediately apparent that the principal source of YTS participants was unemployment as was noted

in chapter one, although figure 2.3 indicates that there was some temporal variation. In particular, from May until August 1985, a substantial proportion of YTS entrants came from full-time education. It will also be observed that between October and December 1984 the numbers entering YTS fell rapidly. With some fluctuations during the first half of 1985, numbers joining YTS began to rise consistently in the Summer 1985. Initially, the entrants in the later period came from full-time education. Furthermore, many of those entering from unemployment in the Autumn 1985 came indirectly from education. That is, after spending a year in further education, they entered the labour market but could not find work and, consequently, joined YTS.

Table 2.5 and figure 2.4 present analogous information regarding the destination of YTS participants on leaving the scheme. From the table, it is evident that the principal destination on leaving YTS was a full-time job (nearly 60%), however, a substantial proportion (31%) of those leaving the scheme became unemployed. It would not appear, on this basis, that YTS provided a very effective "Bridge to Work". What sort of bridge is it that only gets three-fifths of those crossing it to the other side ? On the other hand, to suggest that the DE slogan be replaced by "Gangplank to the Dole" as Finn (1985) would have it is perhaps going a little too far. The analysis of chapter four deals with this question rather more systematically, taking a slightly longer term perspective. It is evident from the figures presented here, however, that YTS by no means guaranteed a job. In any event, 91% of those leaving YTS remained in the labour market (at least in the short-run). Only 2% left YTS to return to full-time education. Figure 2.4 shows the temporal variation in the destination of YTS leavers. The numbers leaving the scheme gradually increased over the first year reaching a peak in September 1985. Those leaving in October and November 1984 were almost as likely to move into unemployment as employment. There is a widening of this gap during the following eight months after which time it once again closes. Early leaving may therefore be identified as being due principally, either to young people finding a "real job", or to participants becoming disillusioned with the scheme, preferring to remain in unemployment. The latter phenomenon being more prevalent at the start of the scheme than later on.

2.3.3) Movements Between States

It is also useful to look at longer term movements between different states over the period. This helps to provide an impression of the role that early experience had in determining outcomes in the two years following the reaching of minimum school-leaving age. Tables 2.6a and 2.6b display the status of young people in September 1984 and at the time of the first sweep (early Summer 1985) in percentage terms. The percentages refer, in table 2.6a, to status in September 1984 (row percentages). Thus, for example, 43% of those people who were unemployed in September 1984, were also unemployed at the time of the first sweep. In the second part of the table (2.6b), the percentages refer to the Summer 1985 (column percentages). Tables 2.7a and 2.7b repeat the procedure with regard to status at the time of the second sweep (Spring 1986). It is immediately apparent that the initial status of young people was important in determining where they ended up both nine months and twenty months later. Thus, in particular, 87% of those going (more or less) straight into a job from school, were observed to be in full-time employment in both the Summer 1985 and the Spring 1986 (although this was not necessarily the same 87%). On the other hand 71% of those going straight into YTS had gained full-time employment by the Spring 1986 (2.7a). Whilst only 41% of those unemployed in September 1984 had gained full-time employment by the Spring 1986. This gives an indication that YTS participation compared unfavourably with early employment experience but favourably with early unemployment experience in terms of its impact on the probability of finding work. This point will be returned to at length in chapter four.

Another observation to be made regards the stability of full-time education. Some 89% of those at school or college in September 1984 were still there the following Summer. Perhaps of more importance as regards the analysis undertaken in chapter three is the fact that 99% of those in full-time education in the Summer 1985 were also in education in the previous September. This is relevant in as much as those in education in the Summer 1985 are considered as having stayed on for the purpose of the analysis in chapter three. This allows the exclusion of young people remaining in education to do retakes in the Autumn 1984. Thus, in chapter three, the variable chosen to indicate staying on in full-time education is to be interpreted as those continuing in education for at least one academic year. The suggestion is that there were very few people returning to full-time education

once they had left. This picture is further supported by table 2.7b. It may be observed that 97% of those at school and college in the Spring 1986 were also in the same state in September 1984.

A further point arising from table 2.7b is that, of those on YTS in the Spring 1986, 85% had initially stayed on in further education. The implication is that YTS was also providing a way into the labour market also for seventeen year old leavers. This reinforces the suggestion in section 2.3.2 above that late entrants to YTS were coming, either directly or indirectly, from education.

2.4 Conclusions

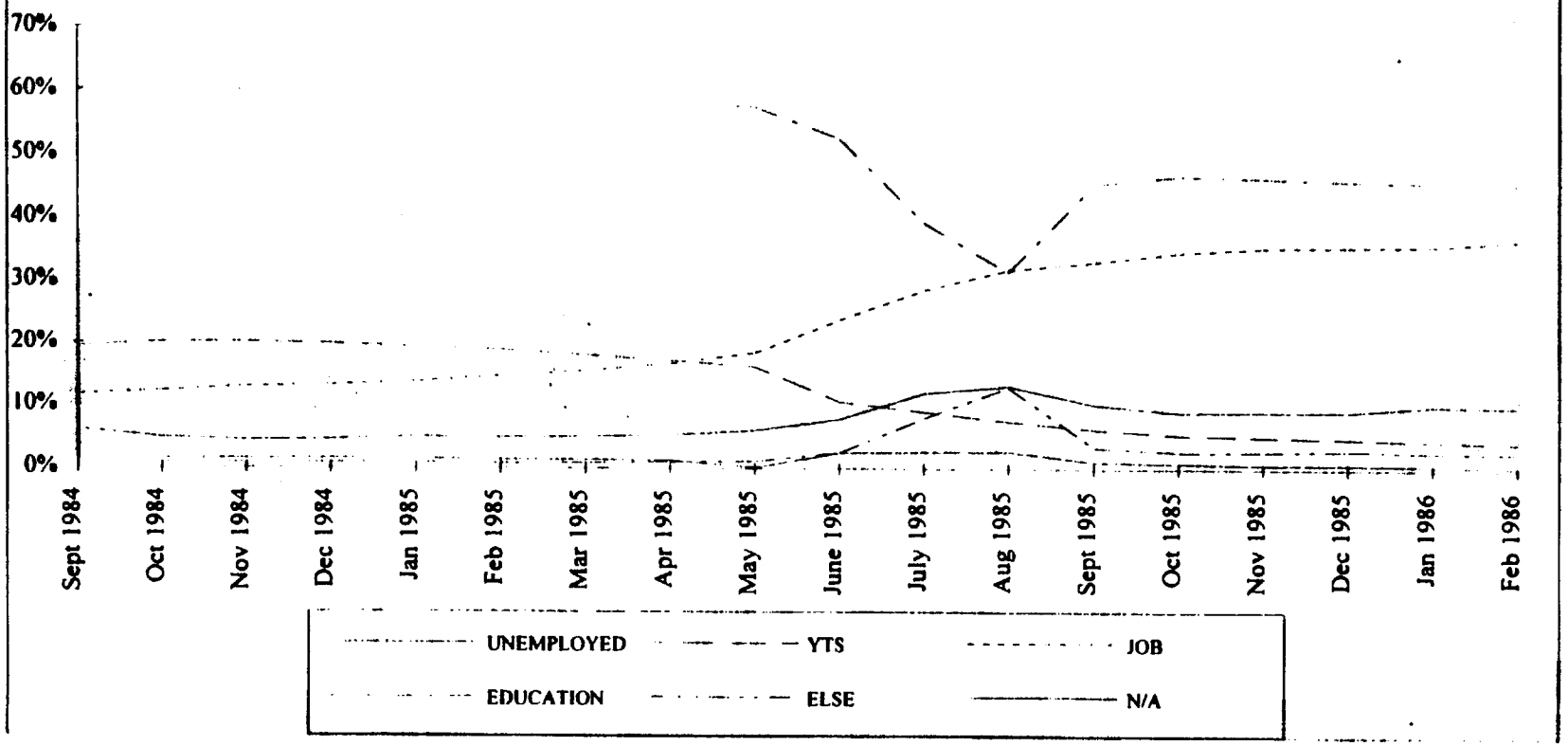
In this chapter some of the issues arising out of the use of the YCS have been considered. The chapter also employed the data to give an overall impression of young people's experiences in and out of the labour market. Like all surveys, the YCS is not without its faults, and some attention was paid to its drawbacks. On the other hand, the YCS is a rich source of information providing detailed data on the experiences of young people in and out of the labour market during the two years following the reaching of minimum school-leaving age.

The picture of the ELMS of young people presented in chapter one was developed with regard to survey respondents. The role of YTS in replacing full-time employment as the first-time "labour market" experience of young people was confirmed. It further emerges that whilst YTS and further education were, to some extent, substitutes, they were also complementary. That is, after spending a year in further education, many young people were using YTS as a route into the labour market. The principal source of seventeen year old entrants to the scheme in the Summer 1985 was further education.

It is worth making a number of observations pertinent to the analyses undertaken below. Further education was the most stable state. 89% of those in full-time education in September 1984 were still there in the Summer 1985. Subsequently, there was a small movement from education to the labour market, largely by way of YTS participation (and unemployment), however, by the Spring 1986, 74% of those initially entering further education were still there. On the other hand, 99% of those in education in the Summer 1985 were also in education in September 1984. This provides a justification for the definition of "staying on" used below.

As regards YTS, the impression gained is that, whilst participation on the scheme provided a better initial basis than unemployment, it did not compensate for the failure to find a "real" job immediately on leaving school. This is indicated, above-all, by the relationship between status in September 1984 and status in the Spring 1986. At first glance, it would appear that YTS could not accurately be described as either a "Bridge to Employment" or a "Gangplank to the Dole".

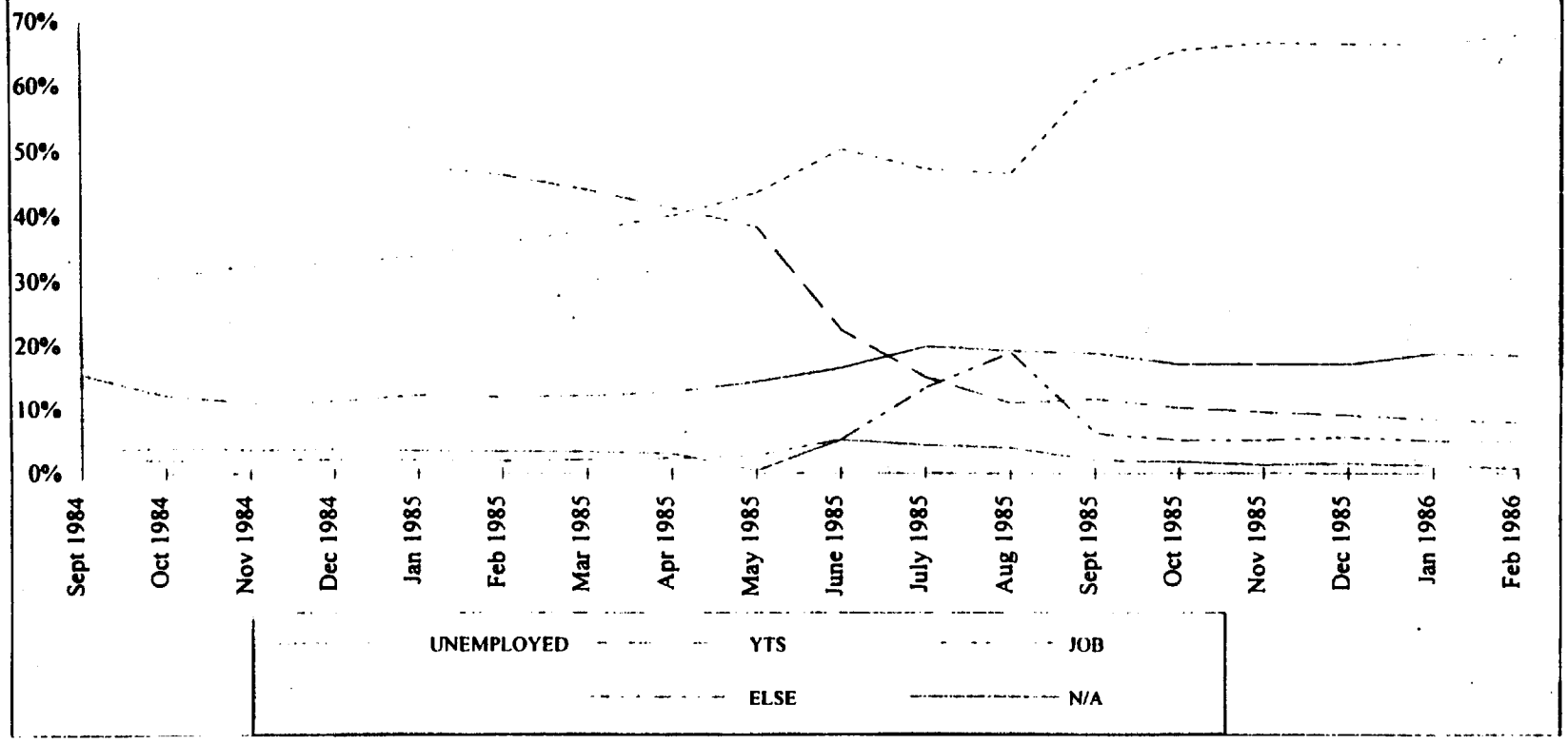
Figure 2.1: YCS Respondents' Status, September 1984 - February 1986 (%)



Source: England & Wales Youth Cohort Study (YCS).

Notes: 1) The figure shows the proportion of young people in each state for each month in the "diary" section of the first two sweeps of the cohort.
2) The "diary" question for May 1985 was present in both the first and second sweep questionnaires. The procedure adopted was as follows. For those giving a usable replies at the time of the first sweep, that reply was used. For those not giving a usable reply at the time of the first sweep, the second sweep response was used. This issue is further discussed in the text.
3) It will be observed that the keys for the "unemployed" and "N/A" groups are the same. In all cases, the lower unbroken line represents the "N/A" group.

Figure 2.2: YCS Respondents' Status Excluding Those in Full-Time Further Education, September 1984 - February 1986.

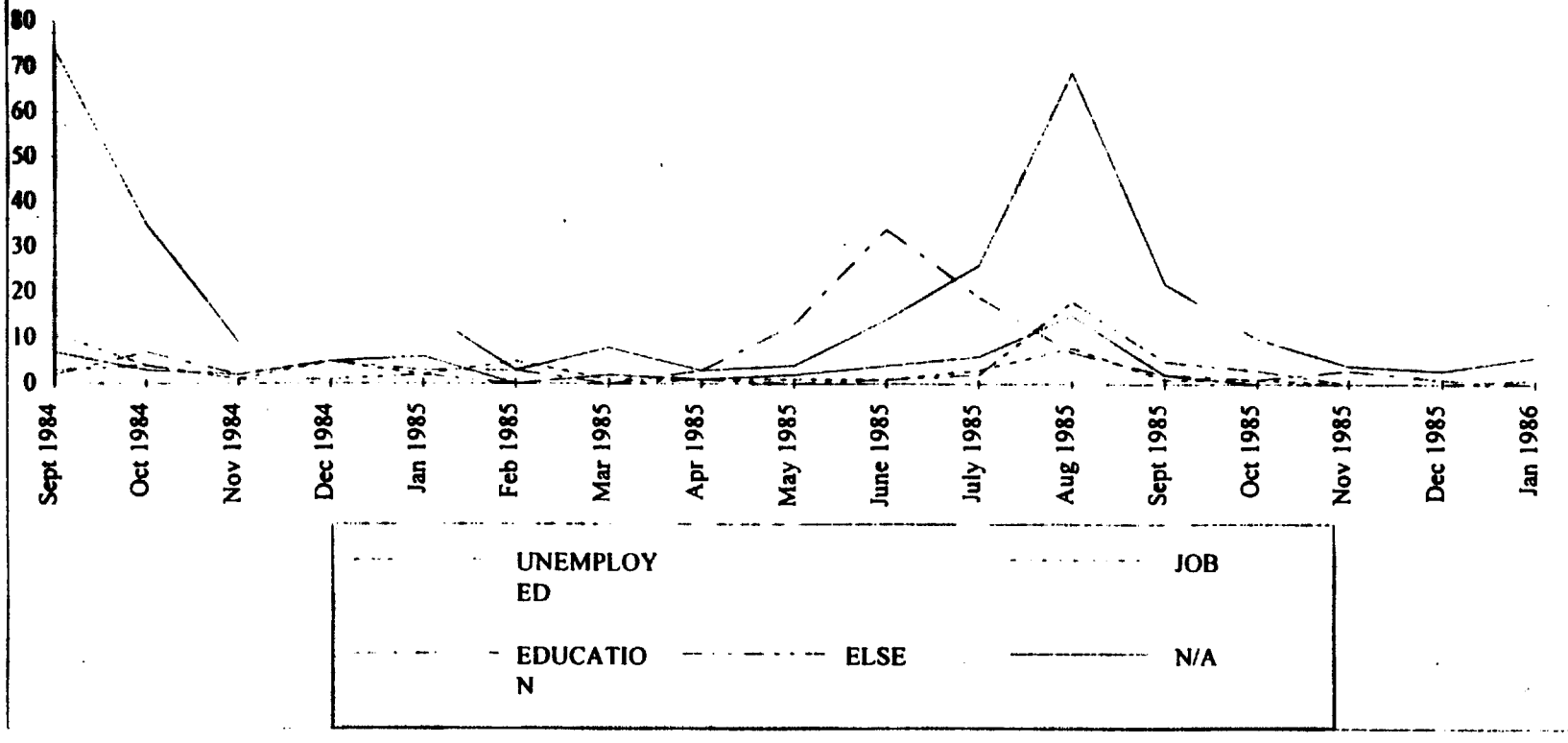


Source: YCS.

Notes: 1) The figure shows the proportion of young people in each state on a month-to-month basis, excluding those in full-time further education.

2) See also figure 2.1, notes 2 and 3.

Figure 2.3: Source of YTS Entrants: 9/84-1/86 (absolute figures).

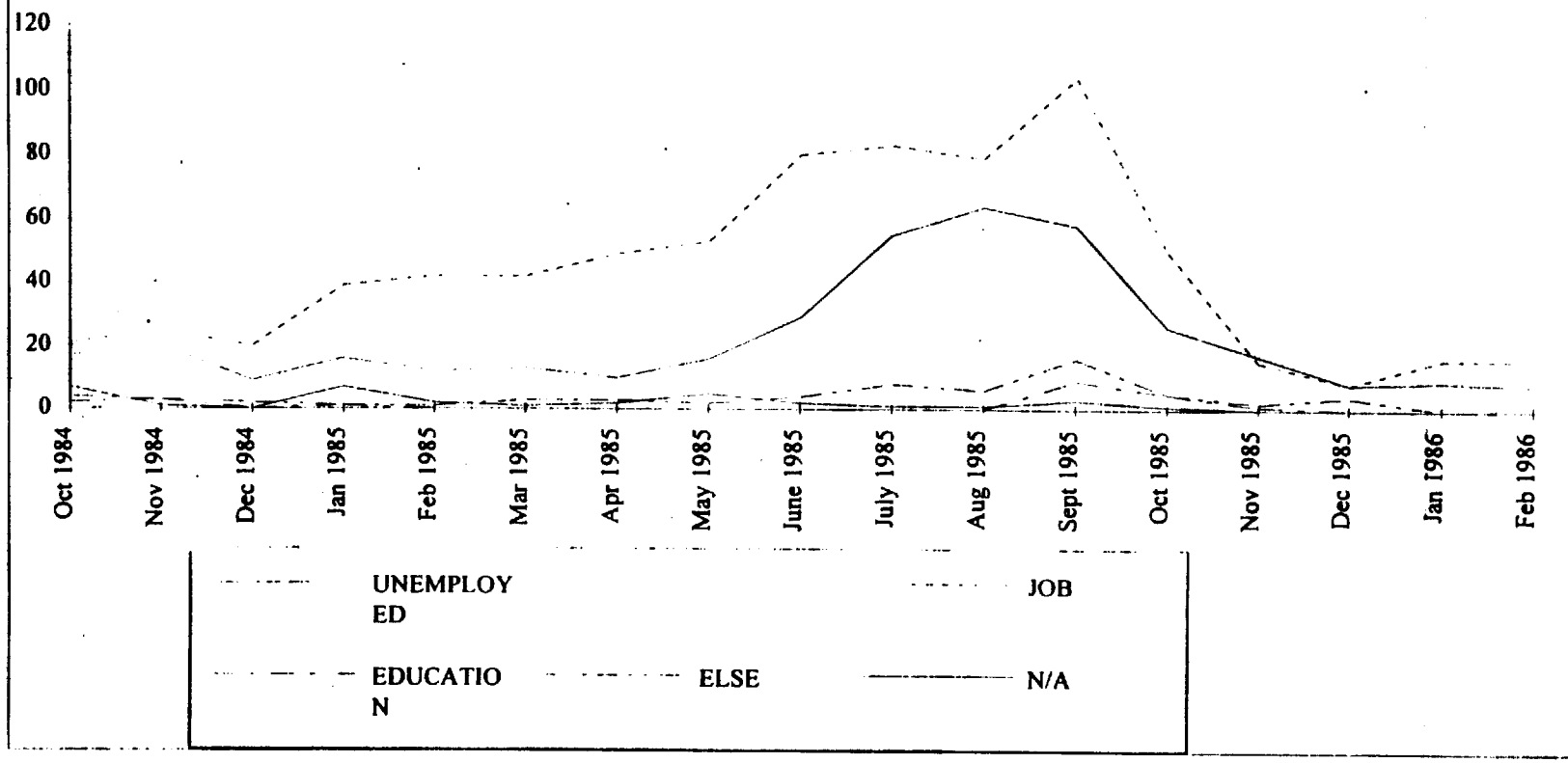


Source: YCS.

Notes: 1) The figure shows (in absolute terms) the status of YTS entrants in the month before entering YTS. Therefore, the date refers to the month previous to joining the scheme. Thus, for example, the figure states that of the 97 young people joining YTS in October, 74 were unemployed in September, 11 were in a full-time job, 2 were in full-time education, 3 were doing something else and 7 gave non-usable replies.

2) See also figure 2.1, notes 2 and 3.

Figure 2.4: Destination of YTS leavers: 10/84-2/86 (absolute figures).



Source: YCS.

Notes: 1) The figure shows (in absolute terms) the status of YTS leavers in the month following the last full month spent on the scheme. Thus, for example, the figure states that of the 51 young people on YTS in September 1984 who were not on the scheme in October of that year, 17 were unemployed in October, 21 were in a full-time job, 4 were in full-time education, 2 were doing something else and 7 gave non-usable replies.

2) See also figure 2.1, notes 2 and 3.

Table 2.1: Status of Sixteen Year Olds in January 1985: YCS and DE data Compared (%)
Standard errors in parenthesis

	All Young People			School-leavers		
	YCS		DE data	YCS		DE Data
Unemployed	5.0	(.28)	10.1	12.3	(.66)	18.3
YTS	19.4	(.51)	26.7	47.9	(1.01)	48.5
Employed	13.8	(.44)	18.4	34.1	(.96)	33.4
Further Education	59.5	(.63)	44.9	-		-
Something Else	0.9	(.12)	-	2.1	(.29)	-
No Response	1.5	(.16)	-	3.6	(.38)	-

Source: YCS and DE Gazette.

Notes: 1) YCS data refer England & Wales, DE data refer to Great Britain.
2) Standard errors are calculated using the formula: $[p(1-p)/n]^{1/2}$. Since the sample was stratified this is a slight underestimate, but serves to give an idea of its order of magnitude. See Courtenay (1988a) for details.

Table 2.2: status in May 1985 according to the Fist (CIS1) and Second (CIS2) Sweeps compared.

2.2a: Raw Data

		STATUS MAY 1985 (CIS2)						
		UNEMPLOYED	YTS	JOB	EDUCATION	ELSE	N/A	
STATUS MAY 1985 (CIS1)	UNEMPLOYED	262	11	25	17	17	17	349
	YTS	53	684	156	6	10	73	982
	JOB	17	26	999	18	11	20	1091
	EDUCATION	46	11	40	3325	34	39	3495
	ELSE	10	1	11	12	32	4	70
	N/A	23	8	34	9	9	12	88
		411	741	1265	3387	106	165	6075

2.2b: Row Percentages

		STATUS MAY 1985 (CIS2)						
		UNEMPLOYED	YTS	JOB	EDUCATION	ELSE	N/A	
STATUS MAY 1985 (CIS1)	UNEMPLOYED	75,07%	3,15%	7,16%	4,87%	4,87%	4,87%	5,74%
	YTS	5,40%	69,65%	15,89%	0,61%	1,02%	7,43%	16,16%
	JOB	1,56%	2,38%	91,57%	1,65%	1,01%	1,83%	17,96%
	EDUCATION	1,32%	0,31%	1,14%	95,14%	0,97%	1,12%	57,53%
	ELSE	14,29%	1,43%	15,71%	17,14%	45,71%	5,71%	1,15%
	N/A	26,14%	9,09%	38,64%	10,23%	10,23%	13,64%	1,45%
		6,77%	12,20%	20,82%	55,75%	1,74%	2,72%	100,00%

Source: YCS.

Table 2.3: Summary of States Experienced by Young People (9/84 - 2/86)			
	YOUNG PEOPLE WITH EXPERIENCE OF		Median No. of Months in State
	N	%	
UNEMPLOYMENT	1617	26,62%	3
YTS	1727	28,43%	9
FULL-TIME JOB	2734	45,00%	9
FURTHER EDUCATION	3768	62,02%	17
SOMETHING ELSE	1062	17,48%	2
TOTAL	10908	179,56%	

Source: YCS.

Note: The first two columns of the table show the numbers and percentages of young people who had at least one month's experience of the various states. The final column indicates the median number of months spent in that state for those having spent at least one month in it.

Table 2.4: Source of YTS Entrants (9/84-1/86)		
	YTS	FROM:
	N	%
UNEMPLOYED	321	56,51%
JOB	45	7,92%
EDUCATION	105	18,49%
ELSE	42	7,39%
N/A	55	9,68%
TOTAL	568	100,00%

Source: YCS.
Note: The table reports the status of young people who joined YTS between October 1984 and February 1986, in the month previous to participation on the scheme.

Table 2.5: Destination of YTS Leavers (10/84- 2/86)		
	YTS Exits To:	
	N	%
UNEMPLOYED	387	31.03%
JOB	742	59.50%
EDUCATION	23	1.84%
ELSE	62	4.97%
N/A	33	2.65%
TOTAL	1247	100.00%

Source: YCS.
Note: The table summarises the status of young people in the month following the last full month's participation on the scheme over the period October 1984 to February 1986.

Table 2.6: Status in September 1984 and Summer 1985 (at the time of the first sweep) Compared.

2.6a: Row Percentages

		STATUS SUMMER 1985						
		UNEMPLOYED	YTS	JOB	EDUCATION	SOMETHING ELSE	PART-TIME JOB	
STATUS SEPTEMBER 1984	UNEMPLOYED	42,55%	25,00%	25,53%	2,13%	2,93%	1,86%	376
	YTS	15,00%	47,03%	36,02%	0,25%	0,51%	1,19%	1180
	JOB	6,75%	3,94%	87,34%	0,84%	0,42%	0,70%	711
	EDUCATION	4,04%	1,53%	4,40%	89,10%	0,49%	0,44%	3661
	ELSE	15,52%	18,97%	24,14%	15,52%	10,34%	15,52%	58
	N/A	37,08%	20,22%	29,21%	8,99%	3,37%	1,12%	89
		575	762	1343	3296	47	52	6075

2.6b: Column Percentages

		STATUS SUMMER 1985						
		UNEMPLOYED	YTS	JOB	EDUCATION	SOMETHING ELSE	PART-TIME JOB	
STATUS SEPTEMBER 1984	UNEMPLOYED	27,83%	12,34%	7,15%	0,24%	23,40%	13,46%	376
	YTS	30,78%	72,83%	31,65%	0,09%	12,77%	26,92%	1180
	JOB	8,35%	3,67%	46,24%	0,18%	6,38%	9,62%	711
	EDUCATION	25,74%	7,35%	11,99%	98,97%	38,30%	30,77%	3661
	ELSE	1,57%	1,44%	1,04%	0,27%	12,77%	17,31%	58
	N/A	5,74%	2,36%	1,94%	0,24%	6,38%	1,92%	89
		575	762	1343	3296	47	52	6075

Source: YCS.

Table 2.7: Status in September 1984 and Spring 1986 (time of the second sweep) Compared

2.7a Row Percentages

		STATUS SPRING 1986								
		UNEMPLOYED	YTS	JOB	EDUCATION	FULL-TIME AT HOME	SOMETHING ELSE	PART-TIME JOB	OTHER SCHEME	
STATUS SEPTEMBER 1984	UNEMPLOYED	41,22%	4,52%	41,49%	2,93%	2,66%	1,86%	3,99%	1,33%	376
	YTS	19,32%	1,02%	70,59%	2,54%	0,85%	1,36%	2,80%	1,53%	1180
	JOB	8,44%	0,28%	87,34%	1,41%	0,56%	0,28%	1,41%	0,28%	711
	EDUCATION	3,14%	5,63%	15,79%	73,89%	0,08%	0,52%	0,85%	0,11%	3661
	ELSE	17,24%	5,17%	48,28%	13,79%	6,90%	1,72%	6,90%	0,00%	58
	N/A	29,21%	2,25%	50,56%	11,24%	2,25%	1,12%	1,12%	2,25%	89
		594	242	2261	2774	33	46	94	31	6075

2.7b: Column Percentages

		STATUS SPRING 1986								
		UNEMPLOYED	YTS	JOB	EDUCATION	FULL-TIME AT HOME	SOMETHING ELSE	PART-TIME JOB	OTHER SCHEME	
STATUS SEPTEMBER 1984	UNEMPLOYED	26,09%	7,02%	6,90%	0,40%	30,30%	15,22%	15,96%	16,13%	376
	YTS	38,38%	4,96%	36,84%	1,08%	30,30%	34,78%	35,11%	58,06%	1180
	JOB	10,10%	0,83%	27,47%	0,36%	12,12%	4,35%	10,64%	6,45%	711
	EDUCATION	19,36%	85,12%	25,56%	97,51%	9,09%	41,30%	32,98%	12,90%	3661
	ELSE	1,68%	1,24%	1,24%	0,29%	12,12%	2,17%	4,26%	0,00%	58
	N/A	4,38%	0,83%	1,99%	0,36%	6,06%	2,17%	1,06%	6,45%	89
		594	242	2261	2774	33	46	94	31	6075

Source: YCS.

CHAPTER THREE: SCHOOL-LEAVING AT SIXTEEN

In this chapter, I consider some of the factors influencing the decision of young people in England and Wales to stay on in full-time education beyond the minimum school-leaving age of sixteen. Increasingly, concern has been expressed at the low level of both post-compulsory educational participation in Britain and the low levels of vocational training provided outside the school[1]. Figure 3.1 provides a picture of staying-on rates in the European Community for the academic year 1982/3. Although cross-country comparisons of this type are problematic due, in particular, to institutional differences (Micklewright et. al., 1989), it may be observed that only girls in Greece had a lower staying on rate than the UK.

The economics literature has, until recently, concentrated on the role of earnings in the determination of schooling choice (e.g. Willis & Rosen, 1979). It is evident, however, that an important element of the choice is ignored in this context. That is, concentrating on earnings ignores the fact that a large proportion of school-leavers (69% in the YCS sample) did not move straight into employment. Rather, the majority went into either unemployment (17%) or YTS (52%). The presence of a substantial unemployment, or more generally, non-employment rate, has implications not only for the level of income in the labour market but also its certainty. Nickell (1979) considers the role of education in determining unemployment and Ashenfelter & Ham (1979) explain the effect of schooling on wages in terms of its role in reducing unemployment. It is only recently, however, that the role of unemployment and, in particular, unemployment expectations in the determination of the choice of the level of schooling has been considered.

The implications of YTS are rather more complex. YTS implied in the short-run, a period of low paid, full-time work. The scheme also provided off-the-job training. In the long-run, this might be expected to improve the individual's employment prospects and, perhaps, earnings. Evidence presented in chapters four and five suggests that the former effect was prevalent in the period immediately following participation on the scheme, however, it is plausible that the longer run benefits were not yet apparent[2]. The relevant point here is that YTS was presented as a vocational

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1 See, for example, the entire issue of the **Oxford Review of Economic Policy**, (vol. 4, n. 3, 1988) devoted to these questions.

2 This should not be taken to imply that there would **necessarily** be longer-run wage gains associated with YTS participation.

training scheme. Therefore, it might be seen as a direct competitor to staying on in full-time education, particularly in the context of TVEI mentioned in chapter one. Seen in this light, YTS had one very obvious advantage over staying on in school. Although the rates of pay were low, YTS participation did provide some financial support for participants whilst further education did not[3]. Whitfield & Wilson (1991) present time series evidence which suggests that YTS (and YOP) had the effect of discouraging participation in further education. The data on the ELMS of young people in chapter one also provide some support for this idea. Between 1983 and 1984, following the introduction of YTS, participation in further education fell from 44% to 40% for boys and from 54% to 51% for girls, interrupting a period of relatively rapid expansion in the post-compulsory educational participation rate. Between 1981 and 1983, the percentage of sixteen year old males rose from 38% to 44% whilst the corresponding increase for females was from 48% to 54%.

These considerations suggest that a comprehensive model of the school leaving decision would take into account the various aspects of labour market experience, namely unemployment, YTS participation, and employment, which, in addition to wages, are likely to influence the decision. In practice, such a model would be very complicated indeed and is not attempted here. It would imply, at the very least, the joint determination of school-leaving, employment and YTS participation. Distinctions between types of full-time educational participation would also become fundamentally important. YTS might be considered as an alternative to taking part in a TVEI scheme, or more generally, obtaining further vocational qualifications, whilst it would presumably not be considered an effective competitor to more academic forms of further education. In the discussion of past results and the development and estimation of the model presented below, these issues are taken up in more detail.

The structure of the chapter is as follows. Section 3.1 considers past studies of the schooling choice, concentrating on individual level cross-section studies. Section 3.1.1 discusses past studies which focus on the role of wages in determining educational choice. The principal study of this kind is Willis & Rosen (1979). These authors estimate a structural human capital model involving the simultaneous determination of wages and participation in further education. Much of what is said

3 The Rice (1987) paper discussed in this chapter uses the "Effects of Educational Maintenance Allowances" (i.e. financial support for those remaining in full-time education) as its principal justification. Since the data employed come from 1976, however, the analysis allows no consideration of the effects of YOP or YTS. Other problems with the study are discussed below.

regarding this paper may be applied to the use of the human capital approach in general, and, to this end, their model is analysed in some detail. Section 3.1.2 turns to a consideration of more general models which recognise the role of unemployment, and occasionally government programmes, in determining school-leaving. Given the complications implied by the recognition of the role of unemployment in school-leaving, these are almost invariably reduced form models although, in some cases, the inclusion of exogenous variables employed to capture individual expectations renders the distinction between structural and reduced forms less well-defined.

Section 3.2 briefly describes the nature of the data employed in this paper and outlines the specification and estimation procedure adopted for the empirical model. After a brief consideration of the problems involved with the explicit incorporation of YTS into the model, a single equation reduced form probit model is proposed and estimated using data drawn from the YCS. An attempt is made to take some account of expectations through the inclusion of terms to represent labour market conditions, however, these do not prove to be particularly successful. Section 3.3 presents and discusses the results. The principle findings are that school-leaving is strongly influenced by both individual and family background characteristics. These findings are compared to previous studies which consider the British youth labour market in earlier periods to examine the changing nature of the influence of social class. In this indirect manner, some light is also thrown on the role of changes in the youth labour market. Section 3.4 provides some concluding comments.

3.1: Empirical Analyses of School-Leaving

3.1.1) School-leaving and Wages

The seminal paper in this area was undertaken by Willis & Rosen (1979, hereafter W&R) who estimate what might be termed an extreme form of the human capital model. W&R analyse the school-leaving decision and the determination of individual earnings taking into account the interdependence between the two. As Griliches (1977) notes, one problem with human capital models estimating earnings as a function of schooling is that, in a choice model of this kind, the length of schooling itself depends on the expected returns to education. If expectations concerning

returns are rational, in as much as they differ from realised earnings only in a non-systematic way, the decision as to the length of time spent in full-time education is endogenous to the model. W&R consider such a model in the American context, estimating factors influencing the choice between leaving school with a high-school diploma and continuing in education at college taking into account the implied simultaneity of observed earnings and the school-leaving decision.

Putting the argument in slightly more formal terms, W&R assume that individuals are only concerned with maximising lifetime income, or rather an infinite earnings stream[4]. In such a context, individuals choose schooling option j so as to maximise:

$$E(PV_j) = \int_0^{\infty} \exp(-rt) E(Y_{jt}) dt \qquad (3.1)$$

Where Y_{jt} represents earnings of the individual in option j at time t; r is the discount rate; PV_j is the present discounted value of the earnings stream corresponding to option j; and, the E(.) terms represent expectations on the part of individuals. It may be noted that, throughout the analysis, individual subscripts are suppressed, although it should be remembered that all the variables are individual specific.

W&R further simplify the choice problem, restricting their attention to just two options: leaving education after completing high school; and, staying on in college. Clearly, this is an important simplification, but also one which they are well aware of. In this context, individuals may be thought of as implicitly maximising the income streams within the two possible options. That is to say, they will continue their education in graduate school, for example, if the net gain is positive (as against leaving education after completing college). W&R do discuss problems with the error normality assumption in the face of truncated normal variables implied by this assumption, however, they leave the issue unresolved. Hartog et al. (1989) propose a means to deal with this problem. They estimate a structural model which is similar in character to that of W&R, but which allows for seven different exit levels from education. In order to arrive at a manageable form for estimation,

4 As W&R point out, the assumption of an infinite rather than finite time horizon should have little effect on the results, ceteris paribus, since the existence of a positive discount rate ensures that income in later life has a relatively low weighting in the objective function.

however, they necessarily make another fairly strong assumption about the error terms. Specifically, they assume a stepwise decision process. That is, at each level, individuals decide on the basis of current information whether or not to continue in education, rather than deciding at the outset at which level to leave education. Thus, the error terms at each level are assumed to be independent of those at higher levels.

One important question to be raised regards the treatment of expectations. Leaving aside for the moment the assumption of risk neutrality which is returned to below, W&R assume that expectations are rational in a very particular way. At the time of making the decision as to whether or not to stay on in education individuals estimate their lifetime earnings prospects in the different options. In order to operationalise such prospects one needs to assume some relationship between expected and realised earnings. W&R assume that expected earnings are related to realised earnings in the following manner:

$$Y_{jt} = E(Y_{jt}) + \varepsilon_{jt} \qquad \varepsilon_{jt} \sim N(0, \sigma^2) \qquad (3.2)$$

Such an approach implies the estimation of a model in which earnings and the school-leaving decision are simultaneously determined. Expectations are estimated at the reduced form stage by a regression of realised earnings on all exogenous variables. Expectations are thus taken to be the estimated value of the systematic component of realised income which is subsequently inserted in the structural equation of educational choice. In principle, this assumption regarding expectations implies that at the moment of making the decision, all systematic movements in the relative earnings from the different occupations over the individual's lifetime are anticipated. Such an approach is frequently employed in cross-section work, perhaps because of the *relative* ease with which lifetime earnings expectations may be derived. It should be noted, however, that it is quite different from the type of rational expectations assumed by time-series analyses[5] where the expected gains from staying on in education are generally assumed to be related to *current* (rather than future) values of observed variables. That is to say, the calculations of gains are presumed to be based on what more and less educated workers earn at each stage of their career *at the point in time at which the decision is*

5 See, for example, Pissarides (1981) or Whitfield & Wilson (1991).

taken. Not, as is assumed by the model of W&R, what they will really be able to earn over the lifetime (give or take a random error). That is, taking into account future changes in the structure of demand for different types of labour and the like.

Siow (1984) proposes a rational expectations model in which earnings at the time of entry to the labour market provide sufficient information on future earnings streams, in as much as other wage differentials will be arbitraged away by future generations. Siow further provides a simple and convenient test of the rational expectations hypothesis in this context. Unfortunately, Connolly (1989) points out that this conclusion, and, consequently, also the test of the rational expectations hypothesis, are both crucially dependent on the assumption that the only source of heterogeneity across workers is the level of education. Once earnings differences due to experience are incorporated, the entire stream of future earnings enter the earnings function. It might also be noted that Orazem & Mattila (1991, p.111) report that estimates of earnings based on the myopia assumption were more successful than rational projections of the type employed by W&R in explaining career choices.

Additional assumptions are employed to further simplify the analysis. Education is assumed to be an investment good whose only cost is that of foregone earnings during the period spent in education. That is to say, there is no mention of school being a consumption good with an associated price. One might justify such an assumption suggesting that the direct (consumption) benefits and costs are likely to more or less cancel each other out, however, it is difficult not to feel that some mention of this issue would have been warranted.

In order to arrive at an estimable form of the model, W&R employ one other assumption worthy of comment. This regards the rate of growth of earnings. W&R employ the observed income at two points in an individual's career, which, coupled with the assumption of a constant rate of growth of income allow the estimation of lifetime earnings. Micklewright (1988) has questioned the use of such an assumption on the grounds that it will tend to underestimate the rate of growth of earnings in earlier life, which, given a positive discount rate, will have an important influence on the decision. It is commonly observed in empirical work that, in both the United States and Britain, the rate of growth of earnings decreases with age, eventually becoming negative. That is to say,

individuals' earnings profiles display quite a different shape to that assumed by W&R[6]. The inclusion of this assumption, coupled with a first-order Taylor's approximation, allows the straightforward derivation of lifetime earnings from the two observed income variables.

The W&R model may now be summarised. After completing high school, individuals face the choice of whether or not to continue their education at college. The decision they make depends on whether the discounted earnings stream from the college option is greater than that from leaving education. That is to say, if the expected (i.e. the systematic component of realised) earnings after going to college are sufficiently high to more than compensate for the period of zero earnings sustained during the college period. Thus, individuals will continue in education at college level iff:

$$E(PV_1) = \int_s^{\infty} \exp(-rt)E(Y_{1t})dt > E(PV_2) = \int_0^{\infty} \exp(-rt)E(Y_{2t})dt \qquad (3.3)$$

where the subscripts 1 and 2 represent the staying-on and leaving options respectively, and s represents the length of time spent in additional schooling. One may perhaps express the condition more clearly as:

$$\int_s^{\infty} e(-rt)\left[E(Y_{1t}) - E(Y_{2t})\right]dt > \int_0^{s} \exp(-rt)E(Y_{2t})dt \qquad (3.3')$$

Simply stated, individuals will remain in school so long as the higher discounted earnings stream derived from a college education more than compensates for the zero earnings received during the period spent at college.

The W&R paper, therefore, has the virtue of being explicit in the relationship between the theoretical and empirical models. The price of such explicitness is a number of questionable simplifications. The crucial point, however, is that at no stage is the underlying human capital model tested. The internal consistency tests carried out serve to verify the accuracy of the approximation of lifetime earnings by initial earnings and a geometric growth rate and do not test the theoretical model in itself. Furthermore, it should be added that the rational expectations hypothesis and the human

6 See, for example, Murphy & Welch (1990) for the USA and Moghadam (1990) for Britain.

capital model cannot be independently tested. Thus, the lack of statistical significance (and/or wrong sign) of coefficients on terms representing expected income in W&R, as well as in other cross-section studies of this type[7] may be given one of two possible interpretations. Either expected income is not important in the decision process, or, rather more plausibly, the variables employed to represent income expectations in empirical applications do not adequately measure the phenomenon which they are intended to capture. That is, the systematic component of realised future income is not in fact closely related to individual income expectations.

As regards the econometric specification of the model, one or two further issues should be mentioned. Firstly, identification requires that there is at least one explanatory variable in the structural wage equation not included in the structural school-leaving equation. In their formulation, W&R choose to enter "ability" indicators as influencing wages directly, whilst family background variables have an impact on the school-leaving decision through their influence on the discount-rate. Thus, this formulation posits that individual characteristics such as ability contribute towards the determination of potential earnings in the various options whereas family background characteristics enter only in as much as they influence the discount rate, r. No justification is given for such a division, although the need for some difference between the two equations is discussed. In as much as family background variables may reflect financial constraints on the choice, their introduction through the discount rate may be reasonable, certainly it is not clear what other justification they might be given in the context of the human capital model. Whilst the model is consistent with the maximisation of a family utility function with the earnings of children as arguments, the inclusion of family effects in this way excludes the possibility of education being a consumption good. It is noted below that tastes for education are likely to be influenced by family background in a variety of ways.

A more serious criticism of the reported estimation procedure regards the introduction of schooling duration and work experience variables into the structural wage equations (Table 3, p. s26). In statistical terms, if an explanatory variable in one of the equations is exogenous then, when one substitutes expressions for the endogenous variables to arrive at the reduced form, such a variable must also be present. If, on the other hand, the variable is endogenous, it is correct to exclude it from the reduced form but, of course, it needs explaining. That is, to complete the system,

7 See below, and, for example, the results of Micklewright (1988) and Hartog et. al. (1989).

there should be a structural equation corresponding to each endogenous variable. W&R follow neither of these procedures introducing experience and schooling-duration variables in their structural wage (and wage growth) equations which were not present in the reduced forms. If these variables are exogenous, their exclusion from the reduced forms implies bias in the estimation of the other reduced form coefficients and underestimation of the size of the standard errors of parameters arising from the correlation of omitted variables with those included. If, on the other hand, the excluded variables are endogenous, the structural form parameter estimates are biased due to the correlation between the endogenous variables and the error term.

One might look at this issue from the point of view of the logic of the theoretical model. Indeed, it is in these terms that W&R provide a logically inconsistent statement justifying the inclusion of these variables. Thus,

> "structural estimates of earnings....are somewhat different from the typical earnings equations....because they include a much sparser set of regressors. For example, we know respondents' unemployment experience....and so forth but have not included them in the regressions. The logic lies in the model itself: at the time the decision was made, there is no reason to expect that respondents knew the outcomes of such variables,"(W&R, p. s23).

But, two sentences later they argue that,

> "the problem is more difficult in the case of school-completion differences....[which] raises an unresolvable aggregation problem. The anticipation's argument above suggests that school-completion differences within group A [stayers] may not enter the earnings equations.... Alternatively, it can be argued that the level of schooling achieved within group A should be controlled....[the] latter specification is used to estimate the structural probit." (W&R, p. s23).

One might agree that the level of schooling should form part of the analysis, however, at the same time the issue of endogeneity or exogeneity is in no way resolved. Indeed, matters are made worse because W&R deal with the problem in an inconsistent manner. W&R are faced with the logical problem that future values of the wage are determined partly by factors unknown at the time the decision is made as to whether to stay on at school or not. This raises an obvious question related to the modelling of expectations considered above. If young people are not aware of the influences

that various factors will have on their estimated earnings, how can they rationally formulate such expectations[8]. W&R fall between two stools by including variables representing different completion times of schooling. As they observe, the problem is not resolvable within the simple dichotomous choice framework of the model. That being the case, however, such variables should not enter the analysis at all. Clearly, the question of the level of education chosen would fit conceptually into the model. Different levels of education could be incorporated formally as part of the choice problem as in Hartog et. al. (1989). One is left wondering why, given that they choose not to add this complication to an already sophisticated model, they include such variables at all and do not leave their effect implicit in the other variables in the model. One might observe that in the earnings and earnings-growth equations the R^2 is extremely low, particularly in the case of the early school-leavers who do not have the benefit of the additional variables. It might also be noted that these additional variables are almost the only statistically significant explanatory variables in the regressions. Finally, one might add that the coefficient on the growth rates of earnings in the structural leaving equation is extremely unstable. In the case of leavers' growth-rates, the coefficient is either statistically insignificant (at a 5% significance level) or wrongly signed.

Recently, a similar model to that employed by W&R has been applied to British data (Micklewright, 1988). Micklewright's model differs from that of W&R in as much as he allows for two sample selection effects: with regard to the leaving decision (as in W&R); but, also with regard to panel attrition in the data. The principal differences between the two models, however, arise because, in contrast to W&R, Micklewright employs no underlying theoretical structure which allows a flexibility not possible in the W&R model. Thus, the analysis differs somewhat in the underlying assumptions. Micklewright does not adopt the rigid distinction between individual ability and family background influences. He also adopts a more empirically accurate varying growth rate of earnings. Finally, Micklewright's analysis differs from that of W&R in that he enters estimates of the leavers and stayers earnings separately, rather than in the form of a ratio. In so doing, it emerges that, at least in Britain, the only correctly signed and statistically significant earnings variable is starting earnings. In interpreting his results, Micklewright points to problems of measurement with respect to lifetime earnings data. One is again faced with the difficulty of the representation of

8 It may be noted that Hartog et. al. (1989) resolve the issue by allowing earnings expectations to differ systematically from expected earnings, allowing variations in the type of job to influence earnings but not earnings expectations.

expectations in the model which, in this case, is aggravated by problems in the measurement of realised incomes. In any event, if Micklewright's analysis does not provide much evidence against such a hypothesis, it certainly provides no support for the idea that lifetime earnings play an important role in the leaving decision at sixteen.

I feel that the crucial weakness in this type of model is the assumption made concerning expectations. That is, the assumption that the decision to leave school depends on the non-stochastic, or more precisely, the explicitly explained part of the realised values of earnings. Micklewright suggests that the statistical insignificance and/or wrong signs on future earnings coefficients may be due to a divergence between the estimated values employed and their realisations and not to a divergence between individuals' expectations and their representation in the empirical estimation. Once again, the problem arises that their is no way of testing the formation of expectations independently of the effect of realised values in such a model.

Thus, the estimation of structural human capital models allowing for the endogeneity of earnings, has so far not produced very satisfying results. Even in its simplest form, a structural model raises a number of difficult estimation issues. Once the possibility of unemployment and, more generally, different labour market states is recognised, these difficulties are aggravated. The discussion continues below with a consideration of the approaches that have been adopted to deal with (or avoid) problems posed by the structural model. As before, the central issue revolves around the treatment of expectations.

3.1.2) School-leaving and Unemployment

One important issue not treated in the structural models discussed above concerns attitudes to risk and, in particular, the role of future (un)employment expectations. Levhari & Weiss (1974) show that in the presence of risk aversion, investment in human capital is negatively related to the riskiness of the return. Snow & Warren (1991) consider the case in which labour supply is endogenous, thereby incorporating income effects on labour supply. That is, human capital investment raises wage-rates and, therefore, potential but not necessarily realised earnings. The effect of the riskiness of the return depends on whether human capital investment is normal or inferior. In

the former case, the Levhari & Weiss result holds, in the latter, the effect of uncertainty is indeterminate.

All of these models, however, assume that there is no constraint on labour supply. Common sense, as well as the rather more rigorous analyses of Ham (1986a, 1986b)[9] suggest that unemployment does not necessarily represent voluntary leisure. Kodde (1988) explicitly incorporates unemployment expectations in a theoretical and empirical model of educational choice. Employing a two period framework, individuals allocate their time between the labour market and education in the first period. In the second period, they spend all their time in the labour market. Both those with and without further education face a non-zero unemployment probability. Unemployment probability is higher and wages lower (in both periods) for those not undertaking further education. Thus, the choice problem faced by individuals has a similar form to the W&R model summarised by equation (3.3) above. There are three basic differences. Firstly, Kodde introduces the possibility of a non-zero unemployment probability. Secondly, time is collapsed into two periods. Finally, schooling choice regards the *amount* of time spent in education and not the dichotomous choice between school and labour market. He derives the theoretical prediction that the demand for further education rises with increases in the probability of employment at all levels of education as well as increasing in response to improvements in the relative advantage of more educated people with regard to the chances of finding a job. The effect of foregone earnings is indeterminate, however, wage gains arising from education will have a positive effect on human capital investment.

In his empirical model, Kodde gets around the problem of estimating earnings and (un)employment expectations by using data which includes explicit information on individuals' expectations. Whilst he is then heavily dependent on the accuracy of self-reported expectations, it might reasonably be argued that such reports are likely to conform more closely to the phenomena which they are intended to represent than the constructed estimates considered above. Certainly, the parameter estimates produced by Kodde are more satisfactory than those based on rational future expectations. They have the expected signs and are almost always statistically significant[10]. On the other hand, the two period structure of Kodde's underlying theoretical model makes it difficult, in the

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[9] See also the papers considering the issue of market clearing in the labour market cited in Chapter one, note 13.

10 The exception being the coefficient on expected foregone earnings which, as noted above, has an indeterminate effect on the decision in the theoretical model.

empirical application, to interpret earnings and employment expectations as lifetime values. The expectations variables employed might therefore be more properly thought of as starting earnings and employment prospects relating to the two options. Thus, strictly speaking, the model does not test the predictions of human capital theory.

Turning now to reduced form estimates, that is to say, models which get around the problem by avoiding it altogether. Using this approach, the effects of expected financial and other gains are not explicitly included. Several studies have been carried out in Great Britain. Rice (1987) reports reduced form estimates for a human capital model based on cross-section data. Her theoretical model differs from that of W&R in that family background variables are assumed to affect attitudes towards further education, that is, to have a direct effect on the school-leaving decision and not just to influence the discount-rate, although, of course, in the context of a reduced form model, such a distinction is of no material importance. Regional dummies, the regional unemployment rate and measures of household income are also included. It should be noted that the regional unemployment rate is included to reflect variations in the opportunity cost of further education. That is, in contrast to Kodde, a higher unemployment rate is seen as reflecting lower expected foregone wages for those staying on in school, and not as influencing the expected returns to education. Finally, and of principle importance, since Rice is interested in the potential effects of Educational Maintenance Allowances (EMAs), the model includes family income variables. These represent the existence (or absence) of constraints in the decision and might therefore be thought of as entering through their impact on the discount-rate. Rice finds no significant impact for males, but a strong impact for females. In the context of a reduced form, however, this result may be somewhat misleading in as much as it neglects any substitution effects influencing the choice, as she herself observes. Finally, Rice finds a significant positive impact of the unemployment rate on staying on rates, which conforms to her prior expectations.

Micklewright, Pearson & Smith (1990) argue for a rather more sophisticated treatment of the role of unemployment in the school-leaving decision. Building on the arguments contained in Kodde (1988), they suggest that, although the current level of youth unemployment is likely to have the effect suggested by Rice, current levels of adult unemployment are likely to influence expectations concerning future prospects. Higher expected future unemployment will tend to reduce the returns to

education, although such an effect may be mitigated by the fact that the more educated, or rather, better qualified individuals will face a lower unemployment probability (Nickell, 1979). Finally, there is the impact of parental unemployment which is likely to raise the probability of leaving school since it lowers both consumption and investment demand for schooling (Micklewright et. al., 1990, p. 163) and reduces access to credit, i.e. raises the discount-rate. Rice takes account of this last factor by including family income as an explanatory variable. Micklewright et al. use, in addition, the proportion of the previous year spent in unemployment by the head of the household. They find that regional unemployment-rates have a positive impact on the probability of leaving school at sixteen. That is, the opposite effect to that found by Rice (and, indeed, by Pissarides, 1981). One explanation may be sought in the different time periods analysed. Pissarides' analysis covers the period 1955-1978, whilst Rice looks at cross-section data for 1976. Micklewright et. al., on the other hand, employ cross-section data over the period 1978-84, during which unemployment was rapidly rising. It may be the case that the effect of such increases in unemployment has been to lower the expected returns to schooling sufficiently to counteract the opportunity cost effect.

Another aspect of the problem is considered by Micklewright (1989). The paper concentrates on family background and individual specific effects (namely school-type and a measure of ability), leaving aside issues related to unemployment rates. The inclusion of family background variables provides a basis for comparison with the results presented below and discussion of them is deferred to section 3.3. It is interesting to note here that, in common with his previous estimates (Micklewright, 1988), he finds no significant impact of household income on the school-leaving decision, although, in common with Rice (1987), Micklewright finds that the effect is better determined for girls than for boys. This raises the obvious question as to what the Head-of-Household unemployment variable in Micklewright et. al. (1990) is actually reflecting. However, it should be recalled that the more recent analysis refers to a period of relatively high unemployment.

One issue which has not yet been dealt with in microeconometric studies of educational choice regards the role of government training programmes. Programmes such as YTS are likely to influence the decision in two ways. Firstly, in the short-run, YTS participation may be seen as reducing the probability of unemployment on entering the labour market at sixteen and therefore increasing the opportunity cost of education. This is likely to have a limited impact for two reasons.

As noted previously, the YTS allowance was relatively low, slightly above the social security benefit available to unemployed young people[11]. Secondly, it was noted in chapter one that YTS involved a substantial degree of displacement. Many YTS places substituted jobs which would have existed in any case, presumably with higher rates of pay.

Perhaps of more importance are the long-run effects. In as much as YTS raised the level of human capital of participants, or generally made them more attractive to employers, YTS was likely to raise the post-programme employment prospects of young people. In both cases, the effect of YTS would be to increase the attractiveness of the labour market as opposed to further education. Thus, one would expect a negative influence of YTS on staying on in school. In as much as full-time employment provided higher wages and a more stable future[12], the effect of YTS was likely to be less influential than increases in the probability of finding work. Thus, an improvement in the probability of finding employment on entering the labour market should be more influential in determining the choice. In their study of school-leaving employing aggregate time series data, Whitfield and Wilson (1991) report an elasticity of the staying on rate with respect to YTS of -.2 for boys and -.4 for girls at the 1985/6 levels of participation. The elasticity of staying on with respect to the unemployment rate is of the order of .1. Therefore, the implications are that the longer run effects of YTS were operating. This abstracts from a number of problems. In particular, YTS participation is likely to be endogenous[13] and the effect of unemployment is ambiguous given the two opposing influences identified above.

To summarise, it is important to note that, despite the plausibility of the positive relationship between the expected earnings gain from education and the propensity to stay on in school, sophisticated structural models employing what might be termed rational future expectations have failed to produce statistically significant support for the notion. The results presented by Kodde (1988) employing a direct measure of expectations have produced more satisfactory estimates

11 As with the studies discussed above, the assumption is made that the negative impact of unemployment arose solely through a reduction in income. The possibility that unemployment is intrinsically unpleasant does not materially affect the thrust of the argument. The implication of negative utility arising from unemployment in itself is that the effects of YTS would be reinforced.

12 See chapter four below.

13 Whitfield & Wilson deal with this by using lagged values of YTS participation, subsequently testing for omitted variable bias through the exclusion of current values. Having thus excluded current values, they test for simultaneity bias using the lagged values of YTS participation only. One might question the appropriateness of this methodology. YTS values from year to year are likely to be highly correlated, and, therefore, it is not surprising that the exclusion of current YTS participation is not rejected. It would be interesting (and would constitute a more convincing test) to consider the possibility of simultaneity bias including current values of YTS in the specification.

suggesting it may not be the human capital model which is at fault but rather the modelling of expectations. In as much as Kodde employs variables which should perhaps be interpreted as representing starting rather than lifetime values, however, the issue remains unresolved.

A second issue which remains to be dealt with regards the influence of YTS on the decision. Theoretical considerations suggest that this is likely to have a negative impact on staying on, however, given the low levels of remuneration, and the more stable future provided by a "real" job, the effect is likely to be weaker than an improvement in employment prospects. The situation is complicated when it is recognised that YTS participation is likely to be endogenous. In outlining the empirical model below, problems associated with the inclusion of YTS participation in the decision are dealt with more formally. Discussion of this issue provides a justification for the simpler approach actually adopted.

3.2: Empirical Model.

In this section a single equation model of the school-leaving decision incorporating individual, family and background socio-economic effects is presented. Labour market variables are included in order to take some account of the role of individual expectations on earnings and (un)employment experience related to the two options. These "expectation" variables are measured at a regional rather than an individual level, however, so they cannot adequately control for individual differences which will inevitably be absorbed to some extent by other explanatory variables in the model.

3.2.1) Basic Model

Before outlining in more detail the estimation procedure it is worth considering the modelling problem in a little more detail. To keep things simple, suppose that earnings and employment probability differ between the two options, but that they remain constant over time. Suppose also that the only influence of unemployment is to reduce earnings and that unemployment income is zero. None of these simplifications affect the thrust of the argument expressed in its general form. Now suppose that young people can choose whether or not to participate on YTS. To remain in the spirit of the human capital model, suppose that expected and realised values are equal. The

probability of staying on at school may be expressed as a function of individual characteristics and the outcomes associated with the two options:

$$p(s=1) = f\{X, p(e=1|s=1)E(w|s=1), p(e=1|s=0)E(w|s=0)\} \tag{3.4}$$

where X represents a vector of individual characteristics, s is a dummy taking the value of one if the person stays on in school and e is dummy taking the value of one iff the person finds a job. The reasoning above suggests that $f_2' > 0, and\ f_3' < 0$ where the two terms represent partial derivatives with respect to the second and third arguments of the function. The third argument has a dual role. It is important in itself in determining the opportunity cost of education, but also enters as a determinant of the expected gains from education. It is probable that the third argument will depend also on whether or not the individual participates on YTS. Thus:

$$p(e=1|s=0)E(w|s=0) = p(y=1)p(e=1|s=0,y=1)E(w|s=0,y=1) + p(y=0)p(e=1|s=0,y=0)E(w|s=0,y=0) \tag{3.5}$$

where y=1 if person participates on YTS and y=0 otherwise. The argument outlined above was that YTS would plausibly raise the probability of finding work and the wages of participants. Thus, $\frac{\partial p(s=1)}{\partial y} < 0$. This does not, however, represent a full specification. Note that the probability of participating on YTS should more correctly be expressed as:

$$\begin{aligned} p(y=1) &= p(y=1|s=0) \\ &= \frac{p(y=1, s=0)}{1-p(s=1)} \end{aligned} \tag{3.6}$$

If YTS participation and school-leaving are independent, then the model reduces to (3.5). Given the structure of the decision procedure assumed, however, this cannot be true. The YTS participation decision will necessarily depend, amongst other things, on the gains from staying on in school. Once one recognises the role of YTS in determining employment and wage prospects, the situation is further complicated.

Some practical considerations should be introduced at this point. Firstly, the expected prospects for the majority of people staying on at school are not observed in the data set employed

here. In principle, one might employ the third sweep of the data to remedy this, however, in a more realistic framework the problem is not resolved. The third sweep of YCS would give information on wages for those eighteen/nineteen year olds enter the labour market with two years of post-compulsory education. In practice, wages and employment prospects change over time, however, so that it is clear that the gains to further education are only likely to be observable over a longer time span. Indeed, in the short-run, these "gains" may be negative.

A second issue of central importance regards the decision making process, and, in particular, the formation of expectations. It is simply not plausible to suppose that sixteen year olds have more than a vague idea of the wage and employment prospects associated with the various outcomes. This is not to say that they do not rationally choose whether or not to continue in further education based on their expectations. Rather, the point is that expectations are not likely to be the highly sophisticated formulations implied by an augmented W&R model. This is particularly the case of labour market entrants, and is used to justify the separation of school-leaving from the determinants of labour market experience examined in chapters four and five. Specifically, YTS had only existed for just over one year when the educational choice was made, and had only been fully operational since September 1983. The relevant information on the outcomes for YTS participants necessary to make even a short-run rational choice was therefore not available. Thus, the assumption adopted here, and in the following chapters is that the school-leaving/YTS decision process was sequential, not simultaneous. That is, young people first chose whether to stay on at school or not based on an assessment of prospects. Subsequently, labour market entrants "chose" whether or not to participate on YTS[14].

Given these considerations, the rather complicated modelling framework outlined above is not adopted here. It is questionable whether a more sophisticated simultaneous model is likely to add much to our understanding. Given the unsatisfactory nature of the expectations variables included, however, the individual specific variables will necessarily also reflect individual differences in expectations. On the other hand, the model is consistent with the proposition that variables such as family background and individual characteristics exert a direct influence on the probability that an individual continues in full-time education beyond the minimum school-leaving age, rather than

14 The basis of the YTS participation decision is developed more fully in chapter four.

simply being proxies for expectations, capital market constraints and unobserved ability. In order to further consider this question, various specifications are presented.

The model used is the univariate probit. The existence of an unobserved or latent variable s^* is postulated. This represents the "tendency" to stay on in full-time education. This latent variable is assumed to be a linear function of various independent variables, X, producing the standard linear model of the form:

$$s^* = X\beta + \varepsilon \qquad \varepsilon \sim N(0,1) \tag{3.7}$$

The outcome of this variable is observed in terms of whether or not a young person decides to stay on in full-time education. That is, the dichotomous variable, s, is observed taking the value of one if the person stays on and zero if the person leaves full-time education. s is related to s^* by the following relationship:

$$\left.\begin{array}{ll} s = 1 \quad if & s^* > 0 \\ s = 0 & Otherwise \end{array}\right\} \tag{3.8}$$

Therefore, we may postulate that the probability that the person stays on at school is:

$$p(s = 1) = p(\varepsilon > -X\beta) \tag{3.9}$$

Given the assumptions on the error term, this may be expressed as:

$$\begin{aligned} p(s = 1) &= 1 - \Phi(-X\beta) = \Phi(X\beta) \\ &= \int_{-\infty}^{X\beta} (2\pi)^{-1/2} \exp\left(\frac{-u^2}{2}\right) du \end{aligned} \tag{3.10}$$

giving the likelihood function:

$$\prod [\Phi(X\beta)]^{S}[\Phi(-X\beta)]^{(1-S)} \tag{3.11}$$

3.2.2) Heteroscedasticity

The formulation of (3.11) neglects an important specification issue. In the theoretical econometrics literature, it is well-known that, if the error term in the probit model is not homoscedastic (i.e. does not have constant variance), estimation produces not only inconsistent (biased) estimates of standard errors, as in the linear model, but also inconsistent parameter estimates (e.g. Godfrey, 1988). This is easy to see when one considers that in a probit model, the error variance, σ, is not identified. Thus, in practice one estimates β/σ not β. The normalisation, $\sigma=1$ is innocent so long as σ is constant, however, if it is not, the variation in σ will obviously affect the estimate of the parameter vector, β.

Yatchew & Griliches (1985) consider the effects of specific forms of heteroscedasticity in the univariate probit model, and Davidson & MacKinnon (1984) suggest tests for multiplicative heteroscedasticity in this context. As yet, this interest has not been reflected in any change in applied work which almost invariably ignores this issue[15]. The tests for heteroscedasticity are based on the comparison of the hypotheses:

$$\begin{cases} H_0: \sigma = 1 \\ H_a: \sigma = \tau_i \end{cases} \tag{3.12}$$

where τ_i is some function of a set of independent variables. Davidson & MacKinnon suggest employing the function:

$$\tau_i = \exp(W_i \vartheta) \tag{3.13}$$

where W is a row vector of independent variables, and ϑ is a parameter vector[16]. In the case of the univariate probit, therefore, the test consists of a comparison of the models:

15 A recent exception to this, in the context of the univariate probit model is provided by Knapp & Seaks (1992).

16 The functional form is not relevant for testing purposes, so long as: a) it is twice differentiable; b) $\tau_i(0) = 1$; and c) $\tau_i'(0) = 0$.

$$\begin{cases} H_0 : p(e=1) = \Phi(X\beta) \\ H_a : p(e=1) = \Phi\left(\dfrac{X\beta}{\exp(W\vartheta)}\right) \end{cases} \tag{3.14}$$

Whilst the testing procedure is fairly well established in the literature, the response to the presence of heteroscedasticity is not. The most obvious solution, and that employed here, is to use the heteroscedastic model employed in the test (Greene, 1993).

It should be noted that the test is also likely to pick up others forms of misspecification of the model. Thus, what is called heteroscedasticity may, in reality, be more properly thought of as, for example, incorrect functional form. However, since the predicted probabilities are calculated using the entire corrected function, the exact interpretation of what is being picked up is of minor interest. That is to say, the interpretation of what "heteroscedasticity" actually represents should not affect the probability calculations which are the focus of interest[17].

The parameter vectors β and ϑ are estimated simultaneously. The heteroscedastic model takes the form of the alternative hypothesis in (3.14). The likelihood function therefore becomes:

$$\prod\left[\Phi\left(\frac{X\beta}{\exp(W\vartheta)}\right)\right]^{S}\left[1-\Phi\left(\frac{X\beta}{\exp(W\vartheta)}\right)\right]^{(1-S)} \tag{3.15}$$

The procedure adopted to choose the precise specification of heteroscedasticity consisted of: a) estimation of a model including in W all the variables in X save the intercept[18]; and, b) reduction of the terms in W using t-ratios so as to have a relatively simple form of heteroscedasticity which, at the same time, was not rejected in a formal comparison with the more general model. Once again, results are presented below for both the heteroscedastic and homoscedastic models so as to allow further consideration of the issue.

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17 This approach still assumes error normality. A promising alternative which has not yet found its way into the mainstream applied literature would be to estimate the model semi-parametrically. This approach allows a more general form of the distribution of the error term. See, for example, Horowitz (1993) and Gabler et al. (1993). Gerfin (1993) provides a comparison of the performance of the probit model with three semi-parametric estimators in the estimation of a labour-supply model for German and Swiss married women. For Germany, but not for Switzerland, he finds that the probit model is rejected in favour of a semi-parametric estimator although it still performed better than the semi-parametric estimators in a within sample simulation.

18 Since exp(0)=1, the inclusion of an intercept term is redundant.

3.2.3) Empirical Implementation

The data employed are drawn from the second sweep of the YCS. Although, in principle, it would be possible to estimate the model using just the first sweep, it was noted above that use of the second sweep allows the inclusion of additional individual characteristics obtained at that time. In particular, data on ethnic origin and disability was only collected at the time of the later sweep.

The dependent variable is a dummy taking the value of one if respondents stated that they were in full-time education at the time of the first sweep of the data, that is, in the Summer 1985[19]. For the purposes of the analysis I consider staying on at school to comprise those continuing in all forms of full-time further education. The use of the later date to define staying on in school largely avoids the problem of the interpretation of the decision. That is, it excludes those people returning to school or college in the Autumn for retakes. On the other hand, it was noted in chapter two that 99% of those in full-time education in the Summer of 1985 were also in full-time education in September 1984. The use of the later date also gets around the problem of missing data. The "diary" questions regarding the status in each month between September 1984 and May 1985 are subject to a small percentage (1-3%) of non-response. Thus, to be explicit, the probability of being in education one year after the earliest possible leaving date is estimated.

No distinction is made between school-leavers who enter the labour market and those leaving the labour force. Clark & Summers (1982) suggest that for American teenagers unemployment and out-of-the-labour-force are not distinct states. For the purposes of the analysis here the question makes little practical difference. Excluding from the sample those who reported themselves as doing "something else", that is, as neither unemployed, employed, on a government training scheme or in full-time education removes 46 young people from the sample and has virtually no influence on the parameter estimates.

[19] As noted in chapter two, the date of return of the questionnaires varied somewhat. The vast majority (90.0%) were received between May and July, 1985.

In common with other studies of this type, I consider the problem in terms of a simple dichotomous choice, not taking into account, for example, the intended length of time to be spent in further education, the type of institution chosen, nor indeed, the date of school-leaving[20].

Table 3.1 provides descriptive statistics for the variables used in the analysis. I postulate that the leaving decision will depend on a variety of factors. Firstly, items which might be considered immutable individual characteristics. In this group fall DISABILTY and BLACK, dummy variables representing the possession of a significant disability and ethnic origin respectively[21]. These variables are both expected to have a positive influence on staying on in education through their influence on its opportunity cost. That is, both the probability of finding work and the wages received in employment are likely to be lower for coloured and disabled people[22]. I would argue that this is due more to discrimination on the part of employers than to any objective difference in the potential productivity of these groups. Whatever the reason, if the perceived difference is reduced by education, that is with education the relative discrimination against these groups is reduced, then one would expect a positive coefficient on these variables.

The third indigenous (although not immutable) characteristic is gender. The effect of being female is expected to be positive. The higher staying on rates of females is a feature of all EC countries apart from Greece (figure 3.1), and has been fairly stable over time in the UK (figures 1.5, 1.6). This higher staying on rate is reflected in the sample, as can be seen from table 3.1. This issue is returned to in the discussion of the results.

The next group of variables included relate to the individual's experience at school. The influence of a part-time job at school is not obvious *a priori*. In as much as a job at school may reflect an underlying desire to (i.e. a relative preference for) work rather than study, as well as, perhaps more importantly, giving the individual greater access to labour markets, one would expect a negative impact on staying on. On the other hand, a part-time job also provides a certain amount of

20 In principle, respondents may have left full-time education at a variety of dates, and, in particular, one might expect some difference in the nature of the decision for those leaving at Easter before taking any exams, and those leaving in the Summer 1984.

21 Full definitions of variables employed in the analysis in this and subsequent chapters are included in a data appendix to be found at the end of the thesis.

22 Although, in the analysis of wages in chapter five, young people from ethnic minorities are found to receive higher wages in employment than other young people. Explanations for this finding are also offered below.

income, thereby relaxing to some extent the constraint on further study imposed by what one might call imperfect capital markets.

In the case of the work experience variable, the expected sign is unequivocally negative. The relaxation of the financial constraint does not apply because work experience was not paid. Furthermore, undertaking work experience at school would also reflect the class background of the person (in as much as it was only offered in schools more oriented towards sixteen year-old leavers). and more clearly, a relative preference for work in that such experience was a substitute for school lessons.

The dummy variables representing truancy at school (serious truants if the person played truant for weeks or days at a time, or for particular days or lessons, and occasional truants if they played truant for the odd day or lesson) are again expected to have an unequivocally negative influence on staying-on. They are presumed to represent a specific dislike of school, but in this case, do not necessarily indicate a relative preference for work. Rather, one might expect these variables to reflect motivational characteristics of individuals. That is, they are seen as operating through tastes for education rather than through the opportunity cost of further education. Indeed, chapter four below reports results suggesting that truants faced significantly lower employment probabilities once they entered the labour market.

I also include three dummies representing the type of school attended. A sixth form college is a school (generally an ex-grammar school) providing, in principle, exclusively post-compulsory education. The presence of young people under minimum school-leaving age reflects the fact that in the period under consideration these schools were being phased in. A grammar school is a higher ability school with post-compulsory educational provision. Comprehensive schools are all-ability schools which were in the process of replacing the old grammar/secondary modern system. Not all of these had provision for post-compulsory education. Those which did are explicitly included. The residual category is made up of those people attending comprehensive schools without a sixth form (i.e. post-compulsory provision) and secondary modern schools (also finishing at sixteen). The idea underlying these variables being that schools with a sixth form are more oriented towards further education, an orientation which may be inculcated in their students. Sixth form colleges and grammar schools are also associated with higher ability, in as much as they were subject to an entrance exam

at eleven. The presence of an internal sixth form also eases access to staying on. Thus, one would expect a positive effect of each of these dummies on staying on.

I include two sets of variables intended to represent ability. An (integer) index of success in exams taken at sixteen (ILEA score). When included, its coefficient is positive and highly significant. In as much as it measures academic performance and not intrinsic ability, however, it is problematic as an explanatory variable since performance in examinations is also likely to reflect prior intentions with regard to school. That is, it is unlikely to be exogenous to the school-leaving decision. In particular, young people who obtain the promise of employment before taking exams have much less incentive to perform well, and may even leave before sitting them. Therefore, we employ three dummy variables as alternatives. Specifically whether the young person received advice to stay on at school or not (from the family, teachers at school, or the careers service). These variables are an imprecise measure of ability, and, may reflect a number of other factors such as social class (particularly in the case of family advice), however, they do have the advantage that they may more reasonably be treated as exogenous to the school leaving decision. Results are reported for various specifications, principally differing in the ability variables included.

The model also comprises a number of variables representing family background. Family size represents the reported number of offspring in the family. It has often been suggested that the number of children in the family is likely to be negatively related to the probability of staying on[23]. The principle argument being that academic ability depends in part on the amount of time parents spend with each child. This, in turn, is negatively related to the number of children in the family. The effect is likely to be stronger in the presence of older brothers and sisters, however, the data does not allow us to distinguish between older and younger siblings. Therefore, we include the overall reported number of offspring in the family.

It has generally been found, not surprisingly, that parental social class has a significant influence on the school-leaving decision (Micklewright, 1989). These influences are taken into account explicitly by dummies representing whether the fathers occupation was professional, otherwise non-manual and whether the mothers occupation was non-manual. Social class is also likely to be reflected by variables included for other purposes, in particular, family advice to stay on,

23 See, for example, Micklewright (1989).

family size and so on. These variables will also reflect different tastes for education, although, the issue of consumption and investment demand is somewhat blurred in as much as young people coming from "middle class" backgrounds may both be more aware of the potential material advantages of further education and also more able to realise such potential gains through easier access to jobs requiring higher levels of education. Thus, parental background is interpreted here as having a rather more extensive influence on the staying on decision of young people than determining their time-rate of preference as W&R would have us believe.

Parental self-employment might be thought of as having an effect more directly through household income, that is, reducing the financial constraint, in the absence of a specific measure of household income. On the other hand, parental self-employment is likely to enhance an individual's likelihood of getting a job, specifically, in the family firm, and thus encourage school-leaving. The direction of the effect is, therefore, ambiguous.

I also include a variable representing paternal unemployment at the time of the first sweep of the cohort. The idea underlying the inclusion of this influence is to represent the existence of a financial constraint to further education, however, it is somewhat unsatisfactory in as much as it refers to a single point in time one year after the school-leaving decision is made. Finally, in the group of family background influences, I include a dummy variable to represent whether or not young people live in owner occupied (as opposed to rented) accommodation. Here again, the idea is that home ownership represents the relaxation of the financial constraint[24], but, of course, it will also tend to reflect the social class of the parents.

The final group of variables included reflect local labour market conditions. As noted above, the approach to expectations adopted here differs from that of W&R. Rather than estimate a simultaneous model of the determination of earnings and school-leaving, I attempt to take some account of expectations by including variables reflecting labour market conditions at a regional level. In doing so, information is lost on individual differences in employment and earnings prospects, however, in the context of the discussion above concerning the formation of expectations, the relevance of rationally formed expectations seems at best problematic. Certainly, it has not been demonstrated that young people have such precise long-term perspectives on earnings and

24 I do concede, however, that people suffering from re-possession might not be in full agreement with this argument.

(un)employment potential, much less has it been demonstrated that such correctly formed prospects exert an important influence on the school-leaving decision. In any event, the first two sweeps of the data do not provide information concerning even the starting earnings and employment prospects of eighteen year old leavers let alone their lifetime earnings potential, or indeed, the earnings increment arising out of an university education.

I employ three labour market variables. The first of these, youth unemployment, is the median uncompleted duration of unemployment for young people under twenty five, subdivided by region, and sex. This variable is intended to represent the (un)employment prospects of school leavers. The use of this indicator, rather than the more conventional unemployment rate, is dictated by the availability of published data, however, I feel its use is appropriate. It was noted in chapter one that the increases in unemployment in the UK were due more to reductions in the unemployment outflow, reflected in increasing unemployment duration, than to variations of incidence (unemployment inflow). In as much as this variable represents the opportunity cost of further education, it is expected to be positively related to staying-on in school. The second unemployment indicator is the regional adult unemployment rate subdivided by sex. This is intended to capture, to some extent, unemployment expectations. An increase in the regional adult unemployment rate implying a reduction in the expected returns to education as discussed by Kodde (1988) and Micklewright et. al. (1990). Thus, the distinction is drawn between the youth unemployment situation reflecting the opportunity cost of education, expected to be positively related to staying on, and, the adult unemployment rate reflecting expectations concerning the returns to education which is likely to be negatively related to participation in further education. Apart from the fact that they do not take into account individual differences in employment prospects, the principal problem with the unemployment variables is that they do not distinguish between unemployment rates according to education, which would allow a clearer consideration of the issue. That is, one would expect that the gain in employment prospects to be had from further education would be at least as relevant as the absolute level of unemployment. A YTS indicator is not included. In as much as it reduced unemployment, its effect will be partly subsumed by the youth unemployment variable, and the direction of the effect should be the same. On the other hand, use of YTS was highly correlated with

unemployment levels, therefore its inclusion would compound the multicollinearity problems already present in the other three labour market variables included.

The third, and final, labour market variable is the natural logarithm of the ratio of non-manual to manual hourly earnings at a regional level derived from the New Earnings Survey. This is intended to reflect the wage gain to be had from staying-on at school. One would expect a positive relationship between this ratio and staying on. That is, the larger the difference between non-manual and manual wages, the greater the incentive to continue in further education.

3.3: Results

Table 3.2 below reports the results of the estimation of the school-leaving model. Variables preceded by "Log" represent natural logarithms. Five separate estimates are presented: model 1 excludes expectations (labour market) variables; model 2 excludes all ability variables; model 3 excludes exam performance (ILEA score); model 4 excludes the advice variables; and, model 5 presents the full specification, providing a basis of comparison for the other models.

It may be noted that heteroscedasticity was detected[25]. Furthermore, the more general form of heteroscedasticity is rejected. It will also be observed that each of the exclusions implied by models 1 to 4 are rejected by a Likelihood Ratio (LR) test. The specification of model 5 is therefore preferred. This ignores the probable endogeneity of exam performance. On the other hand, whilst the estimates of the impact of "ability" thus measured are likely to be biased, the inclusion of ILEA score (in addition to the advice variables) implies that the influence of other variables may be considered to be "net" of ability.

Since, the estimation of the effects of the independent variables are also dependent upon the parameters of the heteroscedastic function, comparison of parameter estimates is not very revealing. Thus, the specific effects are considered separately in table 3.3. The effects are calculated as the shift in probability of staying on at school brought about by the inclusion of the specific variable. That is, the effect is calculated as:

[25] Full results for the homoscedastic model are presented in an appendix to the chapter.

$$E = \Phi_1 - \Phi_0 \qquad (3.13)$$

Where Φ_0 represents the mean probability of leaving school, and Φ_1 gives the probability with the addition of the relevant variable. In the case of continuous variables, the effect of an increase of one standard deviation is considered. The table also reports, in the final column, the estimated probabilities calculated using the homoscedastic model. The results produced suggest that taking heteroscedasticity into account did not greatly influence the probability estimates.

With regard to the labour market variables, one is immediately struck by their individual lack of statistical significance. As a group, however, their exclusion is rejected by a LR test at a 1% significance level (model 1). This points to the importance of multicollinearity, with all three indicators being closely related for obvious reasons. The joint significance of the variables implies that they do have a role to play in young people's school-leaving decision. Their lack of individual significance implies, however, that little or nothing can be inferred from the model regarding the nature of this role. On the other hand, it will be observed that all the coefficients do have signs consistent with a priori expectations and that the size of the effect is fairly stable across the different specifications. The effect of youth unemployment is to raise the probability of staying on consistent with the notion of a lowering of the opportunity cost of further education, whilst the adult unemployment rate, reflecting future expectations, tend to lower the probability of continuing in school, consistent with their role as indicators of lower returns to education. Similarly, the coefficient on the non-manual/manual hourly wage is, as would be expected positive, albeit statistically insignificant.

It may be noted that being female had a small "positive" impact on staying on. The influence is net of the lower unemployment rates facing teenage girls. That is, in calculating the effect of being female, the lower unemployment rates and lower wage differential were also included. This explains the difference in significance of the "female" variable between tables 3.3 and 3.2. In the earlier table, when labour market variables were included the coefficient was generally not statistically significant. When one allows for variations in these factors, however, the calculated effect of being female becomes significant.

Belonging to an ethnic minority appears to have a relatively strong and statistically significant impact on staying on. This confirms the notion that people coming from ethnic minorities are more likely to remain in school. As suggested above, my explanation of this regards the relatively poor prospects facing such minorities when they do enter the labour market which it was not possible to incorporate in the labour market terms. On the other hand, the effect of disability is much weaker and not generally statistically significant. It might be that, in this case, the difficulties faced in finding work are mirrored by difficulties in continuing in school.

Turning to the variables relating to experience at school, it is apparent that whilst work experience has a significant negative influence on staying on in school, the possession of a part-time job at school does not. This may be explained by the effect of income relaxing to some extent the financial constraint on further education in the case of a part-time job, and therefore, to some extent, counteracting what might be called the labour market attachment effect that both a part-time job and work experience represent. Since work experience is not paid, the only influence operating is the latter one.

As regards the truancy variables, one may note that their negative influence is sizeable and statistically significant. The effect is substantially reduced when the ILEA score is included reflecting the poor performance of truants in examinations. In all cases however, truancy remains negative and statistically significant over and above the ability indicators. This is interesting in as much as people who play truant at school are not likely to be advantaged on entry into the labour market as is shown below in chapter four, and thus, it is reasonable to consider these variables as representing general motivation of the individuals concerned as regards their interest and ability both at school and in the labour market.

It will also be observed that the type of school attended appears to be particularly important in determining staying on. I would suggest that this is the result of a variety of factors. In addition to the influence of the school's attitude to further education, one might also note that the type of school attended will also reflect class, and, in the case of sixth form colleges and grammar schools, ability at eleven when selection for these schools was undertaken. In the case of comprehensive schools, admission is not regulated on the basis of ability and one might suggest that it is more the effect of

ease of access to a sixth form that is operating in this case. Not surprisingly, these variables lose some of their influence once exam success is taken into account.

The variables included to capture ability are all highly significant. The stronger influence of family advice may reflect familial preference for education as well as simply ability, whereas advice to stay on at school by members of the school will tend to depend, given the attitudes of the particular school, more strictly on the academic ability of the student. It will be observed that the effect of these variables is substantially reduced when the ILEA score is also included. The fact that they are reduced adds weight to their employment as indicators of ability, whereas, the fact that two of them remain statistically significant suggests that, particularly in the case of family advice, they are reflecting rather more than just ability. As regards exam success, it may be observed that both the ILEA score and its square have a positive coefficient, indicating that, ceteris paribus, the marginal effect of exam success on the probability of staying on increased with the level of success. Given the considerations above on the likely endogeneity of this variable, however, one should not attach too much importance to this result.

Turning to family background influences, one observes that family size exerts a statistically significant negative influence on staying on when exam results are excluded but otherwise not. This is as would be expected in as much as it was suggested above that family size might be related to academic ability.

As regards the other variables employed to explicitly represent the class background of young people, having a non-manual father or mother and living in an owner occupied household appear to have an important role in the choice of young people at sixteen. I would suggest that this is likely to be due to consumption motives on the part of parents, although, as noted above it may also be the case that middle class families are more aware of, and more able to exploit, the financial (and other) gains to be achieved through further education. At the same time, these variables will also reflect, to some degree, relaxation of the financial constraint on further education. It may also be observed that parental self employment is always statistically insignificant, whereas, having an unemployed father appears to be positively related to staying on when exam results are included. This is quite the opposite of what was expected, and, I would suggest, may be due to the poor quality of the variable rather than the positive influence of paternal unemployment on staying on.

The results confirm the importance of social class in the determination of the decision found by previous authors, and, in particular, by Rice (1987) and Micklewright (1989) who studied the same decision at a time of low unemployment. There is a strong effect even controlling for ability, and school type. This provides some indirect support for the suggestion that the worsening labour market situation facing young people had relatively little impact on their probability of staying on. On the one hand, coming from a "middle class" background would tend to enhance the employment prospects of young people[26]. In as much as these young people were less affected by the worsening conditions than their less fortunate counterparts, one would expect a notable reduction in the influence of social class on staying on. This is not evident from a comparison of the results. Rice (1987) finds that having a professional father increased the probability of staying on by 9 percentage points for boys and 13 percentage points for girls. The effect of having a father employed in an intermediate occupation (roughly equivalent to the other non-manual classification adopted here[27]) was very similar, 9 percentage points for boys and 12 for girls. More in line with the results presented here, Micklewright (1989) finds a stronger effect of having a professional father. Specifically, controlling for ability, having a professional father raises the probability by 30 percentage points for boys and 32 for girls (my calculations). This is higher than the 17 percentage points calculated above, however, Micklewright's analysis does not include a variable to control for home ownership. Since professional people almost invariably own their own houses, inclusion of this variable in the effect raises the "effect" to 24 percentage points. On the other hand, the effect of intermediate occupations is, once again, very similar to the effect found here, 10 percentage points for boys and 12 for girls (compared to 11 percentage points reported above). The implication is that the influence of social class has not greatly altered between the seventies and eighties. For the reasons mentioned above, I would suggest that this supports the notion that class factors far outweigh the role of (un)employment expectations in determining the choice.

[26] Evidence presented in the next chapter supports this proposition.

[27] The other non-manual classification includes also skilled non-manual workers. In both the analyses considered here, although the effects were estimated separately for this group, the parameter estimates were not statistically different from the intermediate group.

3.4: Conclusions

In this chapter I have considered some of the issues involved in the determination of decision as to whether or not to leave school at the minimum school-leaving age. In the consideration of previous approaches to this problem I identified the difficulties associated with the estimation of expectations, and the corresponding failure of such models to provide convincing support for more extreme versions of the human capital model. In particular, the idea that the decision is based exclusively, or even principally, on the maximisation of discounted expected lifetime earnings has not been demonstrated. Two potential explanations of this failure may be suggested. Either young people do not maximise expected lifetime earnings and/or the variables employed in such models to represent expectations do not correspond to those actually held by individuals. Certainly, the two interpretations are not mutually exclusive. However, in the type of model employed by these studies, it is not possible to distinguish between these two alternatives. In as much as it is based on a two period model, I would argue that the analysis undertaken by Kodde(1988) offers evidence to support the view that individuals have a rather short-run view of expectations. Certainly the relatively good results suggest that individuals are responsive in their choices to what they perceive as their income and employment prospects.

In the second part of the chapter I undertook an empirical estimation of the school-leaving decision in England and Wales. I attempt to get around the problems of expectation formation by employing aggregate regional level variables to capture expectations. In as much as these neglect individual level differences, however, they do not fully capture the effects of expectations which will largely be absorbed by the other explanatory variables in the model. Indeed, they do not prove to be enormously successful in determining differences in the probability of staying on in full-time education.

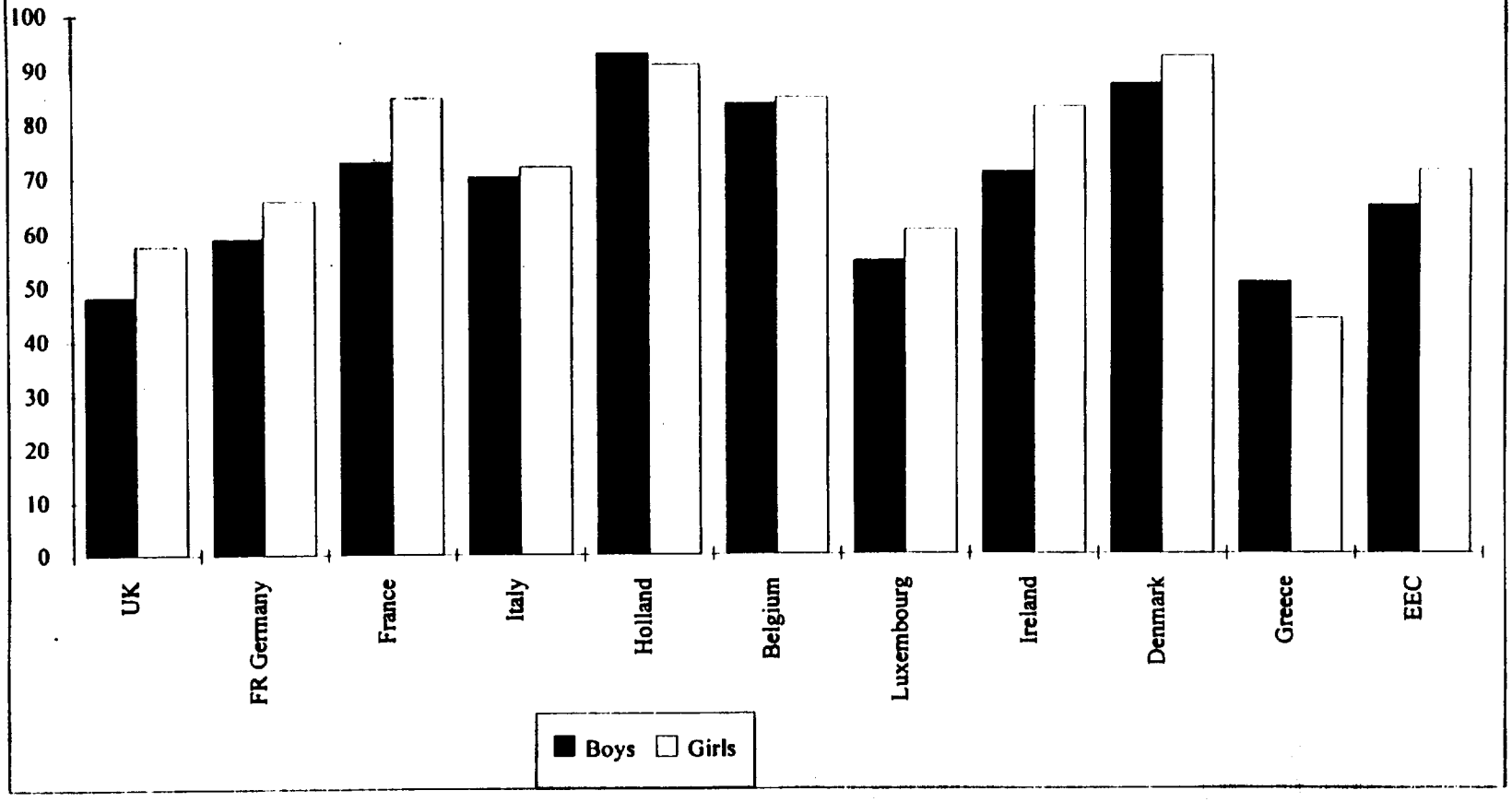
It does emerge from the estimation, however, that participation in full-time education is strongly influenced by individual and family characteristics. In particular, the social class of individuals plays an important role in the decision as to whether or not to stay on in school even when ability and the type of school attended are controlled for. In the analysis presented above, it was not possible to formally distinguish between different explanations of this finding, however, I

feel that the strength of the effect is sufficient to reject an explanation relying entirely on differences in the time-rate of preference, along the lines of the W&R model.

Comparison with previous analyses of the same decision in the seventies demonstrated that the influence of class has remained remarkably constant over time. It was suggested that this provides indirect evidence to support the idea that worsening labour market conditions have had a relatively minor role in the schooling choice.

It is more difficult, however, to distinguish between consumption and investment motives. That is, social class is likely to affect individuals tastes for education, but, also the possibility of realising the potential material gains to be had. Given that ability is amply controlled for (even though its measured influence is problematic due to its probable endogeneity this, obviously, does not affect its value as a control) the differences in the probability of staying on by social class cannot be attributed simply to relative advantages in wage and employment gains due to ability. It may be, indeed I feel it is almost certainly, the case, that coming from a "middle-class" background allows young people to realise wage and employment gains from further education which are not available to their less fortunate "working-class" colleagues. In any event, in the present context, the question of consumption versus investment as a basis for class differences in the demand for further education remains unresolved. It is, I hope, fairly clear, however, that a simple human capital model which neglects such issues entirely ignores an important source of variation in staying on rates with wide-reaching implications.

Figure 3.1: Percentage of sixteen year olds in full-time Education, EC 1982/3



Source: Eurostat (1985)

Note: The figures for West Germany, Greece and the EC as a whole refer to 1981/2.

Table 3.1: Means (standard deviations of continuous variables in brackets) of variables used in the analysis						
	ALL (n=6075)		STAYERS (n=3296)		LEAVERS (n=2779)	
STAYON	.54		-		-	
INDIGENOUS CHARACTERISTICS						
DISABILITY	.03		.03		.03	
BLACK	.04		.06		.02	
GIRL	.53		.56		.50	
SCHOOL EXPERIENCE						
PART-TIME JOB	.56		.56		.57	
WORK EXPERIENCE	.29		.26		.33	
SERIOUS TRUANT	.11		.04		.19	
OCCASIONAL TRUANT	.34		.32		.37	
SIXTH FORM COLLEGE	.07		.13		.01	
GRAMMAR SCHOOL	.04		.06		.01	
COMPREHENSIVE (SIXTH FORM)	.65		.67		.61	
ADVISED TO STAY BY FAMILY	.58		.79		.34	
ADVISED TO STAY BY TEACHER	.38		.51		.23	
ADVISED TO STAY BY CAREERS SERVICE	.27		.37		.16	
ILEA SCORE	29.2	(16.1)	38.0	(13.6)	18.1	(12.1)
FAMILY CHARACTERISTICS						
SIZE OF FAMILY	2.87	(1.62)	2.72	(1.46)	3.05	(1.79)
DAD PROFESSIONAL	.06		.09		.02	
DAD OTHER NON-MANUAL	.31		.41		.19	
DAD SELF-EMPLOYED	.16		.18		.15	
DAD UNEMPLOYED	.07		.05		.09	
MUM NON-MANUAL	.42		.51		.31	
MUM SELF-EMPLOYED	.05		.06		.04	
OWNER OCCUPIER	.73		.84		.60	
LABOUR MARKET						
YOUTH UNEMPLOYMENT	29.6	(5.89)	29.4	(5.83)	29.9	(5.95)
ADULT UNEMPLOYMENT	9.80	(3.47)	9.62	(3.41)	10.02	(3.48)
NON-MANUAL/MANUAL HOURLY WAGE-RATE	1.48	(.11)	1.48	(.11)	1.49	(.11)

Notes: 1) Youth Unemployment is defined as the median duration of uncompleted spells of unemployment for youths under 25 subdivided by region and sex, calculated from Published DE data for April 1984.
2) Adult unemployment is defined as the adult unemployment rate, subdivided by region and sex, average 1984.
3) The wage-ratio is calculated from the New Earnings Survey data on the Gross weekly Earnings of manual and non-manual workers, subdivided by sex and region.

Table 3.2: Probit model of School-leaving with Correction for Heteroscedasticity (t-ratios in brackets).

	Model 1 No Expectations		Model 2 No Ability		Model 3 No ILEA Score		Model 4 No Advice		Model 5 Full Model	
INTERCEPT	-2.55	(-13.40)	-3.96	(-2.62)	-3.80	(-2.25)	-3.37	(-2.66)	-3.02	(-2.78)
INDIGENOUS CHARACTERISTICS										
DISABILITY	.22	(1.59)	.32	(1.68)	.22	(.98)	0.30	(2.02)	.21	(1.50)
BLACK	.95	(7.95)	1.16	(6.58)	1.08	(5.97)	1.09	(6.55)	.89	(7.43)
FEMALE	.27	(5.58)	.53	(2.28)	.32	(1.20)	.38	(1.90)	.16	(.93)
SCHOOL EXPERIENCE										
PART-TIME JOB	-.05	(-1.04)	.07	(1.07)	-.05	(-.65)	-.10	(-1.88)	-.06	(-1.45)
WORK EXPERIENCE	-.11	(-2.22)	-.31	(-4.49)	-.34	(-4.16)	-.14	(-2.49)	-.11	(-2.29)
SERIOUS TRUANT	-.58	(-6.66)	-1.75	(-9.42)	-1.57	(-8.35)	-.68	(5.76)	-.60	(-6.77)
OCCASIONAL TRUANT	-.12	(-2.54)	-.48	(-6.21)	-.42	(-5.02)	-.18	(-2.90)	-.13	(-2.60)
SIXTH FORM COLLEGE	1.80	(10.97)	3.59	(9.27)	3.27	(8.90)	2.65	(6.77)	1.82	(10.96)
GRAMMAR SCHOOL	.81	(4.61)	2.24	(8.00)	2.34	(8.09)	1.12	(4.14)	.79	(4.49)
COMPREHENSIVE (SIXTH FORM)	.53	(8.86)	1.10	(10.22)	1.09	(8.98)	.67	(6.64)	.54	(8.96)
ABILITY										
ADVISED TO STAY BY FAMILY	.77	(11.31)	-		1.41	(9.23)	-		.78	(11.41)
ADVISED TO STAY BY TEACHER	.09	(1.77)	-		.55	(5.96)	-		.17	(3.06)
ADVISED TO STAY BY CAREERS SERVICE	.16	(2.97)	-		.64	(5.83)	-		.09	(1.68)
ILEA SCORE/10	.33	(4.46)	-		-		.18	(1.33)	.34	(4.54)
ILEA SCORE SQUARED/1000	.36	(2.62)	-		-		.98	(2.56)	.35	(2.57)
FAMILY CHARACTERISTICS										
SIZE OF FAMILY	.00	(.20)	-.07	(-3.36)	-.05	(-2.11)	.01	(.81)	.00	(.20)
DAD PROFESSIONAL	.46	(3.80)	1.35	(6.17)	1.27	(5.59)	.64	(4.18)	.44	(3.67)
DAD OTHER NON-MANUAL	.32	(5.85)	.82	(7.80)	.74	(6.59)	.42	(5.29)	.30	(5.58)
DAD SELF-EMPLOYED	.07	(1.18)	.08	(.97)	.06	(.62)	.07	(.97)	.06	(.94)
DAD UNEMPLOYED	.16	(1.88)	-.00	(-.01)	.10	(.74)	.23	(2.28)	.19	(2.24)
MUM NON-MANUAL	.15	(3.10)	.48	(6.19)	.36	(4.37)	.22	(3.60)	.14	(2.96)
MUM SELF-EMPLOYED	.07	(.66)	-.12	(-.81)	.08	(.49)	.06	(.49)	.09	(.79)
OWNER OCCUPIER	.23	(4.20)	.75	(8.10)	.78	(7.30)	.23	(3.50)	.23	(4.25)
LABOUR MARKET										
Log(YOUTH UNEMPLOYMENT)	-		.83	(1.18)	.60	(.76)	.42	(.72)	.44	(.86)
Log(ADULT UNEMPLOYMENT)	-		-.50	(-.98)	-.58	(-.98)	-.41	(-.96)	-.56	(-1.48)
Log(Non-Manual/Manual wage-rate)	-		1.93	(1.82)	1.26	(1.04)	1.37	(1.45)	.75	(.93)
Heteroscedasticity terms										
FEMALE	.11	(2.31)	.08	(1.52)	.13	(2.59)	.07	(1.50)	.11	(2.26)
PART-TIME JOB	.13	(2.72)	.29	(4.77)	.20	(3.98)	.09	(1.87)	.13	(2.75)
COMPREHENSIVE SCHOOL (18)	-.20	(-3.51)	-.13	(-1.74)	-.14	(-2.24)	-.30	(-4.77)	-.19	(-3.44)
ADVISED TO STAY BY TEACHER	.13	(2.28)	.03	(.53)	.13	(2.41)	.15	(2.83)	.12	(2.13)
ILEA SCORE/10	-		.55	(11.05)	.47	(9.70)	.18	(2.29)	-	
ILEA SCORE SQUARED /1000	-		-1.12	(-14.55)	-.90	(-12.86	-.21	(-1.84)	-	
RESTRICTED LOG-LIKELIHOOD	-4188.8		-4188.8		-4188.8		-4188.8		-4188.8	
UNRESTRICTED LOG-LIKELIHOOD	-2351.2		-3116.0		-2712.5		-2525.8		-2344.7	
McFADDEN R-SQUARED	.44		.26		.35		.40		.44	
LR TEST FOR HETEROSCEDASTICITY	33.7	(4 d.f.)	213.1	(6 d.f.)	169.3	(6 d.f.)	47.0	(6 d.f.)	31.8	(4 d.f.)
LR TEST FOR MORE GENERAL HET.	17.3	(22 d.f.)	33.8	(20 d.f.)	28.8	(20 d.f.	22.2	(20 d.f.)	16.9	(22 d.f.)
LR TEST FOR PARAMETER RESTRICTIONS	13.0	(3 d.f.)	1544.1	(5 d.f.)	737.1	(3 d.f.)	363.7	(2 d.f.)	-	
N	6075		6075		6075		6075		6075	

Notes: 1) The McFadden R^2 is defined as: [1-(ULL/RLL)] where ULL is the log-likelihood function maximised with respect to all the parameters, RLL is the log-likelihood function maximised with respect to the intercept only, McFadden (1974).

2) The LR test for heteroscedasticity tests the homoscedastic model against the simpler form of heteroscedasticity. The test has a χ^2 distribution, and the degrees of freedom are given in brackets.

3) The LR test for more general heteroscedasticity, compares the heteroscedastic model with four or six terms with the more general form including all 26 independent variables.

4) The LR test for parameter restrictions tests the restrictions imposed on each model against model 5. In the case of models 2, 3, and 4, the relevant more general model includes also the ILEA score variables in the heteroscedasticity term. The relevant Log-likelihood is -2343.9. The specific tests are: Model 1 - Exclusion of Expectation terms; Model 2 - exclusion of "ability" variables; Model 3 - exclusion of ILEA score; and, Model 4 - exclusion of advice variables.

Table 3.3: Effects of Independent Variables evaluated at the Mean
(t-ratios in brackets).

	Model 1 No Expectations		Model 2 No Ability		Model 3 No ILEA Score		Model 4 No Advice		Model 5 Full Model		Model 5a Full Model No Het.	
INDIGENOUS CHARACTERISTICS												
DISABILITY	.09	(1.63)	.07	(1.71)	.05	(.99)	.08	(2.14)	.08	(1.53)	.08	(1.57)
BLACK	.31	(10.01)	.22	(5.00)	.21	(3.09)	.20	(1.86)	.30	(3.71)	.30	(3.92)
FEMALE	.09	(4.94)	.07	(3.52)	.06	(1.44)	.09	(4.61)	.09	(2.78)	.10	(5.03)
SCHOOL EXPERIENCE												
PART-TIME JOB	-.02	(-1.27)	-.00	(-.01)	-.02	(-.31)	-.03	(-1.86)	-.03	(-1.03)	-.03	(-1.52)
WORK EXPERIENCE	-.04	(-2.22)	-.06	(-4.58)	-.08	(-4.36)	-.04	(-2.51)	-.04	(-2.28)	-.04	(-2.32)
SERIOUS TRUANT	-.22	(-7.10)	-.33	(-6.91)	-.32	(-4.43)	-.19	(-6.33)	-.23	(-6.09)	-.22	(-6.75)
OCCASIONAL TRUANT	-.05	(-2.54)	-.10	(-6.65)	-.09	(-5.34)	-.05	(-3.11)	-.05	(-2.59)	-.05	(-2.61)
SIXTH FORM COLLEGE	.43	(13.82)	.43	(3.57)	.43	(1.86)	43	(5.24)	43	(2.79)	.41	(3.19)
GRAMMAR SCHOOL	.28	(5.78)	.36	(4.42)	.37	(2.20)	.27	(5.13)	.27	(3.63)	.21	(3.63)
COMPREHENSIVE (SIXTH FORM)	.24	(9.47)	.24	(7.79)	.25	(4.82)	.24	(9.75)	.24	(7.87)	.17	(5.60)
ABILITY												
ADVISED TO STAY BY FAMILY	.24	(10.30)	-		.24	(2.42)	-		.24	(3.66)	.27	(4.73)
ADVISED TO STAY BY TEACHER	.04	(1.78)	-		.12	(4.39)	-		.04	(1.67)	.02	(1.01)
ADVISED TO STAY BY CAREERS SERVICE	.06	(3.01)	-		.13	(4.19)	-		.06	(2.99)	.06	(2.96)
ILEA SCORE	.30	(12.25)	-		-		.41	(1.93)	.30	(4.00)	.29	(4.43)
FAMILY CHARACTERISTICS												
SIZE OF FAMILY	.00	(.20)	-.01	(-3.33)	-.01	(-2.42)	.00	(.81)	.00	(.20)	.00	(.10)
DAD PROFESSIONAL	.17	(4.16)	.25	(5.21)	.25	(3.04)	.17	(4.70)	.17	(3.46)	.16	(3.76)
DAD OTHER NON-MANUAL	.12	(6.11)	.16	(6.85)	.15	(4.20)	.11	(6.14)	12	(4.85)	.11	(5.04)
DAD SELF-EMPLOYED	.03	(1.18)	.02	(.97)	.01	(.62)	.02	(.98)	.02	(.94)	.03	(1.28)
DAD UNEMPLOYED	.06	(1.91)	-.00	(-.01)	.02	(.74)	.06	(2.38)	.08	(2.22)	.07	(2.21)
MUM NON-MANUAL	.06	(3.14)	.10	(5.88)	.08	(3.93)	.06	(3.79)	.06	(2.93)	.05	(3.03)
MUM SELF-EMPLOYED	.03	(.67)	-.03	(-.82)	.02	(.49)	.02	(.49)	03	(.79)	.02	(.48)
OWNER OCCUPIER	.09	(4.26)	.15	(7.19)	.16	(4.12)	.06	(3.65)	.09	(3.97)	.09	(4.25)
LABOUR MARKET												
Log(YOUTH UNEMPLOYMENT)	-		.03	(1.26)	.02	(.81)	.02	(.98)	.03	(.93)	.03	(.93)
Log(ADULT UNEMPLOYMENT)	-		-.02	(-.99)	-.03	(-1.01)	-.03	(-1.21)	-.05	(-1.52)	-.05	(-1.64)
Log(Non-Manual/Manual wage-rate)	-		.02	(1.90)	.01	(1.10)	.02	(1.53)	.01	(.96)	.01	(.88)

Notes: 1) Effects are calculated at the mean school-leaving probability, .54.

2) Calculation of t-ratios are based on the general formula for the asymptotic variance of a non-linear function (e.g. Greene, 1993). That is, the asymptotic variance of the effect under consideration denoted by E is given by:

$$\left(\frac{\partial E}{\partial \beta}\right)' Var(\beta)\left(\frac{\partial E}{\partial \beta}\right).$$

In practice, the t-ratios were calculated using the WALD routine in LIMDEP 6.0. For the purposes of the calculation of t-ratios, the function was evaluated at the mean male values of continuous variables and at the default values of dummy variables. The constant was adjusted to ensure that the base probability was equal to the sample mean.

3) For dummy variables, the effect is the discrete shift in probability brought about by the inclusion of the variable. For continuous variables, the effect is the discrete shift brought about by an increase of one standard deviation in the variable. The effect of being female, for models 2-5a, include the effects of different mean levels of the expectation variables. That is, the effect is calculated including the girl dummy and shifting the values of the expectation variables from the mean male levels to mean female levels.

Appendix: Probit model of School-leaving without Correction for Heteroscedasticity
(t-ratios in brackets).

	Model 1 No Expectations		Model 2 No Ability		Model 3 No ILEA Score		Model 4 No Advice		Model 5 Full Model	
INTERCEPT	-2.42	(-20.58)	-2.11	(-2.43)	-2.09	(-2.26)	-2.71	(-2.81)	-2.76	(-2.75)
INDIGENOUS CHARACTERISTICS										
DISABILITY	.21	(1.67)	.16	(1.49)	.09	(.79)	.25	(2.05)	.20	(1.55)
BLACK	.92	(8.67)	.81	(8.07)	.71	(6.83)	.97	(9.10)	.88	(8.06)
FEMALE	.25	(5.84)	.32	(2.29)	.15	(.99)	.21	(1.34)	.13	(.79)
SCHOOL EXPERIENCE										
PART-TIME JOB	-.05	(-1.08)	-.05	(-1.31)	-.05	(-1.35)	-.08	(-1.82)	-.07	(-1.53)
WORK EXPERIENCE	-.10	(-2.22)	-.21	(-5.23)	-.20	(-4.63)	-.12	(-2.63)	-.11	(-2.33)
SERIOUS TRUANT	-.56	(-7.34)	-1.03	(-15.54)	-.94	(-13.34)	-.57	(7.63)	-.58	(-7.47)
OCCASIONAL TRUANT	-.11	(-2.52)	-.28	(-7.06)	-.24	(-5.85)	-.13	(-2.90)	-.12	(-2.61)
SIXTH FORM COLLEGE	1.45	(11.90)	1.97	(17.81)	1.71	(15.01)	1.67	(13.69)	1.48	(12.05)
GRAMMAR SCHOOL	.59	(4.04)	1.42	(11.78)	1.29	(10.11)	.57	(3.96)	.58	(3.90)
COMPREHENSIVE (SIXTH FORM)	.45	(9.40)	.62	(14.59)	.60	(13.14)	.45	(9.76)	.46	(9.55)
ABILITY										
ADVISED TO STAY BY FAMILY	.76	(17.29)	-		.88	(21.51)	-		.77	(17.42)
ADVISED TO STAY BY TEACHER	.05	(1.07)	-		.31	(7.34)	-		.05	(1.01)
ADVISED TO STAY BY CAREERS SERVICE	.14	(2.90)	-		.33	(7.21)	-		.15	(3.03)
ILEA SCORE/10	.35	(5.53)	-		-		.39	(6.38)	.35	(5.57)
ILEA SCORE SQUARED/1000	.29	(2.68)	-		-		.35	(3.22)	.29	(2.66)
FAMILY CHARACTERISTICS										
SIZE OF FAMILY	.00	(.08)	-.03	(-2.61)	-.03	(-2.36)	.01	(.70)	.00	(.11)
DAD PROFESSIONAL	.45	(4.19)	.90	(9.91)	.74	(7.66)	.52	(4.99)	.43	(4.01)
DAD OTHER NON-MANUAL	.29	(6.09)	.51	(12.19)	.42	(9.37)	.32	(6.78)	.28	(5.72)
DAD SELF-EMPLOYED	.09	(1.50)	.08	(1.63)	.07	(1.29)	.08	(1.47)	.07	(1.23)
DAD UNEMPLOYED	.16	(1.85)	-.00	(-.07)	.03	(.36)	.18	(2.15)	.19	(2.21)
MUM NON-MANUAL	.14	(3.21)	.30	(7.65)	.22	(5.33)	.18	(4.09)	.14	(3.07)
MUM SELF-EMPLOYED	.03	(.33)	.00	(.03)	.04	(.41)	.03	(.32)	.05	(.47)
OWNER OCCUPIER	.23	(4.59)	.43	(9.81)	.42	(9.17)	.20	(4.11)	.23	(4.62)
LABOUR MARKET										
Log(YOUTH UNEMPLOYMENT)	-		.39	(.95)	.37	(.85)	.38	(.85)	.41	(.88)
Log(ADULT UNEMPLOYMENT)	-		-.24	(-.79)	-.40	(-1.24)	-.43	(-1.30)	-.56	(-1.62)
Log(Non-Manual/Manual wage-rate)	-		1.06	(1.58)	.71	(1.00)	.76	(1.01)	.66	(.86)
RESTRICTED LOG-LIKELIHOOD	-4188.8		-4188.8		-4188.8		-4188.8		-4188.8	
UNRESTRICTED LOG-LIKELIHOOD	-2368.1		-3222.5		-2797.2		-2549.3		-2360.6	
McFADDEN R-SQUARED	.43		.23		.33		.39		.44	
N	6075		6075		6075		6075		6075	

CHAPTER FOUR: YTS AND EMPLOYMENT

In this chapter, the effectiveness of the Youth Training Scheme (YTS) in England and Wales is analysed in terms of its impact, at an individual level, on the employment prospects of young people. The analysis goes beyond previous work in that it explicitly deals with the problems of sample selection bias in the determination of employment and the effects of heteroscedasticity. Both sample selectivity and heteroscedasticity are found to be present and influential on the estimates obtained. An heteroscedasticity corrected switching bivariate probit model is proposed and is found to be preferred to both the univariate probit and the bivariate probit model with a dummy variable representing YTS participation. In addition to alleviating distortions due to sample selectivity and heteroscedasticity, the preferred model explicitly allows the effect of YTS to vary across individual characteristics. Thus, it is possible to identify which types of people benefited more or less from participation on YTS.

The results of the empirical implementation of the model suggest that the previous studies of Main & Shelley (1990, hereafter M&S) and Whitfield & Bourlakis (1990, 1991, hereafter W&B) may have underestimated both the size and the variability of the effect of YTS participation on the likelihood of finding employment. The more general model employed also suggests that the effects of some labour market disadvantages, namely those associated with being female and being a habitual truant, were partially alleviated by YTS participation. On the other hand, the effect of other disadvantages, in particular, those faced by ethnic minorities and disabled people were accentuated. For these groups, YTS is found to have no significant influence on the probability of finding work. Thus, their relative disadvantage in the labour market is increased rather than reduced[1].

In the first section, issues underlying the evaluation of YTS are briefly discussed. This is followed by a consideration of the issues involved in the estimation of the impact of YTS on employment prospects. In particular, the problems of sample selection bias and heteroscedasticity are considered. The third section presents the estimation results. An univariate probit model, similar in character to those estimated by both M&S and W&B is estimated and compared with the results

1 The relative disadvantages facing ethnic minorities in the labour market have recently been analysed by Drew et. al. (1992) and by Jewson et. al. (1990), whilst those facing the disabled are considered by Morrell (1990).

presented in these studies. Subsequently, tests for heteroscedasticity and sample selection as well as more general formal comparisons of the different models are undertaken. Full results are presented for the heteroscedastic univariate probit and switching probit models. The final section summarises the results.

4.1: YTS and Employment

In chapter one, some broad issues concerning the youth labour market in Britain were raised. This also involved a brief discussion of the characteristics and development of YTS along with a consideration of some of the wider implications of the scheme for the youth labour market[2]. Here I limit myself to reiterating the central features of YTS which are relevant to the analysis undertaken in this chapter and the next.

The scheme was introduced in April 1983. It involved one years work experience with an employer including at least 13 weeks "off-the-job" training. The scheme was principally aimed at sixteen year-old school-leavers, although unemployed seventeen year-olds were also eligible. Young people received a small weekly allowance (£26.25 in 1985) financed by the government, although employers were free to supplement this if they so chose. In the sample considered here, 8.4% of those on YTS at the time of the first sweep (Summer 1985) reported that they received more than £26.25. The mean take home pay for those receiving more than the minimum was £34.46.

One of the stated aims of the programme was to provide "a permanent bridge between school and work" and, in particular, to enhance the employment prospects of young people. Two principal ways in which this was to be achieved may be identified in government pronouncements. Firstly, through the provision of general (as opposed to firm-specific) training. Thus,

> "YTS is designed to give school-leavers a range of practical, transferable skills to enable them to compete more effectively in the labour market," (HC Papers, 1982/3, 335-i, p.1)

[2] Chapman & Tooze (1987) provide a more detailed treatment of the development of YTS. Dolton (1994) provides a brief overview of the youth labour market in the eighties in Britain, along with a consideration of some of the issues in modelling the effectiveness of YTS.

In other words, YTS was to increase participants' human capital, and therefore make them more attractive to employers. The second mechanism through which YTS was to improve young people's chances of finding jobs was through the lowering of their wage expectations. In his March 1985 budget Speech, Nigel Lawson, then Chancellor of the Exchequer made this explicit saying,

> "Since it was first launched in 1983 the Youth Training Scheme has proved to be a very successful bridge between school and work. It has also helped to make young people's pay expectations more realistic," (quoted in Main, 1987a).

YTS was to make participants more attractive to employers both through increasing their level of (particularly transferable) skills and through the lowering of expected and, therefore, reservation wages. This suggests that one suitable indicator of the effectiveness of YTS would be its impact, at an individual level, on the probability of finding work.

It is important to be clear, however, that the analysis presented here, in common with M&S and W&B[3], regards participants' relative position in the labour market. The evidence presented in chapter one on the job displacement effects of YTS, and, of more direct relevance, the importance of aggregate demand in determining the level of youth unemployment suggest that most of the YTS "effect" should be interpreted in terms of the improvement of participants position in the job queue **at the expense of others**, rather than through a generalised increase in demand for youth labour. Thus, the effects of YTS reported below are based on a comparison between YTS participants and non-participants **in the presence of the scheme**, and conclusions should not be drawn as to what would have happened in the absence of the programme.

4.2: Modelling Employment Probability

A useful staring point for this analysis presented here is the basic model used by the two studies of YTS cited above. M&S and W&B both estimate single equation probit models of the probability of finding work including as explanatory variables one or more dummies representing participation on YTS[4].

[3] This is also the case with the analysis of Dolton et al. (1994b) considered briefly below.
[4] This approach was also used by Main (1985, 1987a) in analysing YOP.

Before outlining the model in detail, a brief digression is necessary to consider the alternative duration analysis of the employment effects of government training programmes. The earliest analyses of this form were undertaken by Ridder (1986) on Dutch data and Card & Sullivan (1988) on American data. Recently, this type of approach has also been used to analyse YTS in Britain (Dolton et al., 1994b, hereafter DMT1[5]). The basic model of Dolton et al. comprises the analysis of the time spent between leaving school and obtaining the first job[6]. Although, in principle, this approach appears attractive, in practice it presents a number of problems. The first regards missing and erroneous response to the diary questions. The second, and more important problem concerns the modelling of YTS participation. Specifically, the treatment of time spent on YTS in the context of the duration of job search. On the one hand, it is not appropriate to treat YTS participation as if it were unemployment. YTS participants had less time in which to undertake job search than the unemployed, and, if they expected to be kept on by the same employer at the end of the scheme, they might not have engaged in job search at all. Therefore, comparing the time spent to the first job including the duration of YTS participation will tend to underestimate the impact of YTS. On the other hand, it is not appropriate to exclude time spent on YTS from the analysis. This is for two principal reasons. Firstly, It was shown in chapter two that the primary destination of early YTS leavers was full-time employment. Thus, at least some YTS participants were engaged in job search while they were on the scheme. There will, as a consequence, be a tendency to overestimate the impact of YTS if the time spent on the scheme is excluded from the analysis since a number of YTS participants left the scheme in order to take up an offer of a "real" job. Secondly, those YTS participants (assuming they joined the scheme more or less straight from school) who completed the scheme would be entering the labour market one year later than those who did not participate. They would be one year older and would face a different labour market to non-participants. DMT1 deals with these issues by considering duration models with and without time spent on YTS. This obviously does not resolve the problem[7]. Perhaps it might be reasonably argued that the effect of

[5] In this chapter and the following one I make reference to a number of papers by Dolton, Makepeace & Treble. In doing so I refer to the specific papers I use index numbers (DMTi) whilst in referring to the authors themselves I use DMT, that is to say, I exclude the index.

[6] DMT employ two basic definitions of exits. The first is the exit to any job. The second, in an attempt to distinguish between employment in the primary and secondary sectors, is exit to a good job. See the cited paper for details.

[7] Nor, incidentally, does the estimation of an accelerated time model with a sample selection term for YTS participation which is reported in the second part of DMT1.

YTS lies somewhere between the two estimates assuming that the first will tend to overestimate the duration and the second underestimate it. Since the results produced vary considerably according to whether time spent on YTS is included in the duration to the first job, this does not take one very far, and, perhaps for this reason, DMT1 does not adopt this sort of reasoning. In any event, considerations of this type lead me to exclude an analysis of YTS of the form undertaken in DMT1 at an early stage in the preparation of this study.

Returning to probit analyses of the effect of YTS on the probability of finding work, the model is framed in terms of an unobserved or latent variable, e^*, which is a linear function of individual characteristics and may be expressed as:

$$e^* = X\beta + \gamma y + \varepsilon \qquad (4.1)$$

where y is a dummy variable representing YTS participation and X is a vector of individual characteristics affecting the probability of obtaining employment[8]. The latent variable may be thought of as representing the person's position in the labour queue in the spirit of Thurow's job competition model[9]. M&S and W&B both suggest that this approach is also consistent with a human capital model. In such a model, however, one would expect the decision to participate on YTS to depend on the expected discounted lifetime gains in terms of both employment prospects and wages arising out of participation. That is to say, one would expect YTS participation to be endogenous, depending on both employment and wage outcomes[10]. A structural human capital model in which the decision to participate on YTS depends on the probability of subsequently finding work whilst the probability of finding work depends on YTS participation is not, however, logically consistent (Schmidt, 1981, Maddala, 1983, p.119). Essentially, this is because, in order for the four probabilities to sum to one, one or other of the effects must be zero. In the present context, it is worth noting that Ashton & Maguire (1986) found that only 26 % of male and 30% of female YOP participants interviewed gave "easier to get a job" as one of the reasons for joining YOP and none replied in terms of increased wages, whilst, on the other hand, 65% of males (68% of females) stated

8 As before, individual subscripts are suppressed except in cases where their omission may cause confusion.
9 W&B offer a more detailed treatment of the logic underlying the job competition approach.
10 Chapter three considered an example of a structural human capital model of this type and provided fairly extensive criticisms of the assumptions implied by this type of approach.

one reason for joining as being that it was "better than nothing" i. e. unemployment. Thus, the suggestion is that the YTS participation decision depended primarily on the individuals current situation and not on expected future gains, therefore, I exclude the endogeneity hypothesis a priori[11].

If e^* is positive the person is observed as being in employment, otherwise they are not. The assumption that ε is distributed normally with unit variance leads to the probit model[12], so that the probability that a person is in employment may be expressed as:

$$p(e=1)=\Phi(X\beta+\gamma y)=\int_{-\infty}^{X\beta+\gamma y}(2\pi)^{-1/2}\exp\left\{\frac{-\varepsilon^2}{2}\right\}d\varepsilon \tag{4.2}$$

where e is a dummy variable taking the value of one if the person is in employment and zero otherwise. Thus, the likelihood function to be maximised is:

$$\prod[\Phi(X\beta+\gamma y)]^{e}[\Phi(-X\beta-\gamma y)]^{(1-e)} \tag{4.3}$$

In this context, the effect of YTS on employment probability is calculated as:

$$p(e=1|y=1)-p(e=1|y=0)=\Phi(X\beta+\gamma)-\Phi(X\beta) \tag{4.4}$$

and similarly for the other explanatory variables[13].

4.2.1) Sample Selection Bias

The question of sample selection bias in models of wages has received much attention[14], however, in a probabilistic framework the issue is generally ignored. The presence of sample

11 In the case of the basic bivariate model, but not the switching bivariate model, it is possible to estimate the reduced form. Employing this approach does not greatly alter the results obtained.

12 The assumptions that the critical value of e^* is zero and that ε has unit variance are innocent normalisations. See, for example, Greene (1993) on the former and Godfrey (1988) on the latter.

13 I use the discrete shift caused by the inclusion of the relevant variable rather than the partial derivative to measure the marginal effects of explanatory variables. When the relevant explanatory variable is a dummy, the use of partial derivatives can produce nonsensical results (Caudill & Jackson, 1989). See also chapter three above.

selectivity is likely to have just as serious consequences for the estimated programme effects in the non-linear case as it does in the linear model. The problem is as follows. In order to use a single equation model, it must be assumed that *the decision to participate on YTS is independent of unobserved variables in the error term of the employment probability equation.* In other words YTS participants should constitute a random subset of school-leavers, at least as regards unobserved characteristics. It was noted above that YOP was not considered an attractive alternative to employment. It will be recalled from chapter two that the YCS data tends to support this picture also for YTS. Only 8% of YTS entrants in the sample were in employment in the month previous to joining the scheme. The introduction of a term representing early employment experience in the equation should eliminate, or at least mitigate, this potential source of bias[15].

The problem is more serious if unobserved factors, such as motivation, which influenced the chances of finding work, also influenced YTS participation. Consider the job competition model. It may be the case that YTS participants were more motivated than non-participants, and that this greater motivation was observable by potential employers in job interviews, but not by the analyst conducting the research. If this is the case, then YTS participants would have held a higher position in the queue than non-participants, ceteris paribus, *even if they did not participate on the scheme.* Alternatively, the converse may be true. In both cases, a problem arises because unobserved factors influencing both YTS participation and employment probability will be interpreted as part of the YTS "effect".

The argument may be put more formally. The problem arises when y and ε in (4.2) are correlated. Suppose that YTS participation itself may be thought of in the latent variable framework, in an analogous way to employment. Thus, the likelihood of YTS participation may be represented by an underlying latent variable, y^*, which is determined by the relationship:

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14 The seminal articles dealing with this problem are Heckman (1979) and Barnow et. al. (1979).

15 It might be noted that univariate probit estimation of employment probability without the inclusion of a dummy to represent early employment experience produces a **negative** and statistically significant coefficient on YTS participation. This might explain the negative coefficient on YTS reported by Dolton et al. in an early presentation of DMT1 at the Conference on "Vocational Training in Britain and Europe," held at Oxford University, in September 1992. Although they suggested at the time that two of the three specifications of the employment probability equation presented were replications of the M&S and W&B specifications respectively, nowhere did they introduce terms to control for early (un)employment present in this analysis and in M&S. Specifically in the "M&S specification" they introduced terms representing unemployment at the time of the first and second sweeps respectively (i.e. roughly one and two years after leaving school). The M&S equation, on the other hand, contains a term to represent unemployment in October 1984, in other words, at a much earlier moment in the post education experiences of young people than that employed by DMT.

$$y^* = Za + \upsilon \tag{4.5}$$

Once again, assuming that υ is distributed normally with unit variance and y^* is related to the observed dummy variable, y, in that y =1 iff $y^* > 0$, YTS participation may be expressed in terms of the probit model:

$$p(y=1) = \Phi(Z\alpha) \tag{4.6}$$

If ε and υ are correlated, $E(\varepsilon \mid y)$ will not equal zero and, consequently, the estimates of γ will be biased. If e^* were observed, one could employ the procedure suggested by Heckman (1979), introducing correction terms in the employment equation derived from the univariate probit estimation of YTS participation. This is the basis of the procedure employed in chapter five to control for bias in the estimation of the effects of YTS participation on wages and is laid out in more detail there.

The same procedure has been suggested to correct for selection bias in the probit model of employment (Main, 1987b), however, in the non-linear context this approach is no longer valid. To see this, consider the two equation probit model described by (4.1), (4.2), (4.5) and (4.6). If the error terms, ε and υ, are correlated and both are individually normal then their joint distribution is bivariate normal. Thus, for example, the probability that an individual participates on YTS and is observed as being in employment in the spring of 1986 is given by[16]:

$$p(e=1, y=1) = \int_{-Z\alpha}^{\infty} \int_{-X\beta-\gamma}^{\infty} \phi(\varepsilon, \upsilon; \rho) d\varepsilon d\upsilon$$

$$= \left(2\pi\sqrt{1-\rho^2}\right)^{-1} \int_{-Z\alpha}^{\infty} \int_{-X\beta-\gamma}^{\infty} \exp\left\{-\frac{\varepsilon^2 - 2\rho\varepsilon\upsilon + \upsilon^2}{2(1-\rho^2)}\right\} d\varepsilon d\upsilon$$

$$= \Phi(X\beta+\gamma, Z\alpha; \rho) \tag{4.7}$$

16 It may be noted that $\Phi(.)$ is used to indicate both the univariate and bivariate normal distributions. The number of arguments is hopefully sufficient to distinguish between the two in the text.

The conditional probability that a person is in employment given that he or she participated on YTS may, therefore, be expressed in terms of univariate normal distributions and densities as follows (Johnson & Kotz, 1972, chapter 36):

$$p(e=1|y=1)=\frac{p(e=1,y=1)}{p(y=1)}$$
$$=\frac{\int_{-Z\alpha}^{\infty}\phi(\upsilon)\int_{-X\beta-\gamma}^{\infty}\phi\left[(\varepsilon+\rho\upsilon)/\sqrt{1-\rho^2}\right]d\varepsilon d\upsilon}{\Phi(Z\alpha)}$$
$$=\frac{\int_{-Z\alpha}^{\infty}\phi(\upsilon)\Phi\left(\frac{X\beta+\gamma-\rho\upsilon}{\sqrt{1-\rho^2}}\right)d\upsilon}{\Phi(Z\alpha)} \qquad (4.8)$$

whereas the Heckman type correction procedure implies estimating the probability as:

$$p(e=1|y=1)=\Phi\left(X\beta+\gamma+\sigma_{\varepsilon\upsilon}\frac{\phi(Z\alpha)}{\Phi(Z\alpha)}\right) \qquad (4.9)$$

It is evident that the two formulas are not necessarily the same. The obvious solution to the problem in this case is to estimate a bivariate probit model of the joint determination of employment and YTS participation of the form of (4.7) above[17]. The model is identified so long as Z contains at least one explanatory variable not in X (Maddala, 1983, p.122). Thus, expressed in terms of the underlying latent variables, the model has the form:

$$\left.\begin{aligned} y^{*} &= Z\alpha+\upsilon \\ e^{*} &= X\beta+\gamma y+\varepsilon \end{aligned}\right\} \qquad (4.10)$$

17 An alternative approach to that adopted here would be to determine participation on YTS randomly. That is, once a group of young people willing to participate on YTS had been identified, only a random subsample would actually be allowed to do so. In this way, one could randomly determine treatment and control groups which would alleviate the problem of sample selection bias. Arguments in favour of this approach may be found in Lalonde (1986) and Ham & Lalonde (1989), whilst Manski & Garfinkel (1992) contains papers espousing both experimental and non-experimental approaches. One might express serious reservations about the ethical issues involved in determining beneficiaries of a government policy by lottery. Such a policy would also contradict repeated government promises guaranteeing a YTS place for all school-leavers who wished to participate.

in order to compare this with the switching bivariate model proposed below, it is preferable to express (4.10) as:

$$\left.\begin{aligned} y^{*} &= Z\alpha + \upsilon \\ e^{*} &= X\beta + \gamma + \varepsilon \quad \textit{iff} \quad y^{*} > 0 \\ e^{*} &= X\beta + \varepsilon \qquad \textit{otherwise} \end{aligned}\right\} \tag{4.10'}$$

with error variance, $\Sigma = \begin{pmatrix} 1 & \rho \\ & 1 \end{pmatrix}$. The corresponding likelihood function is therefore given by:

$$\prod \left[\Phi(X\beta+\gamma, Z\alpha, \rho)\right]^{ey} \left[\Phi(X\beta, -Z\alpha, -\rho)\right]^{e(1-y)} \left[\Phi(-X\beta-\gamma, Z\alpha, -\rho)\right]^{(1-e)y} \left[\Phi(-X\beta, -Z\alpha, \rho)\right]^{(1-e)(1-y)} \tag{4.11}$$

and the effects of YTS are estimated as:

$$p(e=1|y=1) - p(e=1|y=0) = \frac{\Phi(X\beta+\gamma, Z\alpha, \rho)}{\Phi(Z\alpha)} - \frac{\Phi(X\beta, -Z\alpha, -\rho)}{\Phi(-Z\alpha)} \tag{4.12}$$

More generally, it is likely that the impact of YTS varies across different types of individual. That is, individuals with different characteristics are likely to benefit to varying degrees from participation on the scheme. Thus, for example, it may be the case that YTS helps people from ethnic minorities more than others, thereby reducing the relative disadvantage of such groups in the labour market. Alternatively, they may benefit less than others implying that YTS tends to widen the gap in opportunities between the two groups. Fenton at. al. (1984) and Pollert (1986) provide some evidence supporting the latter case. Rather than include a dummy term to represent YTS participation, one may directly estimate different parameter vectors for participants and non-participants. That is to say, one may estimate a switching bivariate probit model, essentially the probit analogue to the switching linear regression model discussed by Maddala (1983). Specifically, expressed in terms of the underlying latent variables, the model becomes:

$$\left.\begin{aligned} y^* &= Z\alpha + \upsilon \\ e^* &= X\beta_1 + \varepsilon_1 \quad iff \quad y^* > 0 \\ e^* &= X\beta_2 + \varepsilon_2 \quad otherwise \end{aligned}\right\} \tag{4.13}$$

with error variance matrix:

$$\sum = \begin{pmatrix} 1 & \rho_{\upsilon\varepsilon_1} & \rho_{\upsilon\varepsilon_2} \\ & 1 & \rho_{\varepsilon_1\varepsilon_2} \\ & & 1 \end{pmatrix}$$

imposing the restriction $\varepsilon_1 = \varepsilon_2$ [18], the likelihood function for this model is given by:

$$\prod\left[\Phi(X\beta_1, Z\alpha, \rho)\right]^{\sigma}\left[\Phi(X\beta_2, -Z\alpha, -\rho)\right]^{\sigma(1-y)}\left[\Phi(-X\beta_1, Z\alpha, -\rho)\right]^{(1-\sigma)y}\left[\Phi(-X\beta_2, -Z\alpha, \rho)\right]^{(1-\sigma)(1-y)} \tag{4.14}$$

the conditions for identification are the same as for the bivariate model (4.10). Without loss of generality, this can most easily be seen by considering the case of the model estimated with just intercept terms. Thus, one has:

$$\left.\begin{aligned} y^* &= \alpha + \upsilon \\ e^* &= \beta_1 + \varepsilon \quad iff \quad y^* > 0 \\ e^* &= \beta_2 + \varepsilon \quad otherwise \end{aligned}\right\} \tag{4.15}$$

Now, this may be rewritten as:

$$\left.\begin{aligned} y^* &= \alpha + \upsilon \\ e^* &= \beta_2 + \gamma + \varepsilon \quad iff \quad y^* > 0 \\ e^* &= \beta_2 + \varepsilon \quad otherwise \end{aligned}\right\} \tag{4.15'}$$
$$with \quad \beta_2 + \gamma = \beta_1$$

this is none other than the bivariate probit with a dummy variable to represent YTS participation given by (4.10'). As expressed, the model is not identified. We have three free probabilities (the fourth is a residual) with which to estimate four parameters α, β_2, γ, and ρ. As with model (4.10'),

18 In practice, a sufficient condition for what follows is given by the restriction $\rho_{\upsilon\varepsilon_1} = \rho_{\upsilon\varepsilon_2}$.

identification requires, therefore, that there is at least one variable in the YTS equation which is not in the employment equations. The precise specification of the two equations is discussed further below.

In the case of the switching bivariate model the effects of YTS on employment probability are calculated as:

$$p(e=1|y=1)-p(e=1|y=0)=\frac{\Phi(X\beta_1,Z\alpha,\rho)}{\Phi(Z\alpha)}-\frac{\Phi(X\beta_2,-Z\alpha,-\rho)}{\Phi(-Z\alpha)} \qquad (4.16)$$

This approach is a natural extension of the model proposed by Van de Ven & Van Praag (1981) to deal with a situation in which the sample is selected. That is to say, these authors apply a bivariate model in which one of the dichotomous dependent variables was only observed if the other was equal to one.

4.2.2) Heteroscedasticity

Chapter three contained a brief consideration of the problem of heteroscedasticity. For the univariate model considered below, the same approach was adopted as before. Firstly, a full heteroscedastic model was estimated employing all the explanatory variables save the intercept in the estimate of the error variance. Subsequently, the heteroscedasticity term was reduced to a more manageable size by employing t-tests to determine the specific variables to be included. Finally, a Likelihood Ratio test was employed to ensure that the more general model was not preferred. For the bivariate models, the test and correction terms are extended in a straightforward way. Consider, the switching bivariate model for which full results are presented in the text. First of all, in order to simplify the already complicated model, the additional restriction, $\sigma_{u_1} = \sigma_{u_2}$, was imposed. The terms to include in the variance estimate were taken from the univariate models. Lagrange multiplier (LM) tests[19] were employed to ensure that: a) equality of the variance of the error terms in the YTS and employment equations was not rejected; and, b) a more general form of heteroscedasticity was not

19 LM rather than LR tests were employed because, although they have the same asymptotic χ^2 distribution, LM tests do not require the estimation of the alternative hypothesis.

preferred. Thus, for the switching bivariate model, the basic heteroscedasticity hypothesis that was tested is given by:

$$\begin{cases} H_0 : \sigma_v = \sigma_\varepsilon = 1 \\ H_a : \sigma_v = \sigma_\varepsilon = \tau_i \end{cases} \tag{4.17}$$

with $\tau_i = \exp(W_i \vartheta)$ as in chapter three, equation (3.13).

The test effectively compares the models:

$$\begin{cases} H_0 : p(e=1, y=1) = \Phi(X\beta_1, Z\alpha; \rho) \\ H_a : p(e=1, y=1) = \Phi\left(\dfrac{X\beta_1}{\exp(W\vartheta)}, \dfrac{Z\alpha}{\exp(W\vartheta)}; \rho\right) \end{cases} \tag{4.18}$$

and the heteroscedastic likelihood function is given by:

$$\prod \left[\Phi\left(\frac{X\beta_1}{\exp(W\vartheta)}, \frac{Z\alpha}{\exp(W\vartheta)}; \rho\right)\right]^{e} \left[\Phi\left(\frac{X\beta_2}{\exp(W\vartheta)}, \frac{-Z\alpha}{\exp(W\vartheta)}; -\rho\right)\right]^{e(1-y)} \cdot \left[\Phi\left(\frac{-X\beta_1}{\exp(W\vartheta)}, \frac{Z\alpha}{\exp(W\vartheta)}; -\rho\right)\right]^{(1-e)y} \left[\Phi\left(\frac{-X\beta_2}{\exp(W\vartheta)}, \frac{-Z\alpha}{\exp(W\vartheta)}; \rho\right)\right]^{(1-e)(1-y)} \tag{4.19}$$

It might be noted that no additional identifying restrictions are **necessary** in the heteroscedastic model[20]. However, one or two observations are in order as regards identifying restrictions and the additional simplifying assumptions adopted. It might be observed that, particularly in the case of the bivariate models, the likelihood function is rather complicated which precluded trials using different specifications[21]. Firstly, in the switching bivariate model (4.19), since

[20] Indeed, it is fairly obvious that one could employ the heteroscedasticity terms to effectively identify the model in cases in which the homoscedastic equivalent is not identified. One might question the theoretical validity of such an approach, and, in any case, it would preclude testing for heteroscedasticity in itself, since there would be no appropriate homoscedastic model with which to compare the heteroscedastic estimation.

[21] The models were estimated on a 486 33 Mhz. IBM personal computer using the MINIMIZE routine in LIMDEP 6.0 386. Whereas the univariate heteroscedastic model took something in the region of 5-10 minutes to converge, the heteroscedastic switching bivariate model took between 72 and 168 hours (according to the starting values employed) to do so. This in part depended on the necessity of using the MINIMIZE routine which slows down estimation,

the employment probability equations are estimated separately for YTS participants and non-participants, one cannot introduce a YTS dummy in the heteroscedastic terms in the employment probability equations. This would be analogous to introducing a YTS dummy in the homoscedastic model (4.14) whose coefficient (in the presence of a constant term) is obviously not identified. Secondly, the assumption of a constant correlation coefficient, ρ, implies that the covariance between ε and υ varies across individuals in a rather particular way. Specifically:

$$\sigma_{\varepsilon u i} = \frac{\exp(2W_i\vartheta)}{\rho} \tag{4.20}$$

that is, the covariance is proportional to the variance of ε and υ. intuitively, I feel this preferable to the obvious alternative specification in which the correlation coefficient is allowed to vary. That is, it seems more reasonable to suppose that the covariance term to vary according to the size of the variance rather than letting the correlation coefficient do so. It might be noted that the restriction, $\sigma_{\varepsilon} = \sigma_{ui}$, which produces the rather particular form of the covariance term is tested.

It should also be observed that, once one introduces the heteroscedastic terms, the likelihood function is no longer necessarily globally concave. This implies that one may find a local rather than a global maximum in the estimation. The procedure adopted to avoid this pitfall, involved the repeated estimation of the model using different starting values. The results produced did not vary (although the time to convergence did), indicating that non-concavity did not present a problem in this context.

4.3: Empirical Model

The sample employed in this paper comprises 2855 young people drawn from the second sweep of YCS. That is, all those young people who were either in full-time employment or

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however, it also depends on the complicated form of the likelihood function. The slow convergence of the model effectively precluded the testing of different specifications. The only re-estimation of the model undertaken was that employing different starting values to ensure that the likelihood function was converging on a global, not a local maximum. Definition of the form of heteroscedasticity adopted was consequently derived from estimation of the univariate model. LM tests were then employed to ensure that the specification adopted was not rejected in favour of a more general model.

unemployed at the time of the second sweep in the Spring 1986[22]. The sample excludes 242 young people still on YTS, 31 on another government scheme, 94 who were in a part-time job, as well as 79 young people who were outside the labour market in a more traditional sense[23]. YTS participants and those in part-time employment were excluded in order to avoid possible confusion in the interpretation of the results. It is not clear whether YTS participants should more properly be thought of as employed or unemployed or as a different group altogether[24]. For part-time workers, analogous reasoning leads to their exclusion. The survey does not allow a distinction to be made between those preferring part-time work to full-time employment and those taking a part-time job because they could not obtain a full-time one. Therefore, it is not clear whether or not these young people were constrained in their choice[25].

The sub-sample chosen also has the advantage that it conforms closely to that used by W&B[26]. W&B also employ the first YCS. Their study differs in as much as it uses data from the *third* sweep of the cohort. That is, they estimate the probability that an individual who reached minimum school-leaving age during the academic year 1983/4 was in full-time employment in February 1987. The alternative considered being unemployment. The principal difference between the dataset employed by W&B and that used here is the timing of the critical (employment/unemployment) observation. This has important consequences for the analysis. By February 1987, all young people in the sample would have completed their normal period of school

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[22] That is, the status was defined according to the reply to the question "what are you doing now ?" Not the diary question. It might be recalled from chapter two, that almost all the replies to the second sweep (97.7%) were received during March and April, 1986 with the remainder arriving in May and the first week of June. It was also noted in that chapter that the introduction of dummy variables representing the week of return of the questionnaire did not affect the results produced. The coefficient on YTS participation in the homoscedastic univariate model remained identical (.27).

[23] That is, 33 young people who reported that they were engaged full-time at home plus the 46 who said they were doing something else. See table 2.6 above.

[24] In practice, this group was mainly composed of late entrants to the labour market following a period of further education. Only 3 of them had spent more than a year on the scheme (these three having spent 13 months on YTS), whilst the majority (206 or 85.1%) had been on the scheme for between five and nine months. On the other hand, 191 (78.9%) had spent at least nine months in full-time further education. The remainder had tended to drift between states, spending short periods in unemployment, employment, YTS and/or full-time education. Given the a priori separation of the school-leaving decision from employment probability and YTS participation, and the fact that, of those in this group, only three had over-run their time on YTS, it seems reasonable to reject consideration of endogenous selection. That is, it is reasonable to exclude this group as comprising, almost entirely, late labour market entrants. Excluding all those with some experience of further education and including those still on YTS (amongst the unemployed) at the time of the second sweep increases the coefficient on the YTS participation dummy in the homoscedastic univariate probit model from .27 to .34.

[25] Inclusion of this group amongst the employed leaves the results virtually unchanged. For example, using the homoscedastic univariate model, the coefficient on YTS participation changes from .27 to .24.

26 W&B define their dependent variable and sample in the same way I do.

education. Those remaining in education at this time would be either at a third-level educational institution, or at a college of further education to extend the qualifications previously obtained. This implies[27] that the sample contained a substantial group of eighteen-nineteen year olds who left full-time education at eighteen having completed A-level or equivalent qualifications. The implications of this difference are returned to below.

The sample used by M&S covers the same period as that analysed here and employs SYPS data which provides analogous information to the YCS for a sample of Scottish young people[28]. M&S also exclude participants on government schemes and those outside the labour market. They are not explicit, however, on whether the group which was employed in the Spring 1986 includes also those in part-time employment. Since they do not mention the exclusion of part-time employees, the implication is that this group is included amongst the employed. In the presentation of the results below we compare the findings of this study with that of M&S and W&B more closely.

In table 4.1, descriptive statistics on the variables used in the analysis are presented. The information contained in the surveys allows the inclusion of a variety of individual and background characteristics. The table reports the means and (where relevant) standard deviations of these variables. In the second and third columns statistics are given separately for the employed (e=1) and the unemployed (e=0). This allows a first rough indication of the effect of the different variables in determining whether a young person was in employment in the Spring 1986. That is to say, ceteris paribus, a higher (lower) value of the mean for employed rather than unemployed young people implies that the variable in question is positively (negatively) related to the probability of finding employment. The purpose of the analysis presented below is precisely that of imposing the ceteris paribus condition.

The explanatory variables fall into five broad groups. The first three variables representing indigenous individual characteristics. The possession of a significant disability, belonging to an ethnic minority and being female might all be reasonably expected to have a negative impact on the probability of finding work due to discrimination by employers and/or the perceived lower levels of

[27] W&B do not make this explicit in either of their studies and, consequently, do not report the numbers falling into this group.
[28] See the discussion in chapter two above.

human capital embodied in these individuals. Indeed, all of these groups comprise a greater proportion of the unemployed than the employed.

The next group of variables relate to the individual's experience at school. A part-time job or work experience are likely to have a positive influence on the chances of finding work, reflecting as they do greater contact with the labour market whilst at school. The dummy variables representing truancy at school are expected to be unequivocally negative in their influence in as much as they will reflect the motivation of individuals. Finally, the index of exam success at sixteen (ILEA), in as much as it represents (and is seen by employers as representing) ability and therefore potential productivity, should have a positive impact on the chances of finding work. With the exception of occasional truancy, the descriptive statistics confirm this a priori reasoning.

The model also includes variables to represent family background. The first three of these are derived from a question asking what the respondent's father did. That is, whether the respondent's father was reported as having a full or part-time job, or was unemployed at the time of the first sweep. The second and third of these variables are included in the employment equation and are expected, particularly in the case of paternal unemployment, to be negatively related to individuals' likelihood of finding work, reflecting constraints on fathers' access to the labour market which are likely to be transmitted to their offspring. It will be observed, however, that these variables relate to the parental situation in the Summer 1985. Thus, they should be interpreted as having an influence on the intermediate experience of labour market participants. The other three variables in this group are likely to be positively signed. Self-employment of the father is likely to increase the probability that a young person is taken on in the family firm or, at least, increase contact with the labour market. Non-manual employment on behalf of the mother and OWNER OCCUPIER (=1 if the respondent stated that they lived in an owner occupied household) are included to take some account of the social class of the person.

The fourth group of variables are related to general demand conditions and therefore job opportunities. The principal variable in this group is the adult regional unemployment rate subdivided by sex included to reflect general demand for labour conditions. This is expected to be negatively related to young people's employment prospects for obvious reasons. Regional dummies for London and the South East are included to take into account differences in employment opportunities not

adequately controlled for by the adult unemployment rate. Specifically, it is proposed that the chances of finding a job for young people varies more than proportionately with the adult unemployment rate[29]. In part, this is taken into account by the use of the natural logarithm of the unemployment rate. The additional dummies for London and the South East were introduced to control for differences in prospects not adequately dealt in this manner[30].

The final group of variables represent individuals' experience in and out of the labour market over the period September 1984-February 1986 and are the focus of interest in this chapter. The first of these represents whether the young person obtained full-time employment (more or less) immediately on leaving school. Such early employment experience is likely to be positively related to the chances of being in employment eighteen months later. It is also important as an explanatory variable in as much as YTS (in contrast to its predecessor YOP) was proposed as a valid alternative to employment, not just as an ameliorative for unemployed youth. Thus, the early employment variable also provides a yardstick against which the effectiveness of YTS may be judged. The YTS variable reflects whether or not young people had some experience of YTS during the period September 1984-February 1986. Obviously, it is to be hoped that such participation had a positive influence on job opportunities. In this regard, it may be noted that the proportion of unemployed young people who had previously participated on YTS is higher than for those in employment in the Spring 1986. Thus, at a first glance, the suggestion is that not controlling for other influences, YTS participation was negatively related to employment probability. Finally, a variable reflecting whether or not young people had some experience of post-compulsory full-time education is included. One would expect this to be positively related to employment probability.

As regards the specification of the YTS equation, it was observed above that, in order to identify both the bivariate probit with a YTS participation dummy (described by the likelihood function (4.11)) and the switching bivariate probit (4.14) models, at least one variable must be included in the YTS equation which is not contained in the employment equation. The variables fulfilling this role are the dummy representing the possession of full-time job on the part of the father, and regional dummies for the North and Midlands and for Wales. The basic reasoning underlying the

[29] This is certainly the case with the national figures over time, as was noted in chapter one.
[30] In practice, the final specification presented here was the result of a certain amount of experimentation with the bivariate model. This will be returned to below.

inclusion of the latter in the YTS equation is the *a priori* knowledge that YTS participation was particularly concentrated in areas of high unemployment. On the other hand, the presence in the household of a fully employed father is likely to encourage YTS participation, given the initial lack of success in job search which participation on the scheme tends to indicate. In addition, the YTS equation excludes several variables which are present in the employment equation. These were removed after trials with the homoscedastic bivariate model due to their lack of significance[31]. The choice of identifying variables is, to some extent, arbitrary. Also the precise form of the identifying variables was the result of some experimentation with this model. This may be criticised as a rather ad hoc procedure. On the other hand, there is an intuitive rationale for the specific inclusions/exclusions. In defence of this procedure, I would also add that the measured effect of YTS in the homoscedastic model is not sensitive to the particular identifying assumptions made. Since this is the key variable of interest, I feel justified in the approach adopted.

4.4: Results

In this section full results are presented for the univariate probit model (both heteroscedastic and homoscedastic), and for the switching bivariate probit. In addition, the results from the bivariate probit model including just a dummy variable representing YTS participation are summarised in table 4.5 below. Table 4.2 presents the results of the estimation of the first model. That is, the independent univariate probit estimation of the likelihood that young people: i) were in employment in the Spring 1986; and, ii) whether they participated on YTS at some time during the period September 1984-February 1986. Although the focus of interest here is the first (employment determination) equation, the YTS results are also presented in as much as they provide a basis for comparison with the other models presented below, as well as being of interest in themselves. Since it is the model which most resembles that presented in both M&S and W&B the estimates not corrected for heteroscedasticity are reported in the third and fourth columns.

It will be observed that the Likelihood ratio test for heteroscedasticity is statistically significant for both the employment and YTS equations (34.7 and 37.0 against the 1% critical χ^2

[31] As noted above (note 21), the lengthiness of the convergence procedure effectively precluded experimentation with different specifications of the heteroscedastic bivariate models.

values 13.28 and 11.34 respectively), so that the hypothesis of homoscedasticity adopted implicitly by the M&S and W&B studies may be rejected. On the other hand, a more general form of heteroscedasticity is not preferred to the form presented here.

As regards the corrected estimates, the first four groups of variables all have the expected signs although they are not all statistically significant. As regards the experience variables, all three of these have a statistically significant positive impact on the probability of being in employment. It also relevant to note that the coefficient on early employment experience is substantially larger than that on YTS although the inclusion of these variables in the estimate of variance make direct comparison of the parameters problematic. A clearer impression of the influence of YTS (and early employment experience) may be gained from table 4.3. The first part of the table reports the effects of YTS and early employment experience on three "ideal types" of teenager. The reported coefficients from M&S and W&B were also applied to the base probabilities in order to calculate comparable effects of YTS as found by these studies. In the second part of the table, the effects of the other explanatory variables on the probability of employment of an otherwise "average" young person are presented. The table reports estimates for both the heteroscedastic (in bold figures) and homoscedastic models.

As noted above, YTS was proposed as a scheme for all school-leavers, not just the unemployed[32]. It is evident from the table that YTS participation did not, however, compensate for a lack of early employment experience. The effect of YTS on employment probability ranges from around 0 percentage points for an "advantaged" young person to around 11 percentage points for a "disadvantaged" one. This compares to an effect of early employment experience of between 3 and 49 percentage points. Thus, YTS participation evidently did not compensate for a "real" job on leaving school[33].

The introduction of heteroscedasticity terms alters the results to a limited degree. The principal difference regards less fortunate young people. YTS participation had the largest influence on the employment prospects of a "disadvantaged" individual. It might be noted that the homoscedastic model does not allow such a finding. That is, the functional form adopted ensures that

32 Even though, in practice, an MSC memo reports that only around 5% of YTS participants came from employment. This figure is confirmed from the low level of movement from employment to YTS found in the YCS data and by the analysis of, amongst others, Roberts et al. (1986) who found that YTS was viewed as an alternative to unemployment for those not finding work, but not as a valid alternative to employment.

33 Another way of looking at this is to estimate the model without an early employment term. Doing this, the coefficient on YTS in the homoscedastic model changes from .27 to -.28.

the measured effect of any explanatory variable will be greatest around a base probability of .5, becoming smaller as one moves towards the tales of the distribution[34]. At the same time, it will be observed that the worsening of employment prospects due to particular disadvantages is more severe when the heteroscedastic model is used.

These results may be compared with those presented in M&S and W&B. Table 3a reports my calculations of the effects of YTS implied by the two studies. The M&S study for Scotland estimated the probability that school-leavers in 1983/4 were in employment (as opposed to unemployment) in April 1986. That is, the study corresponds to a similar sample to this one, considered over the same time period examined here. The principal difference is that their analysis relates to Scotland. The effect of YTS found by M&S ranges from 4 to 11 percentage points[35], which is very similar to those found here on the basis of the homoscedastic model. Although they do not themselves draw attention to the fact, M&S's results also suggest that YTS participation did not compensate for early unemployment, or rather, lack of early employment experience[36].

As regards the W&B model, their analyses refer to the same countries, but to a slightly different sample. The principal difference between the group analysed by W&B and that considered here lies in the fact that W&B look at young people's experience ten months later and therefore include young people who left school at eighteen with A-levels and other higher education qualifications. In the 1990 paper; they consider the effect of YTS on employment probability using two comparison groups. That is, they compared YTS participants, firstly, with those who had had some experience of unemployment, and secondly, with all those who had not participated on YTS. In contrast to this study and M&S, they do not introduce controls for either further education or early employment experience. Not surprisingly, the effect of YTS was much larger when compared with the former control group (6 to 17 percentage points) than with the latter (2 to 5 percentage points).

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34 This is obvious when one considers the partial derivative. The effect of an explanatory variable measured in this way is given by:

$$\frac{\partial p(e=1)}{\partial X_k} = \beta_k \phi(X\beta)$$

the maximum value of the effect is reached when p(e=1)=.5. Although it is perhaps less clear in the case of a discrete change, analogous reasoning applies.

35 They themselves report a rather larger effect. This is because the base probabilities they employ are closer to the centre of the distribution than those reported here.

36 A precise comparison is not possible, in as much as M&S employ two terms relating to unemployment rather than employment experience, however, the implication of their results is similar to mine.

It may be the case that the positive, and statistically significant effect, of YTS participation, even in the latter case, is due to the inclusion of eighteen year old school-leavers who had had neither early experience of employment nor had participated on YTS. In contrast, it was observed above[37] that if the dummy for early employment experience is excluded from model presented here, the measured impact of YTS on employment probability is **negative**.

In any event, the model presented above ignores sample selectivity. Table 4.4 reports the results of estimating the switching bivariate model which explicitly takes this problem into account. This model also allows a much clearer indication of the types of individual who gained more (or less) from YTS participation. Thus, one is able to explicitly model the differential effects that YTS had on the employment prospects of different types of individual. In this context, it may be noted that the t-ratio on the correlation coefficient is significant indicating the presence of sample selectivity. The fact that this is negative indicates that the effect of YTS will be, ceteris paribus, underestimated if no account is taken of sample selection bias. That is, unobserved factors which influence YTS participation are negatively correlated with unobserved factors influencing employment probability. The implication being that unobserved factors which raise the probability of participating on YTS are likely to lower the probability of finding work. The likelihood ratio test statistic on heteroscedasticity and on parameter variation are also statistically significant. On the other hand, tests for more general heteroscedasticity and for differences in the form of heteroscedasticity between employment and YTS equations do not refute the null hypothesis.

The effect of YTS in the context of this model is anything but obvious from the parameter estimates. Table 4.5 reports the effects of YTS on employment probability for the three ideal types of young people as estimated using four different models, whilst table 4.6 presents estimates of the effects of YTS on the employment probability of an average young person with the addition of one other individual characteristic. The comparison of the models presented in table 4.5 suggests that, whilst heteroscedasticity does not have a very large influence on the estimated effect of YTS, ignoring the problem of sample selection does. Specifically, the results suggest that not taking account of selection bias leads to a substantial underestimate of the effect of YTS (at least for

[37] See notes 15 and 33, this chapter.

average individuals). This is true for both the bivariate probit with a YTS dummy and the more general switching model.

Table 4.6 reports the results of calculating the effects of YTS explicitly allowing for different effects for different types of individual. This gives a direct estimate of the effect of YTS on the chances of finding work for different types of person. In this context, it is worth pointing out that, as can be seen immediately from equation (4.16), that the effect depends explicitly on both the difference between the parameters for participants and non-participants and the influence that individual characteristics had on the probability that a young person participated on YTS (the denominator).

The table shows that, in particular, for disabled young people and those belonging to ethnic minorities YTS had no statistically significant impact on the likelihood of finding work. Furthermore, even if the point estimate is taken at face value, participation on the scheme did not compensate for the disadvantages faced, above all, by disabled young people. With regard to ethnic minorities, this provides further formal evidence to support the qualitative picture presented by, for example, Fenton et. al. (1984) and Pollert (1986).

On the other hand, young females appear to have gained more from the scheme than males. The effect is larger for them, and is statistically significant. Thus, whilst participation on YTS did not put young females on an even footing with their male counterparts, it did narrow the gap in opportunities facing the two sexes. Those people who played truant at school (both seriously and occasionally) appear to have done particularly well out of the scheme. This may be because participation on the scheme succeeded in providing motivation which their truancy at school tends to indicate was initially lacking.

The results also suggest that for those with early experience of employment, YTS participation was damaging to employment prospects. This is in part explained by the very substantial initial advantage possessed by these people. The fact that the effect is actually negative suggests that those who initially found employment but subsequently became unemployed, and consequently joined YTS lost the advantage provided by early employment. In this regard it might be noted that the effect is not due to the lack of time spent in the labour market. Only one of these young people had experience of further education (lasting ten months) having returned to school in

October 1984. The notable feature of these young people is their lack of constancy. The average number of states experienced by this group was 2.51. This might be compared to the overall sample average of 1.80 noted in chapter two. It might also be noted that the number of people who had early employment experience and had participated on YTS represent a very small minority, comprising 43 young people.

Thus, the overall impression gained from the results is that YTS did not eliminate the influence of labour market disadvantages, however for some groups, notably females and truants, it did narrow the gap in opportunities. For the disabled and ethnic minorities, on the other hand, the gap was widened.

4.5) Conclusions

In this chapter, some of the issues relating to the estimation of the effects of YTS participation on employment prospects have been examined. In contrast to previous studies, explicit account was taken of the potential bias arising from sample selectivity and heteroscedasticity. When tested for, both problems were found to be present and influential on the results. Thus, it is to be hoped that the importance of taking into account these issues has been established.

Employing a similar model to M&S and W&B, the impact of YTS was estimated as between 3 and 8 percentage points. This is comparable to the impact found by M&S in Scotland of between (according to the recalculations presented here) 4 and 11 percentage points, whilst it lies between the two estimates implied by the 1990 W&B study. Taking into account heteroscedasticity and sample selection, however, substantially modifies these conclusions. The final estimate of the effect of YTS lies between 1 and 21 percentage points according to the type of individual. This finding suggests that previous analyses may have underestimated both the variability and the size of the YTS "effect".

Furthermore, the switching bivariate probit model proposed in the text, as well as controlling for sample selection and heteroscedasticity, also allowed the direct estimation of variations in the impact of YTS according to specific individual characteristics. It was found that, whilst YTS reduced the disadvantages facing females and truants, participation on the scheme was not sufficient to annul such disadvantages. Perhaps of more importance is the finding that ethnic minorities and disabled

teenagers did not appear to gain any statistically significant positive benefit from the scheme in terms of their likelihood of finding work with the implication that the disadvantages faced by these groups in the labour market were, if anything, accentuated. Further research might consider the robustness of these findings by considering the impact of YTS on later cohorts using the framework proposed above.

Table 4 . 1: Descriptive Statistics on the variables employed (standard deviations of continuous variables in brackets).

	WHOLE SAMPLE (N=2855)	EMPLOYED SPRING 1986 (N=2261)	UNEMPLOYED SPRING 1986 (N=594)
INDIGENOUS CHARACTERISTICS			
DISABILITY	.028	.020	.061
BLACK	.020	.017	.032
GIRL	.508	.503	.527
SCHOOL EXPERIENCE			
PART-TIME JOB	.587	.625	.439
WORK EXPERIENCE	.338	.349	.298
SERIOUS TRUANT	.175	.139	.311
OCCASIONAL TRUANT	.374	.377	.360
ILEA SCORE	20.22 (12.43)	21.90 (10.38)	13.85 (11.72)
HOME BACKGROUND			
DAD IN FULL-TIME JOB	.778	.823	.606
DAD IN PART-TIME JOB	.010	.008	.020
DAD UNEMPLOYED	.087	.062	.180
DAD SELF-EMPLOYED	.150	.164	.094
MUM IN NON-MANUAL JOB	.335	.366	..217
OWNER OCCUPIER	.624	.664	.473
LABOUR MARKET			
UNEMPLOYMENT RATE	10.58 (3.43)	10.38 (3.38)	11.35 (3.52)
LONDON	.090	.098	.061
SOUTH EAST	.195	.224	.084
NORTH AND MIDLANDS	.543	.507	.677
WALES	.047	.041	.071
EXPERIENCE 1984-86			
EMPLOYED IN SEPTEMBER 1984	.239	.275	.101
YTS	.472	.457	.530
FURTHER EDUCATION	.254	.265	.212

Table 4.2: Independent Univeriate Probit estimation of:
i) the probability that young people are in employment in the spring 1986;
ii) the probability that young people participated on YTS.
(t-ratios in brackets)

	ESTIMATES CORRECTED FOR HETROSCEDASTICITY				UNCORRECTED ESTIMATES			
	EMPLOYMENT		YTS		EMPLOYMENT		YTS	
INTERCEPT	1.54	(2.59)	.41	(3.05)	1.23	(2.41)	-.72	(-1.23)
INDIGENOUS CHARACTERISTICS								
DISABILITY	-.08	(-4.18)	-.20	(-1.11)	-.71	(-4.57)	-.26	(-1.41)
BLACK	-.25	(-1.34)	-.54	(-2.89)	-.20	(1.07)	-.44	(-2.11)
GIRL	-.39	(-3.31)	.11	(.97)	-.31	(-3.16)	.11	(.93)
SCHOOL EXPERIENCE								
PART-TIME JOB	.28	(3.54)	-		.25	(4.14)	-	
WORK EXPERIENCE	.07	(.99)	-		.08	(1.29)	-	
SERIOUS TRUANT	-.61	(-5.36)	-.24	(-3.03)	-.60	(-7.41)	-.22	(-2.77)
OCCASIONAL TRUANT	-.26	(-3.24)	-		-.22	(-3.23)	-	
Log(ILEA SCORE)	.21	(4.41)	.10	(2.64)	.22	(8.29)	.13	(4.61)
HOME BACKGROUND								
DAD IN FULL-TIME JOB	-		.33	(3.81)	-		.32	(1.89)
DAD IN PART-TIME JOB	-.45	(-1.51)	-		-.48	(-1.86)	-	
DAD UNEMPLOYED	-.39	(-3.55)	.20	(1.76)	-.41	(-4.40)	.24	(1.89)
DAD SELF-EMPLOYED	.21	(2.03)	-		.16	(1.79)	-	
MUM IN NON-MANUAL JOB	.18	(2.29)	-		.16	(2.38)	-	
OWNER OCCUPIER	.12	(1.74)	-		.03	(2.23)	-	
LABOUR MARKET								
Log(UNEMPLOYMENT RATE)	-.72	(-3.16)	.35	(1.35)	-.54	(-2.74)	.42	(1.60)
LONDON	.28	(1.93)	-		.28	(2.18)	-	
SOUTH EAST	.30	(2.18)	.18	(1.63)	.28	(.35)	.22	(2.00)
NORTH AND MIDLANDS	-		.24	(2.08)	-		.23	(2.06)
WALES	-		.40	(2.13)	-		.39	(2.12)
EXPERIENCE 1984-86								
EMPLOYED IN SEPTEMBER 1984	1.84	(3.77)	-3.12	(-2.99)	.81	(8.06)	-2.52	(-28.5)
YTS	.55	(4.33)	-		.27	(3.33)	-	
FURTHER EDUCATION	.48	(2.63)	-2.81	(-3.45)	.10	(1.05)	-2.15	(-28.2)
CORRECTION FOR HETEROSCEDASTICITY								
LOG(ILEA SCORE)	-.15	(-3.15)	-.93	(-2.47)	-		-	
EMPLOYED SEPTEMBER 1984	.83	(3.68)	.67	(1.72)	-		-	
YTS	.41	(3.65)	-		-		-	
FURTHER EDUCATION	.56	(3.50)	.88	(2.36)	-		-	
RESTRICTED LOG-LIKELIHOOD	-1460.0		-1974.5		-1460.0		-1974.5	
UNRESTRICTED LOG-LIKELIHOOD	-1178.4		-1077.3		-1195.7		-1095.8	
McFADDEN R-SQUARED	.19		.45		.18		.45	
LR TEST FOR HETROSCEDASTICITY	34.7	(4 d.f.)	37.0	(3 d.f.)	-		-	
LR TEST FOR MORE GENERAL HETEROSCEDASTICITY	10.7	(15 d.f.)	10.2	(10 d.f.)	-		-	
n	2855							

Note: The first test for heteroscedasticity compares the homoscedastic model with the heteroscedastic model reported in the table. The test for more general heteroscedasticity compares the latter model with a model including all the explanatory variables save the intercept in the heteroscedastic function. The degrees of freedom are given in brackets.

Table 4.3a: Effects of YTS participation and Early Employment Experience on the Probability of Finding Work for Different Ideal Types of Young Person with the Univariate Probit Model (t-ratios of effects in brackets).

	BASE	EFFECT OF YTS					EFFECT OF EARLY EMPLOYMENT	
		M&S	W&B (A)	W&B (B)	My Estimates			
ADVANTAGED								
HOMOSCEDASTISTIC MODEL	.92	.04	.06	.02	.03	(2.55)	.06	(3.61)
HETEROSCEDASTIC MODEL	.98	n.a.	n.a.	n.a.	.00	(.42)	.03	(1.29)
AVERAGE								
HOMOSCEDASTISTIC MODEL	.75	.11	.17	.05	.08	(3.05)	.18	(6.04)
HETEROSCEDASTIC MODEL	.77	n.a.	n.a.	n.a.	.09	(2.18)	.18	(3.41)
DISADVANTAGED								
HOMOSCEDASTISTIC MODEL	.07	.07	.15	.03	.04	(2.64)	.18	(4.19)
HETEROSCEDASTIC MODEL	.01	n.a.	n.a.	n.a.	.11	(2.73)	.49	(4.12)

Table 4.3b: Effects of Other Independent variables on the Probability of Finding Work for an "Average" Person.

	HOMOSCEDASTIC MODEL		HETEREOSCEDASTIC MODEL	
INDIGENOUS CHARACTERISTICS				
DISABILITY	-.27	(-4.27)	-.47	(-5.13)
BLACK	-.07	(1.02)	-.13	(-1.26)
GIRL	-.06	(-2.83)	-.12	(-2.96)
SCHOOL EXPERIENCE				
PART-TIME JOB	.07	(3.91)	.11	(3.45)
WORK EXPERIENCE	.03	(1.30)	.03	(1.01)
SERIOUS TRUANT	-.22	(7.03)	-.36	(-6.08)
OCCASIONAL TRUANT	-.07	(-3.17)	-.14	(-3.17)
HIGH ILEA SCORE (=32)	.03	(8.03)	.06	(6.30)
HOME BACKGROUND				
DAD IN PART-TIME JOB	-.17	(1.72)	-.25	(-1.39)
DAD UNEMPLOYED	-.15	(4.08)	-.22	(-3.69)
DAD SELF-EMPLOYED	.05	(1.85)	.09	(2.18)
MUM IN NON-MANUAL JOB	.05	(2.43)	.07	(2.41)
OWNER OCCUPIER	.04	(2.19)	.05	(1.72)
LABOUR MARKET				
LIVING IN WALES (UNEMPLOYMENT RATE = 16.4%)	-.08	(-2.77)	-.18	(-3.45)
EXPERIENCE 1984-86				
FURTHER EDUCATION	.03	(1.04)	.03	(.83)

Notes: 1) All "ideal types" are male. An **average** individual is defined as living in the south west (unemployment rate = 10.5%) and having achieved the mean ILEA score (20). An **advantaged** young person is defined as having a non-manual mother and a father in full-time employment, living in the south east (unemployment rate = 7.9%) and having achieved an ILEA score one standard deviation above the mean (32). A disadvantaged young person is defined as being disabled, a serious truant at school, having an unemployed father, living in Wales (unemployment rate = 16.4%) and with an ILEA score one standard deviation below the mean (8).

2) The results reported for the M&S and W&B models are recalculations employing their reported parameter estimates and using the same base probability as my estimates.

3) Calculation of t-ratios are based on the general formula for the asymptotic variance of a non-linear function. That is, the asymptotic variance of the effect under consideration denoted by E is given by:

$$\left(\frac{\partial E}{\partial \beta}\right)' Var(\beta) \left(\frac{\partial E}{\partial \beta}\right).$$

4) Figures reported in bold refer to the preferred heteroscedastic model.

5) The effect of being female includes the influence of the lower adult unemployment rate.

Table 4.4: Switching Bivariate Probit Estimation of the Joint Determination of Employment and YTS Participation (estimates corrected for heteroscedasticity).
(t-ratios in brackets)

	EMPLOYMENT YTS PARTICIPANTS		EMPLOYMENT NON YTS PARTICPANTS		YTS	
INTERCEPT	2.22	(3.76)	.79	(1.00)	-.65	(-1.18)
INDIGENOUS CHARACTERISTICS						
DISABILITY	-.60	(-2.94)	-.58	(-2.41)	-.18	(-1.09)
BLACK	-.14	(-.65)	.01	(.04)	-.46	(-2.94)
GIRL	-.34	(-2.97)	-.38	(-2.62)	.10	(1.00)
SCHOOL EXPERIENCE						
PART-TIME JOB	.16	(2.38)	.29	(2.89)	-	
WORK EXPERIENCE	-.00	(-.03)	.13	(1.41)	-	
SERIOUS TRUANT	-.37	(-3.74)	-.47	(-2.90)	-.21	(-2.94)
OCCASIONAL TRUANT	-.15	(-2.17)	-.26	(-2.43)	-	
Log(ILEA SCORE)	.09	(1.87)	.19	(4.10)	.07	(2.35)
HOME BACKGROUND						
DAD IN FULL-TIME JOB	-		-		.32	4.27)
DAD IN PART-TIME JOB	.01	(.03)	-.44	(-1.21)	-	
DAD UNEMPLOYED	-.26	(-2.71)	-.37	(-2.57)	.22	(2.07)
DAD SELF-EMPLOYED	.29	(2.68)	-.01	(.17)	-	
MUM IN NON-MANUAL JOB	.11	(1.42)	.17	(1.73)	-	
OWNER OCCUPIER	.06	(.95)	.10	(1.10)	-	
LABOUR MARKET						
Log(UNEMPLOYMENT RATE)	-.70	(-3.25)	-.70	(-2.40)	.34	(1.48)
LONDON	.13	(.82)	.32	(1.92)	-	
SOUTH EAST	.23	(1.61)	.24	(1.39)	.14	(1.46)
NORTH AND MIDLANDS	-		-		.20	(2.08)
WALES	-		-		.28	(1.88)
EXPERIENCE 1984-86						
EMPLOYED IN SEPTEMBER 1984	1.72	(2.94)	2.07	(6.29)	-2.76	(-6.26)
FURTHER EDUCATION	1.03	(2.81)	.99	(4.62)	-1.98	(-7.88)
CORRECTION FOR HETEROSCEDASTICITY						
LOG(ILEA SCORE)			-.12	(-4.03)		
EMPLOYED SEPTEMBER 1984			.61	(3.60)		
FURTHER EDUCATION			.47	(3.36)		
ρ			-.62	(-2.76)		
RESTRICTED LOG-LIKELIHOOD				-3429.4		
UNRESTRICTED LOG-LIKELIHOOD				-2247.6		
McFADDEN R-SQUARED				.35		
LR TEST FOR PARAMETER VARIATION				36.6	(18 d.f.)	
LR TEST FOR HETEROSCEDASTICITY				45.6	(3 d.f.)	
LM TEST FOR EQUAL VARIANCE				.5	(3 d.f.)	
LM TEST FOR MORE GENERAL HETEROSCEDASTICITY				24.5	(18 d.f.)	
n				2855		

Note: The test for parameter variation compares the bivariate probit with a YTS participation dummy with the switching bivariate probit presented here. The LR test for heteroscedasticity compares the homoscedastic model to the three term heteroscedastic form presented in the table. The LM test for equal variance tests for different values of the

heteroscedasticity parameters in the YTS and employment equations. The LM test for more general heteroscedasticity
[illegible] heteroscedasticity [illegible] term function.

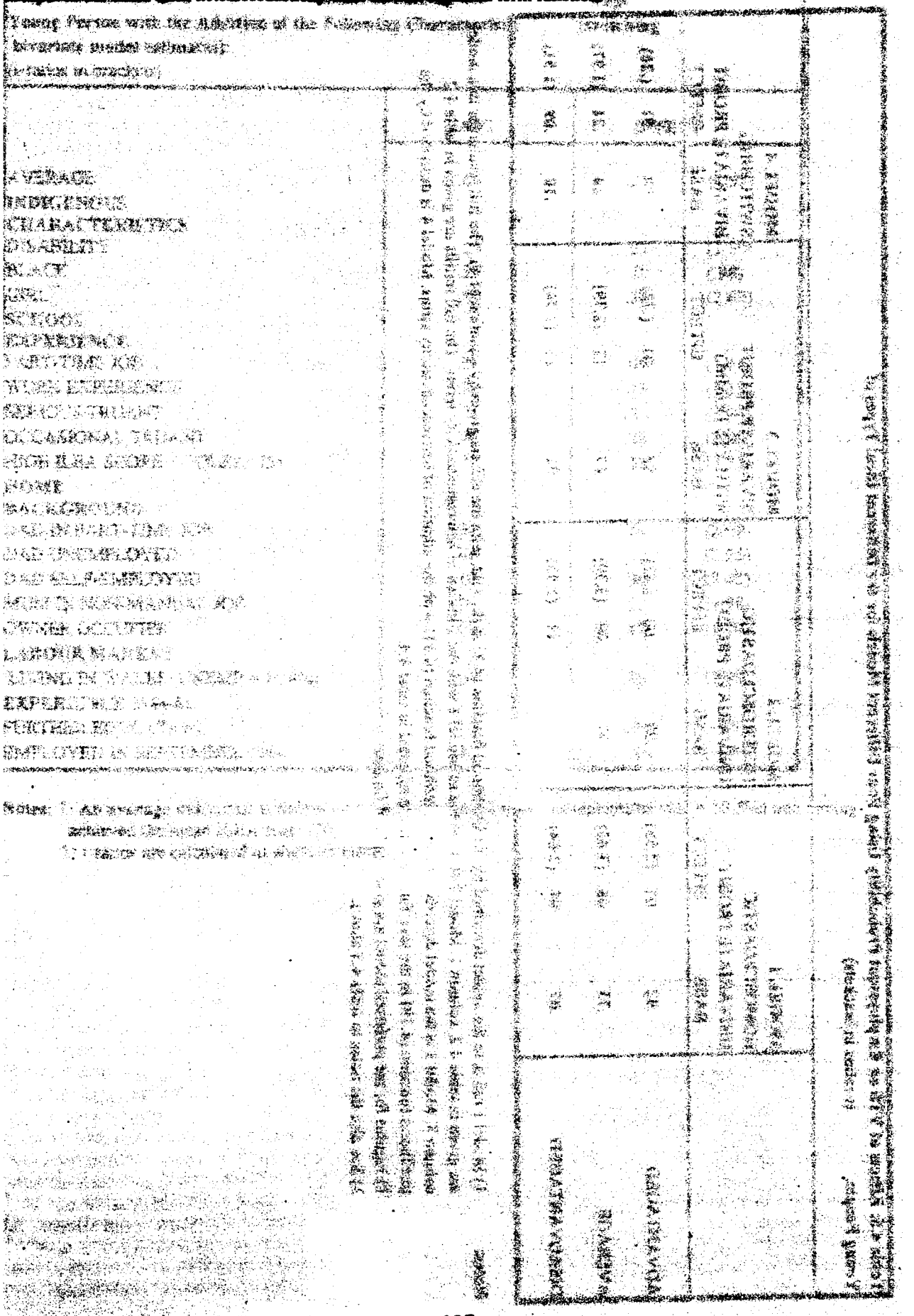

Table 4.5: Effects of YTS on Employment Probability Using Four Different Models for the Different Ideal Types of Young People. (t-ratios in brackets)

	MODEL 1 HOMOSCEDASTIC UNIVARIATE PROBIT		MODEL 2 HETEROSCEDASTIC UNIVARIATE PROBIT		MODEL 3 BIVARIATE PROBIT WITH YTS DUMMY		MODEL 4 SWITCHING BIVARIATE PROBIT	
	BASE	EFFECT	BASE	EFFECT	BASE	EFFECT	BASE	EFFECT
ADVANTAGED	.92	.03 (2.55)	.98	.00 (.42)	.98	.01 (.78)	**.98**	**.01 (.26)**
AVERAGE	.75	.08 (3.05)	.77	.09 (3.30)	.67	.17 (2.79)	**.64**	**.21 (1.97)**
DISADVANTAGED	.07	.04 (2.64)	.01	.11 (2.83)	.01	.12 (2.74)	**.10**	**.09 (1.51)**

Notes: 1) Model 1 refers to the model described by the likelihood function (4.3) in the text, with the effects given by equation (4.4). The full results for this model are given in table 4.2, column 1. Model 2 is the same as Model 1 with the addition of heteroscedasticity terms. The full results are given in table 4.2, column 3. Model 3 is the model described by the likelihood function (4.11) with the addition of heteroscedasticity terms. Model 4 is described by the likelihood function (4.19) in the text. Full results are reported in table 4.4.

2) Figures for the preferred model are given in bold figures.

3) See also the notes to table 4.3 above.

Table 4.6: Effects of YTS on the Probability of Finding Work for an Average Young Person with the Addition of the Following Characteristic (switching bivariate model estimates):
(t-ratios in brackets)

	BASE	EFFECT	
AVERAGE	.64	.21	(1.97)
INDIGENOUS CHARACTERISTICS			
DISABILITY	.23	.27	(1.50)
BLACK	.51	.19	(.98)
GIRL	.50	.28	(2.67)
SCHOOL EXPERIENCE			
PART-TIME JOB	.80	.09	(1.14)
WORK EXPERIENCE	.72	.13	(1.13)
SERIOUS TRUANT	.28	.36	(3.10)
OCCASIONAL TRUANT	.46	.33	(2.80)
HIGH ILEA SCORE (ILEA=32)	.70	.18	(1.72)
HOME BACKGROUND			
DAD IN PART-TIME JOB	.35	.51	(2.09)
DAD UNEMPLOYED	.46	.31	(2.25)
DAD SELF-EMPLOYED	.63	.30	(2.43)
MUM IN NON-MANUAL JOB	.74	.15	(1.38)
OWNER OCCUPIER	.69	.17	(1.70)
LABOUR MARKET			
LIVING IN WALES (UNEMP = 16.4%)	.56	.19	(1.99)
EXPERIENCE 1984-86			
FURTHER EDUCATION	.77	-.04	(-.45)
EMPLOYED IN SEPTEMBER 1984	.93	-.16	(-1.80)

Notes: 1) An average individual is defined as living in the south west (unemployment rate = 10.5%) and having achieved the mean ILEA score (20).
2) t-ratios are calculated as above in table 4.3.

CHAPTER FIVE: YTS AND WAGES

The discussions of YTS in chapter two and in the first section of chapter four suggest that wages might be a second suitable indicator of the effectiveness of YTS. The expected influence of YTS on wages, however, is not as clear cut as it was in the case of employment. From the point of view of the scheme's proponents, two distinct and opposing "desired" effects may be identified. Firstly, YTS was intended to raise the levels of participants' human capital. Thus, one would expect a positive "human capital effect" on wages arising through the greater post-programme productivity of participants. Secondly, YTS was also to make young people's wage expectations "more realistic" (i.e. lower). Thus, there should be a second negative effect arising from the lower "expected"[1], and/or reservation wages of participants. In addition, in what follows a third effect due to the increased chances of receiving a job offer arising out of YTS participation is also identified.

The purpose of this chapter is to examine these issues. Estimates are produced of the influence that YTS participation had on the realised earnings of young people in employment in the Spring 1986[2], and on the "expected" and reservation wages of young people who were unemployed at that time. The analysis distinguishes between the positive "human capital effect" and the negative "reservation wage" and "job offer" effects. In this regard, the identification of sample selection bias due to non-random employment determination is of fundamental importance. The identification of this source of bias allows the distinction to be made between direct "human capital" effects of YTS on the productivity and, therefore, the earnings potential of young people and the indirect "reservation wage" and job offer effects which, by increasing the probability of observing the individual in employment, reduce the expected value of observed earnings.

This chapter makes a contribution in offering a coherent interpretation of a curious empirical finding present in this and all other studies considering the issue[3]. That is, it has been consistently found that YTS had a negative and statistically significant effect on the observed earnings of

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[1] I employ the inverted commas in an attempt to avoid confusion between mathematical expectation and the beliefs of individuals. The inverted comma's are used to indicate the beliefs of individuals. The importance of the distinction between these two types of expectation will, I hope, become apparent in the discussion of the formation of wage "expectations" by the unemployed in section 5.1.4.

[2] It will be recalled that 97.7% of the replies were received by the SCPR between March and April 1986.

[3] In the addition to the results presented below, see also Main & Shelley (1990), Whitfield & Bourlakis (1991), and Dolton et al. (1994a, 1994c). All of these studies are considered in section 5.3 below.

employed young people. A second related finding is that this negative earnings effect tends to disappear[4] when controls for sample selection bias are introduced. The underlying theoretical model presented here allows an interpretation of these two phenomena so far lacking in the literature. The analysis is further supported by consideration of the determination of the "expected" and reservation wages of the unemployed not considered by previous studies of YTS[5]. It is found that YTS had a negative influence on the realised, "expected" and reservation wages of young people. When sample selection is taken into account, however, the effect on realised wages disappears. In the context of the simple job search model proposed here, such findings are in line with the proposition that YTS enhanced employment prospects through a reduction in the reservation wages and an increase in the probability of receiving a job offer of participants, whilst having a negligible effect on individuals' human capital stock.

In the first section, the underlying issues are treated. Two potential sources of sample selection bias are identified arising from non-random YTS participation and the truncation of the earnings distribution. Section 5.1.1 outlines the problem of sample selection in the context of non-random YTS participation. Section 5.1.2 goes on to treat the problem of sample selection bias[6] due to the truncation of the earnings distribution in the context of a static model of labour supply. This is followed, in section 5.1.3, by an analogous treatment of the problem of sample selection bias as it affects the reservation and "expected" wages of the unemployed. Section 5.1.4 proposes three modifications to the static labour supply model. Firstly, the analysis is framed in terms of a simple job search model, allowing the introduction of rudimentary dynamic considerations. Secondly, the possibility of systematic mistakes by the unemployed in formulating "expectations" regarding the distribution of wages is allowed. Finally, the assumption that all young people receive a job offer is relaxed. All three of these modifications have substantive implications for the interpretation of the "reservation wage" effect. Specifically, the "reservation wage" effect may more properly be seen as the combination of at least two negative and two positive effects: the direct "reservation" wage effect

[4] As will be seen below, the studies considering this issue are not unanimous, however, it is argued that results diverging from those presented here may be explained by the misspecification of the models considered by previous authors.

[5] An exception to this is the paper by Main (1987a) which earnings in employment with the wage "expectations" of the unemployed. The paper is discussed in section 5.3.

[6] This problem is more usually referred to as truncation bias. The structure of the problem is analogous to that of sample selection bias. Since, in both cases, the problem is one of the non-random selection of observations from the sample, I prefer to use the unified term for both sources of bias.

(negative); the "erroneous expectations" effect (negative); the "job offer" effect (positive); and the indirect "earnings potential" effect (positive). In addition, it is shown that the probability of receiving a job offer also exerts a direct negative influence on the observed wages of employed participants. Section 5.1.5 brings together the strands of the discussion thus far and proposes the econometric model to be employed in the empirical analysis.

Section 5.2 provides an overview of previous studies of the impact of YTS on wages. The principle argument here is that previous studies are misspecified in that they fail to take account of the two sources of sample selection bias identified in section 5.1. Section 5.3 outlines the empirical specification whilst section 5.4 presents and discusses the results. Section 5.5 offers some concluding comments.

5.1: Modelling YTS and Wages

5.1.1) Sample Selection: YTS.

The estimation of the effect of training programmes on wages has a rather longer history than the effect of such programmes on employment prospects. The basic framework involves a model of the form:

$$w_i = X_i\beta + \gamma y_i + u_i \qquad (5.1)$$

w_i represents the (natural logarithm) of individual i's wages[7], X_i is a vector of individual characteristics influencing wages, y_i is a dummy variable taking the value of one if the individual participates on the programme under consideration and u_i is a stochastic error term. More generally, the effect of YTS may be allowed to vary across different types of individual[8]. This implies the more flexible form:

[7] Throughout the chapter, all the realised, reservation and expected wage terms should be understood as being expressed in natural logarithms.
[8] Hereafter, I drop the use of individual subscripts.

$$\left.\begin{aligned} w_1 &= X\beta_1 + u_1 \quad iff \quad y = 1 \\ w_2 &= X\beta_2 + u_2 \quad iff \quad y = 0 \end{aligned}\right\} \tag{5.2}$$

The principal problem with the estimation of models such as (5.1) or (5.2) identified in the predominantly American literature on the subject arises from the non-random nature of programme participation. That is to say, sample selection bias. Three basic approaches have been suggested to deal with this type of problem. The first exploits longitudinal earnings data to estimate the effect of programme participation in terms of differences between pre- and post-programme earnings. Using this approach, therefore, both observed and unobserved individual characteristics which remain constant over time are excluded. Studies of this kind have been undertaken by, for example, Aschenfelter (1978) and Bassi (1983, 1984). Barnow (1987) provides a review of a number of such studies and Aschenfelter & Card (1985) note the extreme variability in the results produced by these analyses according to the assumptions employed to derive an estimable model. These authors argue the merits of a second methodology, namely the use of experimental data. That is, the random assignment of eligible young people to participant and control groups. The third approach, and that used here, employs purely cross-section data and introduces terms to correct for sample selection bias in the estimates.

The adoption of the third methodology here is determined by the nature of the problem under consideration and the available data. The first approach is not appropriate in as much as most YTS participants had no pre-programme employment and therefore no pre-programme earnings. The second approach is not possible since experimental data is not available. It might also be recalled that there are ethical as well as political problems associated with the random assignment of young people to YTS[9]. Lalonde (1986) explicitly compares experimental and non-experimental estimates of the impact of training programmes, finding the former to be, in general, superior although the results produced using correction terms for sample selection bias are very close to the estimates produced using an experimental design[10].

9 See note 17 in chapter four.
10 Manski & Garfinkel (1992) contains a number of papers espousing the relative advantages of experimental and non-experimental approaches.

It was noted above, in chapter four, that YTS participants were anything but a random sub-sample of the sixteen year old population. Similar problems to those identified above arise if such differences are not observed, and therefore controlled for, in the wage equation(s). One obvious source of this unobserved non-randomness considered above regards the motivation of YTS participants. In the context of wages, it may be the case that YTS participants were more motivated in their search for employment. Thus, they might look harder and therefore find better paying jobs. Alternatively, YTS participation might indicate a predisposition or relative preference for work as opposed to "leisure". In such circumstances, one would expect the reservation wages of participants to be lower, as would the observed wages of participants in employment.

The problem may be expressed more formally. Taking the expectations of (5.1)[11] one obtains:

$$E(w|y=1) = X\beta + \gamma + E(u|y=1) \tag{5.3}$$

for programme participants and:

$$E(w|y=0) = X\beta + E(u|y=0) \tag{5.3'}$$

for non-participants. The estimates of the YTS effect will be biased if $E(u|y) \neq 0$. Now, recalling from chapter four that the YTS participation decision may be expressed in terms of an underlying latent variable y^* such that:

$$y^* = Z\alpha + \upsilon \qquad \upsilon \sim N(0,1) \tag{5.4}$$

The individual participates on YTS if and only if $y^* > 0$, so that the probability of participation can be expressed in terms of the probit model:

$$p(y=1) = \Phi(Z\alpha) \tag{5.5}$$

[11] Model (5.1) is used here for expository simplicity. The treatment of the problem is the same in the context of a model of the form of (5.2).

now, the conditional expectation of the error term can be expressed as:

$$E(u|y=1) = \sigma_{uv}\frac{\phi(Z\alpha)}{\Phi(Z\alpha)} \tag{5.6}$$

for YTS participants and:

$$E(u|y=0) = -\sigma_{uv}\frac{\phi(Z\alpha)}{\Phi(-Z\alpha)} \tag{5.6'}$$

for non-participants. The well-known procedure suggested by Heckman (1979) consists in the two-stage estimation of the model, constructing estimates of $\frac{\phi(Z\alpha)}{\Phi(Z\alpha)}$ and $-\frac{\phi(Z\alpha)}{\Phi(-Z\alpha)}$ from a probit model of YTS participation and subsequently including these as an additional term in the wage equation to produce an estimate of σ_{uv} as well as controlling for sample selection bias.

5.1.2) Sample Selection: Human Capital and Reservation Wage Effects

The type of correction procedure outlined above implicitly assumes that there is no post-programme unemployment. Such an assumption is obviously untenable in the present context. Unemployment implies the presence of a second source of sample selection bias associated with the truncation of the earnings distribution. All individuals may be thought of as being able to command a specific wage or range of wages depending on their potential productivity. Potential productivity is, in turn, determined by individual characteristics. This potential is only observed, however, if the individual is in employment. Controlling for this potential source of bias allows a distinction to be made between potential and realised earnings which, consequently, permits the separate identification of the "human capital" and "reservation wage" effects of YTS.

In the discussion of YTS on employment prospects in chapter four, two principal mechanisms through which YTS might operate were identified. Firstly, YTS was to provide general training and therefore raise the level of participants' human capital. Secondly, YTS was to lower reservation wages. Whilst both of these mechanisms would tend to raise the probability of finding employment,

their effect on the wages of participants would work in opposite directions. The "human capital" effect implies an increase in productivity and, consequently, an increase in the wage that participants would be able to command. The "reservation wage" effect implies a reduction of the observed wage of participants. The basic idea underlying the "reservation wage" effect is that YTS influenced the preference formation of participants in as much as YTS had a negative influence on the wages that young people would find acceptable. It will be recalled that the YTS allowance in 1985 was £26.25 per week. Employers were free to supplement the allowance provided by the government. In the YCS sample, 8% of those on YTS in the Summer 1985 received more than the minimum. The mean pay of those receiving a supplement was £34.46 so that, overall, the average take-home pay of YTS participants in the sample was £26.94. According to the New Earnings Survey (NES), the average gross weekly pay of sixteen and seventeen year old males was £69.50 and for females the corresponding figure was £64.70. Even taking into account the fact that the YCS figure refers to net pay whilst the NES provides information on gross pay, there is still a substantial difference between the YTS allowance and the average pay of the age-group[12]. The idea is that YTS participants became "used" to undertaking a full-time occupation for a relatively low wage and were therefore prepared to accept lower rates of pay. In other words, YTS lowered the reservation wage of participants[13].

These arguments may be clarified by putting them in more formal terms. The basic ideas may be illustrated by a simple static labour supply model[14]. Each young person receives a wage offer which is a random drawing from a lognormal distribution whose mean is determined by the individual's observed characteristics through their influence on his or her potential productivity. The individual either accepts or rejects the wage offer according to whether it is greater or less than his or her reservation wage. The reservation wage is determined by the individual's preferences across the work-leisure choice. Specifically, the reservation wage is the value of the wage-rate for which one of the individual's indifference curves is tangential to the budget constraint at zero hours. Given the presence of unobserved individual characteristics affecting preferences, the reservation wage is

[12] A part of this difference would also be accounted for by the training component of YTS. In the estimation of wages below, however, this is controlled for.

[13] As will become clear in section 5.1.4, this is by no means the only possible interpretation of the "reservation wage" effect. Further discussion of this issue is deferred until then.

[14] It will be observed that the model, as outlined in this sub-section, is similar in structure to the one used by Lee (1983) in his analysis of union wage effects.

assumed to be randomly (and lognormally) distributed around its mean which is determined by observed individual characteristics. One may express the preceding considerations in terms of the following simple formal model:

$$w_p = X_w\beta_w + \gamma_w y \tag{5.7}$$

$$w^* = w_p + u \qquad u \sim N(0, \sigma_u^2) \tag{5.8}$$

$$r^* = X_r\beta_r + \gamma_r y + v \qquad v \sim N(0, \sigma_v^2) \tag{5.9}$$

with, for simplicity of exposition:

$$E(r^*) = X_r\beta_r + \gamma_r y = \bar{r} \tag{5.10}$$

The condition for observing wages is given by:

$$\left.\begin{array}{l} w = w^* \quad iff \quad w^* > r^* \\ w = 0 \quad otherwise \end{array}\right\} \tag{5.11}$$

introducing the criterion function:

$$I^* = w^* - r^* \quad = X_w\beta_w - X_r\beta_r + (\gamma_w - \gamma_r)y + (u - v) \tag{5.12}$$

(5.11) may be rewritten as:

$$\left.\begin{array}{l} w = w^* \quad iff \quad I^* > 0 \\ w = 0 \quad otherwise \end{array}\right\} \tag{5.13}$$

w_p denotes the earnings potential of young people which is a function of individual characteristics, X_w, and of YTS participation, y. The increase in human capital arising out of the scheme implies that $\gamma_w = \frac{\partial w_p}{\partial y} > 0$. Each young person receives a wage offer, w^*, which deviates randomly from earnings potential, whilst his or her realised earnings, w, are equal to the wage offer, if that offer is accepted.

This occurs if and only if the offer is greater than the individual's reservation wage, r^*, which, in turn, depends on individual characteristics and whether or not the young person participated on YTS. In this case, $\gamma_r = \frac{\partial r^*}{\partial y} < 0$, that is, through its influence on preference formation, YTS participation is expected to have a negative effect on reservation wages.

The expected value of an individual's observed wage is thus:

$$\begin{aligned} E(w) &= E(w^* | w^* > r^*) \\ &= E(w^* | (u-v) > -(w_p - \bar{r})) \\ &= w_p + E(u | (u-v) > -(w_p - \bar{r})) \\ &= w_p + \frac{\sigma_{u,(u-v)}}{\sigma_{(u-v)}} E((u-v) | (u-v) > -(w_p - \bar{r})) \end{aligned}$$

Normalising the variance of the criterion function, $\sigma^2_{(u-v)}$, to unity one obtains:

$$E(w) = w_p + (\sigma_u^2 - \sigma_{uv}) E((u-v) | (u-v) > -(w_p - \bar{r}))$$

$$= w_p + (\sigma_u^2 - \sigma_{uv}) \frac{\phi(w_p - \bar{r})}{\Phi(w_p - \bar{r})}$$

$$E(w) = w_p + (\sigma_u^2 - \sigma_{uv}) \lambda_1 \qquad \text{with } \lambda_1 = \frac{\phi(w_p - \bar{r})}{\Phi(w_p - \bar{r})} \qquad (5.14)$$

The effect of YTS on the observed wage is consequently given by:

$$\begin{aligned} \frac{\partial E(w)}{\partial y} &= \frac{\partial w_p}{\partial y} + (\sigma_u^2 - \sigma_{uv}) \frac{\partial \lambda_1}{\partial y} \\ &= \gamma_w + (\gamma_r - \gamma_w)(\sigma_u^2 - \sigma_{uv}) \lambda_1 (\lambda_1 + (w_p - \bar{r})) \\ &= (1 - A_w) \gamma_w + \gamma_r A_w \qquad \text{with } A_w = (\sigma_u^2 - \sigma_{uv}) \lambda_1 (\lambda_1 + (w_p - \bar{r})) \end{aligned} \qquad (5.15)$$

Given the normalisation, $\sigma^2_{(u-v)} = 1$, as long as $\sigma^2_u > \sigma_{uv}$ and $\sigma^2_v > \sigma_{uv}$, A_W will lie in the range (0,1)[15]. The estimated effect of YTS on observed wages will comprise a reduced measure of the "human capital" effect in addition to a part of the "reservation wage" effect. It might also be observed that the size of the bias, ceteris paribus, will vary positively with the expected value of the reservation wage and negatively with earnings potential. The model provides a simple intuitive interpretation of the effect of YTS on wages in the presence of non-random employment determination. The observed wage is a random drawing from a distribution that is truncated from below. The expected value of this truncated distribution (the expected value of the observed wage) will obviously be positively related to the point of truncation (the reservation wage). YTS participation, in as much as it reduces reservation wages, lowers the point of truncation, and consequently, the expected value of the observed wage.

The implications for the analysis below are that if one estimates a wage equation of the form of (5.1) above without taking into account sample selection due to the truncation in observed wages the coefficient on YTS participation, γ_w, will actually be an estimate of the weighted average of the "human capital" and the "reservation wage" effects. Since the "reservation wage" effect of YTS is expected to be negative, the estimate of the "human capital" effect will be biased downwards. If, on the other hand one estimates the effect of YTS, introducing a term to represent λ_1 in order to explicitly take into account truncation then one purges the equation of the negative influence of YTS on reservation wages and one is left with the positive effect of YTS due to human capital accumulation.

5.1.3) Sample Selection: Reservation and Expected Wages

Further light may be thrown on the issues raised in section 5.1.2 by considering reservation and "expected" wages directly. In terms of the model considered above, the effect of sample selection bias on reservation and "expected" wages may be considered in an analogous way to the treatment of the problem in the context of realised wages. The observed distributions of both the reservation wages and the wage "expectations" of young people are truncated in that they are only

[15] One knows that the term, $\lambda_1\left(\lambda_1 + \left(w_p - \bar{r}\right)\right)$ lies in the range (0,1) (Greene, 1993). The condition given in the text implies that $\left(\sigma^2_u - \sigma_{uv}\right)$ also does. Another way of putting this condition is that u must be positively, and v negatively, correlated with (u-v).

observed if the person is unemployed. Thus, the expected value of the reservation wage, given that it is observed ($I^*<0$) may be expressed as[16]:

$$\begin{aligned} E(r) &= E(r^* | w^* < r^*) \\ &= \bar{r} - (\sigma_{wv} - \sigma_v^2) \frac{\phi(w_p - \bar{r})}{1 - \Phi(w_p - \bar{r})} \\ &= \bar{r} - (\sigma_{wv} - \sigma_v^2)\lambda_2 \qquad \lambda_2 = \frac{\phi(w_p - \bar{r})}{1 - \Phi(w_p - \bar{r})} \end{aligned} \tag{5.16}$$

The effect of YTS participation in this context is given by:

$$\begin{aligned} \frac{\partial E(r)}{\partial y} &= \gamma_r - (\gamma_w - \gamma_r)(\sigma_{wv} - \sigma_v^2)\lambda_2(\lambda_2 - (w_p - \bar{r})) \\ &= (1 - A_r)\gamma_r + \gamma_w A_r \qquad \text{with } A_r = -(\sigma_{wv} - \sigma_v^2)\lambda_2(\lambda_2 - (w_p - \bar{r})) \end{aligned} \tag{5.17}$$

it might be observed that given the conditions outlined in note 15 above, the covariance term, $(\sigma_{wv} - \sigma_v^2)$, is negative so that A_r once again lies in the range (0,1). As before, the size of A_r will vary, ceteris paribus, negatively with earnings potential and positively with the expected value of the reservation wage. The implication is that not taking into account sample selection bias, one underestimates, in absolute terms, the size of the negative effect of YTS participation on the reservation wage.

One may also consider the wage "expectations" of young people, denoted by w_e^*. In the presence of full information concerning the distribution of wage offers, wage "expectations" would be identically equal to the expected value of the wage offer distribution (w_p). There are two principal reasons for which the mean of observed "expected" wages might differ from earnings potential. Firstly, young people may have incomplete information on their earnings potential. Initially I assume

[16] In common with the convention adopted for wages, terms with an asterisk should be understood as referring to values defined over the whole sample, whereas terms without the asterisk represent observed values.

that errors in beliefs are randomly (and lognormally) distributed with unit mean[17]. Secondly, "expected" wages are only observed for the unemployed. That is, the observed "expected" wage is the wage that young *unemployed* people said they expected to earn in their next job. Thus, one needs to take account of the effect of non-random employment determination. As in the case of observed wages, the existence of sample selection bias implies that the mean of the error term in the "expected" wage equation, *given that the "expected" wage is observed*, is not equal to zero. Putting these arguments more formally, assume that the "expected" wage, defined over all young people in the labour market, is given by:

$$\begin{aligned} w_e^* &= w_p + u' \\ &= X_w\beta_w + \gamma_w y + u' \end{aligned} \qquad u' \sim N(0, \sigma_{u'}^2) \qquad (5.18)$$

wage "expectations" are equal to the earnings potential of young people give or take random mistakes arising from incomplete information. If the expected wage were observed for all young people, the error term would have zero mean. However, since an individual's "expected" wage is only observed if that person is unemployed, the mean of the error term, given that the "expected" wage is observed, will pick up non-randomness in the determination of employment. As before, The expected value of the "expected" wage must be adapted to take this into consideration. Thus, the mathematical expectation of the observed "expected" wage is given by:

$$\begin{aligned} E(w_e) &= E(w_e^* | w^* < r^*) \\ &= w_p + E(u' | w^* < r^*) \\ &= w_p - (\sigma_{u'}^2 - \sigma_{u'v}) \frac{\phi(w_p - \bar{r})}{1 - \Phi(w_p - \bar{r})} \\ &= w_p - (\sigma_{u'}^2 - \sigma_{u'v})\lambda_2 \end{aligned} \qquad (5.19)$$

and the consequent effect of YTS on the observed "expected" wage is as follows:

$$\frac{\partial E(w_e)}{\partial y} = \gamma_w - (\gamma_w - \gamma_r)(\sigma_{u'}^2 - \sigma_{u'v})\lambda_2(\lambda_2 - (w_p - \bar{r}))$$

[17] I am referring here to the underlying multiplicative form of the model, the assumption on the errors obviously implies that when one expresses the equation in logarithmic form the errors are normally distributed with zero mean.

$$= (1 - A_e)\gamma_w + \gamma_r A_e \qquad \text{with } A_e = (\sigma^2_{w'} - \sigma_{w'v})\lambda_2(\lambda_2 - (w_p - \bar{r})) \qquad (5.20)$$

One immediately notes the similarity to equation (5.15) above. The effect of YTS on the observed "expected" wage comprises a reduced human capital term as well as part of the negative reservation wage effect. The principal difference between this and the wage equation being that the size of A_e varies positively with earnings potential and negatively with the expected value of the reservation wage.

5.1.4) Job Search, Job Offers, and Systematic Errors in "Expectations"

The static model of labour supply outlined above provides a simple intuitive interpretation of sample selection bias in the context of the truncated potential earnings distribution, however, it ignores at least three important issues which need to be considered in order to introduce a modicum of realism into the empirical model.

Firstly, if one moves from the static model to even the simplest dynamic job search model[18] the determination of the optimal reservation wage is modified substantively. Suppose each young person receives one wage offer after leaving school and before the point in time at which they are observed (Spring 1986). As before, they will accept or reject wage offers according to whether or not they are greater than their reservation wage. The difference arises in that the optimal reservation wage will depend on the distribution of wage offers. The choice is no longer between accepting an offer and rejecting it to remain unemployed. Rather the choice is now between accepting an offer and therefore stopping searching, or rejecting it in order to continue searching for a better one. Thus, the reservation wage will depend on, in addition to individual preferences and the level of unemployment income[19], the costs of search, and the expected value of the wage offer distribution. Even if one assumes that search costs and unemployment income are constant across individuals, it needs to be recognised that the reservation wage will be positively related to the mean of the wage offer

[18] See, for example, Kiefer & Neumann (1979).

[19] Obviously, the level of the optimal reservation wage will also depend on unemployment income (and above-all unemployment benefits which are lost if the person accepts employment) even in the static model.

distribution[20]. Thus, all variables influencing earnings potential will also influence the reservation wage.

Secondly, it was assumed that all young people received an offer of employment. This is blatantly unrealistic. The introduction of the probability of receiving a wage offer[21] (not necessarily equal to one) into the framework has non-trivial implications. The probability of being observed in employment will depend not just on the difference between earnings potential and the reservation wage, but also on factors influencing the likelihood of receiving an offer. The estimation of reservation wages also needs to take account of this. The level of the optimal reservation wage will be positively related to the probability of receiving an offer (e.g. Wolpin, 1987). In the presence of the accumulation of both general and firm-specific human capital, participation on YTS is likely to raise the probability of receiving a job offer, primarily with the sponsor of the scheme.

Thirdly, it was assumed that young people knew (give or take a random error) what their true earnings potential was. It is plausible to suggest that young unemployed people had only a rather vague notion of what pay they could realistically expect to command in the labour market given their qualifications and other personal characteristics. The introduction of the possibility of systematically erroneous expectations drives a wedge between the earnings potential of those in employment and the wage "expectations" of the unemployed. Once again, also the estimation of reservation wages needs to take this into account. Since the reservation wage depends on an individual's beliefs about his or her earnings potential, systematic errors in the formation of these beliefs will influence the formation of the reservation wage. Thus, for example, if young unemployed people systematically overestimated the mean of the wage offer distribution, their reservation wages would also be raised above the optimal level. It may be that, through contact with the labour market, YTS participation provided more information on the true wage offer distribution, thereby reducing "expected", and consequently, reservation wages. The reduction of reservation wages due to YTS participation may thus be given a less pejorative interpretation[22]. That is, high reservation wages might also be the

[20] It might also be observed that, even with risk neutrality, the optimal reservation wage is an increasing function of the variance of the wage offer distribution (Devine & Kiefer, 1991). In what follows, the assumption of homoscedasticity of the error term in the wage equation implies that the variance of the wage offer distribution is constant across individuals.

[21] In what follows, I use the terms wage offer and job offer interchangeably.

[22] In an interesting and, to my mind, much neglected paper, Gintis (1974) demonstrates that once one introduces endogenous preference formation into a neo-classical general equilibrium model, the desirable welfare properties of the model are lost.

result of a lack of information leading to suboptimal choices. YTS participation, through its effect on "expected" wages, might bring reservation wages closer to their optimal value.

Before laying out the modified formal model, it is useful to verbally summarise the implications of these considerations for the empirical analysis. Firstly, the "expected" wage equation needs to be adapted to take account of systematic errors in the formation of expectations. If, YTS had a role to play in reducing the size of any systematic overestimation of individuals' earnings potential one would expect the value of the coefficient on YTS participation to be lower in the "expected" wage equation than in the realised wage equation. More generally, one might expect differences in the entire coefficient vector produced in the estimation of the two equations. If, on the other hand, there are no systematic mistakes in the formation of "expectations", one would expect the two parameter vectors to be identical. This suggests an obvious test for the existence of systematic errors obtained by testing parameter variation across the two equations.

Secondly, the reservation wage will depend on individual preferences, the expected value of the wage offer distribution, any errors in the formation of expectations and the probability of receiving a job offer. Therefore, all factors which influence "expected" earnings and/or the job offer probability must also be included in the reservation wage equation.

Finally, the criterion function determining whether or not an individual is observed as being in employment needs to be adapted to take account of the offer probability in addition to the acceptance probability. The introduction of uncertainty regarding the receipt of offers implies that the probability of being in employment is the product of two probabilities. The probability of receiving a job offer and the probability of accepting an offer given that it is received. In what follows, I adopt a significant simplification in this regard. Rather than attempt to separately identify factors influencing the two probabilities, and therefore estimate two separate "criterion" functions determining the receipt and acceptance of job offers respectively, I continue to employ a single criterion function whilst, however, recognising that the probability of being observed in employment will depend on factors influencing the receipt as well as the acceptance of wage offers. It was noted in chapter four that it is possible to estimate a bivariate model without separate observations on offers and acceptances (Poirier, 1980, Abowd & Farber, 1982), however, in order to estimate such a model, one needs to introduce identifying restrictions on the variables determining job offers and

acceptances (at least one variable in the job offer equation does not enter the acceptance equation or vice versa[23]). Since the job offer probability also influences the reservation wage, all variables entering the job offer equation must also enter the job acceptance equation. On the other hand, it is likely that the same factors which influence earnings potential (and therefore the acceptance probability) will also affect the likelihood of receiving a job offer. Identifying restrictions in this context would be, at best, arbitrary. Thus, I prefer to proceed on the basis of an additive rather than multiplicative form. Since, as long as unobserved characteristics determining the probability of receiving an offer are positively correlated with those influencing the acceptance probability, the additive form of the probability will be highly correlated with the more correct multiplicative form, the simplified formulation of the criterion function will control for sample selection. On the other hand, the parameter estimates produced for the function will obviously be biased unless either the offer or acceptance probability does not vary over individuals. In this case, the criterion function represents the acceptance probability (if the offer probability is constant) or the offer probability (if the acceptance probability is constant). Since the parameters of the acceptance probability are also separately estimated, one also has a means of checking the hypothesis that the offer probability plays no role in determining employment. Should this be true, the parameter estimates from the criterion function should be equal to the difference between the parameter estimates from the wage and reservation wage equations (with controls for sample selectivity).

In terms of the effect of YTS on the observed wage, these considerations complicate the interpretation of sample selection. The criterion function will now contain factors directly influencing earnings potential, the reservation wage and the probability of receiving a job offer. The reservation wage itself will be influenced positively by earnings potential, errors in "expectations" and the job offer probability.

Introduction of these considerations into the simple formal framework adopted above, allows some further insights into the mechanisms through which YTS was operating. As regards wages in employment, earnings potential remains unaltered. Thus, as before:

$$w_p = X_w\beta_w + \gamma_w y \qquad (5.21)$$

[23] Maddala (1983, p. 280).

$$w^* = w_p + u \qquad u \sim N(0, \sigma^2_{u_1}) \qquad (5.22)$$

The expected value of the observed wage needs only minor modification becoming:

$$E(w) = E(w^* | I'^* > 0) = w_p + \sigma_{u\varepsilon}\lambda'_1 \qquad \text{with } \lambda'_1 = \frac{\phi(\bar{I}')}{\Phi(\bar{I}')} \qquad (5.23)$$

where $\bar{I}'$ is the systematic component and ε is the error term of the modified criterion function I*'[24].

The introduction of the possibility of the erroneous formation of expectations modifies the "expected" wage equation which becomes:

$$\begin{aligned} w_e^* &= w_p + M + u'' \\ &= X_w\beta_w + X_M\beta_M + (\gamma_w + \gamma_M)y + u'' \end{aligned} \qquad (5.24)$$

where M indicates erroneous expectations (or mistakes), and, used as a subscript, variables and their parameters influencing this error in expectations. In this context, the effect of YTS on "expected" wages is twofold. On the one hand, there is the positive "human capital" effect, γ_w. On the other, it is plausible that, through contact with the labour market, participation on YTS provided young people with a clearer picture of the wage offer distribution, or, as Mr. Nigel Lawson would have it, made young people's wage expectations "more realistic". Thus, one would expect γ_M to be negative. The mathematical expectation of the observed "expected" wage is:

$$E(w_e) = X_w\beta_w + X_M\beta_M + (\gamma_w + \gamma_M)y - \sigma_{u''\varepsilon}\lambda'_2 \qquad \lambda'_2 = \frac{\phi(\bar{I}')}{\Phi(-\bar{I}')} \qquad (5.25)$$

The effect of YTS on the "expected" wage contains two components: a positive effect due to the increase in earnings potential (γ_W) and a negative component (γ_M) arising if YTS played a role in reducing errors in wage "expectations". In this context, the proposition that young people's wage "expectations" did not differ systematically from their earnings potential may be straightforwardly tested. The null hypothesis implies that parameter vector (β_M, γ_M) should be nil. So long as $\sigma^2_u = \sigma^2_{u''}$, the hypothesis may be tested by pooling the realised wages of the employed with the

[24] The specification of the modified criterion function is dealt with below.

"expected" wages of the employed and estimating a unified set of coefficients. If the pooling restriction is rejected, then one may presume that the unemployed did make systematically err in the formation of wage "expectations".

The reservation wage equation needs to be substantially modified. The job search model combined with the introduction of the possibility of errors in the formation of "expectations" and the job offer probability imply that, in addition to factors affecting individual preferences[25], the reservation wage will depend on individual characteristics, the "expected" wage and the probability of receiving a job offer:

$$r^* = r^*(X_r, y, w_e, p(offer)) \tag{5.26}$$

The subscript r is now employed to distinguish factors affecting the reservation wage directly from those operating indirectly through the "expected" wage and the job offer probability. For simplicity, suppose that the (natural logarithm of the) "expected" wage and factors influencing the probability of receiving a job offer enter the reservation wage equation linearly. This may then be expressed as:

$$r^* = X_r\beta_r + \gamma_r y + \eta\left[X_w\beta_w + X_M\beta_M + (\gamma_w + \gamma_M)y\right] + \mu\left(X_p\beta_p + \gamma_p y\right) + v \tag{5.27}$$

where the subscript p indicates factors influencing the probability of receiving a job offer. The first two terms on the right hand side, $X_r\beta_r + \gamma_r y$, represent factors affecting preferences, costs of search and unemployment income[26]. The terms in square brackets, $\left[X_w\beta_w + X_M\beta_M + (\gamma_w + \gamma_M)y\right]$, represent earnings "expectations" (the associated parameter, η, measuring the elasticity of the reservation wage with respect to the "expected" wage), and the third group of terms, $\left(X_p\beta_p + \gamma_p y\right)$, comprise

[25] As noted above, the factors influencing the reservation wage directly will comprise the costs of search and unemployment income in addition to preferences. Indeed, in the standard job search model, individual preferences are effectively excluded by the assumption that individuals maximise expected lifetime income (e.g. Devine & Keifer, 1991).

[26] The presumption here is that YTS was operating through its influence on the first of these. It is plausible that YTS participation also reduced the costs of search, thereby raising (for obvious reasons) the reservation wage. The so-called "direct" effect of YTS would in fact be a composite effect comprising the negative effect due to preference formation and a positive effect due to the reduction in the costs of search. I do not pursue the issue further. The implications for the analysis would simply be the addition of another positive effect of YTS on the reservation wage.

factors affecting the job offer probability with their associated parameter μ. Rearranging terms in order to bring together the coefficients on YTS participation equation (5.27) may be expressed as:

$$r^* = X_r\beta_r + \eta(X_w\beta_w + X_M\beta_M) + \mu(X_p\beta_p) + (\gamma_r + \eta(\gamma_w + \gamma_M) + \mu\gamma_p)y + v' \qquad (5.27')$$

The considerations outlined above suggest that γ_r and γ_M will be negative whilst η, μ and γ_p will be positive. The reservation wage effect of YTS is, therefore, composed of a combination of the direct negative "preference formation" effect, the indirect (positive or negative) "expected wage" effect working through the influence of "expected" wages on reservation wages, and the indirect positive "job offer" effect. YTS will have a negative influence on the reservation wage if $\gamma_r + \eta\gamma_M > \eta\gamma_w + \mu\gamma_p$, whilst the effect will be positive if the inequality is reversed.

Given non-random employment determination, the expected value of the observed reservation wage is given by:

$$E(r) = \bar{r} - \sigma_{vc}\lambda_2' \qquad (5.28)$$

Finally, the criterion function will depend on factors influencing the probability of receiving a job offer and factors influencing the probability of accepting it if received. Thus:

$$I^{*'} = I^{*'}\left[(w_p - \bar{r}), p(offer)\right] \qquad (5.29)$$

expressed in terms of the underlying variables, this becomes:

$$I^{*'} = I^{*'}\left[X_w, X_r, X_M, X_p, y\right] \qquad (5.29')$$

Again, to keep things simple, suppose that the criterion function may be expressed in linear terms, so that it is simply the sum of factors influencing the offer and acceptance probabilities. Thus:

$$I^{*\prime} = X_w\beta_w + \gamma_w y - \left[X_r\beta_r + \eta(X_w\beta_w + X_M\beta_M) + \mu(X_p\beta_p) + (\gamma_r + \eta(\gamma_w + \gamma_M) + \mu\gamma_p)y\right] + X_p\beta_p + \gamma_p y + \varepsilon$$

$$\varepsilon \sim N(0,1) \quad (5.30)$$

The first term is earnings potential, the second composite term in square brackets is the reservation wage, and the final terms comprise factors affecting the probability of receiving a job offer. Rearranging, this may be expressed as:

$$I^{*\prime} = (1-\eta)X_w\beta_w - X_r\beta_r - \eta X_M\beta_M + (1-\mu)X_p\beta_p + \left[(1-\eta)\gamma_w - \gamma_r - \eta\gamma_M + (1-\mu)\gamma_p\right]y + \varepsilon \quad (5.30')$$

The effect of YTS through human capital accumulation, $(1-\eta)\gamma_w$, has both positive and negative components. YTS participation raises the probability of being in employment by increasing the human capital and, therefore, the earnings potential of participants. On the other hand, this increase in earnings potential also leads to an increase in the reservation wage of participants, thereby reducing the chances of accepting any given wage offer. So long as the elasticity of the reservation wage with respect to earnings potential (η) is less than one, however, the net effect will be positive. The effect of YTS on the reservation wage through its influence on preferences (γ_T) and through its tendency to correct overestimates of earnings potential ($\eta\gamma_M$) will be negative, thus raising the chances that an individual will accept a given wage offer. Finally, the probability of receiving a job offer directly raises the probability of being in employment, but also indirectly reduces it through its positive influence on the reservation wage. The net effect, $(1-\mu)\gamma_p$ will be positive so long as $\mu < 1$. To summarise, so long as η and μ are less than one, the effect of YTS on the probability of being in employment will be unequivocally positive.

In this context, the measured effect of YTS on the expected realised wage is given by:

$$\frac{\partial E(w)}{\partial y} = \gamma_w - \left\{\gamma_w - \left[\gamma_r + \eta\gamma_w + \eta\gamma_M + \mu\gamma_p\right] + \gamma_p\right\}A_w' \quad (5.31)$$

with $A_w' = \sigma_{ue}\lambda_1'(\lambda_1' + \bar{I}')$.

Once again, the effect of YTS on the observed wage is composed of one positive term (the "human capital" effect) from which must be subtracted a composite term, also expected to be positive. The estimate of the "human capital" effect of YTS, γ_w, will be biased downwards. The intuitive interpretation of the reservation wage effect is as before. It will be noted that the an increase in the job offer probability arising out of participation on YTS, directly raises the probability of being in employment, and therefore introduces an ulterior negative effect of YTS on the observed wage. This is because, the higher the probability of receiving a job offer, ceteris paribus, the lower will be the expected value of the observed wage. Since the job offer probability also influences the probability of being in employment indirectly (through its influence on the reservation wage) in the opposite direction, the net effect will be positive or negative according to whether the parameter μ is less than or greater than one[27].

It should be observed that, although the particularly simple form of the job offer effect in this case is due to the simplification adopted regarding the formulation of the criterion function, the basic intuition regarding the effect is not altered if one specifies the probability of being in employment correctly as the product of the offer probability and the acceptance probability conditional on an offer being received. Since the issue is of some importance in the interpretation of the results it is worth a brief digression to demonstrate this.

Suppose that one specifies separately the job offer and acceptance probabilities. The model is now made up of equations (5.21), (5.22), (5.27), and the separate job offer and acceptance functions:

$$I^{*\prime\prime} = w^* - r^* = w_p - \bar{r} - (u - v) = w_p - X_r\beta_r - \gamma_r y - \eta w_e - \mu\left(X_p\beta_p + \gamma_p y\right) + (u - v) \quad (5.32)$$

$$J^* = X_p\beta_p + \gamma_p y + \omega \qquad \omega \sim N(0,1) \quad (5.33)$$

with

$$w = w^* \quad iff \quad I^{*\prime\prime} > 0 \quad and \quad J^* > 0 \quad (5.34)$$

in these circumstances, the probability of observing an individual in employment is given by:

[27] Similar expressions may be straightforwardly derived for the bias in the YTS effect for the "expected" and reservation wages of the unemployed. I spare the reader the rather tedious derivations. Suffice it to say that with the obvious modifications, the expressions are analogous to the expression derived above for observed wages.

$$p(e=1) = p\left(I^{*\prime\prime} > 0, J^{*} > 0\right) = \Phi\left(w_p - \bar{r}, X_p\beta_p + \gamma_p y; \rho_{(u-v),\omega}\right) \tag{5.35}$$

whereas, the single criterion function implies approximating this probability by:

$$p(e=1) = p\left(I^{*\prime} > 0\right) = \Phi\left(w_p - \bar{r} + X_p\beta_p + \gamma_p y\right) \tag{5.36}$$

The expected value of the observed wage is given by:

$$E(w) = E\left(w^{*} \mid I^{*\prime\prime} > 0, J^{*} > 0\right) \tag{5.37}$$

That is, the expected value of the observed wage is equal to the expected value of the wage offer, given that a wage offer is both received and accepted. This, in turn may be written as:

$$\begin{aligned} E(w) &= w_p + E\left(u \mid I^{*\prime\prime} > 0, J^{*} > 0\right) \\ &= w_p + E\left(u \mid (u-v) > -\left(w_p - \bar{r}\right), \omega > -\left(X_p\beta_p + \gamma_p y\right)\right) \\ &= w_p + \sigma_u \rho_{u,(u-v)} E\left((u-v) \mid (u-v) > -\left(w_p - \bar{r}\right), \omega > -\left(X_p\beta_p + \gamma_p y\right)\right) \\ &\quad + \sigma_u \rho_{u,\omega} E\left(\omega \mid \omega > -\left(X_p\beta_p + \gamma_p y\right), (u-v) > -\left(w_p - \bar{r}\right)\right) \end{aligned} \tag{5.38}$$

Where the ρ terms represent correlation coefficients. Expressed in these general terms, it is obvious that, so long as the error terms from job offer and acceptance equations are positively correlated with the error term from the wage equation, as well as being positively correlated with each other, the bias in the estimation of earnings potential will vary positively with the expected value of the reservation wage and negatively with the probability of receiving a job offer. That is, the bias will vary inversely with the probability of observing an individual in employment. It is plausible to expect such positive correlations. As regards the acceptance equation, this condition follows almost as a matter of course. The error term from the reservation wage would have to take a very odd form in order that the correlation coefficient be negative (e.g. $v=-u^2$). A positive correlation between the error term from the job offer equation and the earnings equation suggests that unobserved

characteristics of the individuals which positively influence the chances of receiving a wage offer also positively influence the value of such an offer. One might think in terms of motivation which, although not observed by the researcher, is observed by the prospective employer. Such motivation is likely to be positively correlated with the chances of receiving an offer (through its effects on the intensity of search for example) as well as being positively correlated to the wage offer (through being an indicator of greater productivity). Finally, it seems reasonable to suggest that the probability of accepting an offer is positively related to the probability of receiving one. The keener one is to obtain a job, the harder one is likely to try to get an offer and the more likely one is to accept an offer if it is forthcoming.

Given these conditions, since the job offer probability also positively influences the reservation wage, the influence of YTS participation on the observed wage due to the raising of the job offer probability will have both positive and negative elements: an indirect positive element working through the influence of the job offer probability on the reservation wage; and, a direct negative influence due to the raising of the probability of receiving an offer.

More generally, it will be observed that the criterion function as given by (5.30) is misspecified. The misspecification implies that the parameters of the criterion function will not be linearly related to the parameters of the underlying wage, reservation wage and job offer equations. However, since it is to be expected that the additive form will be highly correlated with the more correct multiplicative form, terms calculated using the single criterion function will control for the problem of sample selection. In effect, the inverse Mill's ratio derived from the single equation form is to be used as an instrument for the terms arising from the multiplicative form. Furthermore, if the job offer probability does not vary across individuals, the parameters in the criterion function should be equal to the difference between the parameters obtained by estimating the wage and reservation wage equations separately.

Where then does all this discussion leave us ? To summarise the issues as they affect the empirical analysis below, it is worth briefly restating the model. Seen in terms of the underlying variables and their observed counterparts we have:

$$w^* = w_p + u \qquad u \sim N(0, \sigma_u^2) \qquad (5.39)$$

$$w_p = X_w\beta_w + \gamma_w y \tag{5.40}$$

$$w = w_p + \sigma_{u\varepsilon}\lambda_1' + u \tag{5.41}$$

$$r^* = \bar{r} + v \qquad v \sim N(0, \sigma_v^2) \tag{5.42}$$

$$\bar{r} = X_r\beta_r + \eta(X_w\beta_w + X_M\beta_M) + \mu X_p\beta_p + [\gamma_r + \eta(\gamma_w + \gamma_M) + \mu\gamma_p]y \tag{5.43}$$

$$r = \bar{r} - \sigma_{v\varepsilon}\lambda_2' + v \tag{5.44}$$

$$w_e^* = w_p + M + u'' \qquad u'' \sim N(0, \sigma_{u''}^2) \tag{5.45}$$

$$M = X_M\beta_M + \gamma_M y \tag{5.46}$$

$$w_e = w_p + M - \sigma_{u''\varepsilon}\lambda_2' + u'' \tag{5.47}$$

$$I^{*\prime} = (1-\eta)X_w\beta_w - X_r\beta_r - \eta X_M\beta_M + (1-\mu)X_p\beta_p + [(1-\eta)\gamma_w - \gamma_r - \eta\gamma_M + (1-\mu)\gamma_p]y + \varepsilon$$

$$\varepsilon \sim N(0,1) \tag{5.48}$$

The basic notion underlying the model is that if one estimates equations (5.39), (5.42) and (5.45) on the subsamples of individuals for which these variables are observed, without taking into account non-random (un)employment determination, the resulting parameter estimates will be biased. In particular, it is expected that the estimate of the effect of YTS on earnings through its impact on the accumulation of human capital will be biased downwards. In as much as YTS participation reduces the reservation wage and raises the chances of receiving a job offer, it tends to raise the probability of observing an individual in employment and, therefore, reduce the value of the observed wage.

Following a similar logic, not introducing controls for sample selection bias implies that the effect of YTS on the reservation wage will also be biased downwards, whilst the estimated effect on the expected wage of participation on the scheme will upwardly biased. This is because the increased probability that an individual is observed in employment tends to reduce the expected value of the observed reservation wage and increase that of the observed "expected" wage.

In order to derive an unbiased estimate of the effect of YTS on "expected, reservation and realised wages, probit estimation of the criterion function (5.48) may be employed to derive estimates of the inverse Mill's ratio, λ_1', and its complement, λ_2'. These estimates are then included as additional terms in the estimation of equations (5.41), (5.44) and (5.47) in order to derive the

underlying parameter estimates of interest specified by (5.40), (5.43), and (5.46). In this manner, direct estimates are obtained of:

a) the human capital effect of YTS, γ_w (5.40);

b) the overall reservation wage effect of YTS, $\left[\gamma_r + \eta(\gamma_w + \gamma_M) + \mu\gamma_p\right]$, composed of the direct "preference formation" effect, γ_r, the "expected" wage effect (which, in turn, is composed of "human capital" and "erroneous expectations" effects), $\eta(\gamma_w + \gamma_M)$, and the effect due to the increased probability of receiving a job offer, $\mu\gamma_p$ (5.43);

c) the combined "human capital" and "erroneous expectations" effect, $(\gamma_w + \gamma_M)$, (5.46);

d) the effect of YTS on the probability of being in employment, $\left[(1-\eta)\gamma_w - \gamma_r - \eta\gamma_M + (1-\mu)\gamma_p\right]$, (5.48).

In principal, the results thus achieved may be combined to further provide indirect estimates of:

e) the effect of YTS on the probability of receiving a job offer, γ_p, (by subtracting a) from and adding b) to d));

f) the effect of YTS on errors in expectations γ_M (by subtracting a) from c)).

Such direct and indirect estimates are reported below, however, the indirect estimates should be treated with some caution. In particular, their reasonableness depends on the linear way in which factors influencing the job offer probability influence the reservation wage in (5.43) and the criterion function (5.48). On the other hand, the calculation of e) is important in that, if YTS had no impact on the job offer probability, the effect of YTS on employment probability would consist of just the "human capital" and composite "reservation wage" effects. Thus, a divergence between the coefficient on YTS in the criterion function (5.48) and the difference between the coefficient on YTS in the wage (5.40) and reservation wage equations (5.43) would provide evidence that YTS was also operating by raising the probability of receiving a wage offer. More generally, if the entire parameter vector (β_p, γ_p) were nil, variations in the job offer probability would have no role to play in the determination of employment, and, therefore, the criterion function would be correctly specified, simply containing factors influencing the acceptance probability. Finally, a pooled regression of the wages of the employed and "expected" wages of the unemployed may be used to provide a simple

test of the hypothesis that M=0. That is, that there were no systematic errors in the formation of expectations.

On the other hand, whilst efforts are made to verify the existence of "erroneous expectations" and "offer probability" effects of YTS, no attempt is made to separate these effects from the "preference formation" effect of YTS. Such an attempt might more reasonably be made by explicitly modelling job offer and acceptance probabilities and goes beyond the scope of the present study.

5.1.5) Specification of Sample Selection

In the empirical analysis, the possibility of sample selection bias arising from both non-random YTS participation and non-random employment determination is taken into account. That is, the considerations of the preceding sections are combined to produce the specification of sample selection implemented below. To my knowledge, this is the first study to consider both effects contemporaneously. Section 5.1.1, suggested the introduction of a term to control for bias arising from non-random YTS participation. Sections 5.1.2, 5.1.3 and 5.1.4 provided a justification for the introduction of a term to control for non-random employment determination. In the latter case, the additional factors are subsumed into a single probability of employment term. It will also be observed that, given the analysis of chapter four, employment determination and YTS participation are likely to be related.

The considerations outlined above suggest the use of two criterion functions. The first, to determine YTS participation, was given by (5.4) above as:

$$y^* = Z\alpha + \upsilon \tag{5.49}$$

the second to determine non-random employment determination was expressed as (5.48):

$$I^{*1} = (1-\eta)X_w\beta_w - X_r\beta_r - \eta X_M\beta_M + (1-\mu)X_p\beta_p + \left[(1-\eta)\gamma_w - \gamma_r - \eta\gamma_M + (1-\mu)\gamma_p\right]y + \varepsilon \tag{5.50}$$

the criterion function for employment determination may be more compactly expressed as:

$$I^{*\prime} = X\beta + \gamma y + \varepsilon \tag{5.50'}$$

where X contains all the factors, apart from YTS participation, influencing either earnings potential, the reservation wage or the probability of receiving an offer and y represents YTS participation as before. β and γ represent the associated composite parameter vector. In order to impose as few additional a priori conditions as possible on the estimation procedure, the two criterion functions are jointly estimated by bivariate probit introducing the same individual characteristics in the equation determining YTS participation as in that determining employment. This implies[28] that the parameter on YTS participation in (5.50') is not identified. Therefore, the sample selection terms were derived by bivariate probit estimation of the two criterion functions[29]:

$$y^{*\prime} = X\alpha + \upsilon' \tag{5.51}$$

$$I^{*\prime\prime\prime} = X\beta + \varepsilon' \tag{5.52}$$

The likelihood function for the derivation of the sample selection terms is, therefore:

$$\prod \Phi(X\beta, X\alpha, \rho_{\varepsilon\upsilon})^{ey} \Phi(X\beta, -X\alpha, -\rho_{\varepsilon\upsilon})^{e(1-y)} \Phi(-X\beta, X\alpha, -\rho_{\varepsilon\upsilon})^{(1-e)y} \Phi(-X\beta, -X\alpha, \rho_{\varepsilon\upsilon})^{(1-e)(1-y)} \tag{5.53}$$

where $\Phi(.,.;.)$ indicates the standardised bivariate normal distribution. Consequently, the wage equation corrected for sample selection bias is given by:

$$w = X_w\beta_w + \gamma_w y + \sigma_{w\varepsilon} E(\varepsilon' \mid w^* > r^*, y) + \sigma_{w\upsilon} E(\upsilon \mid w^* > r^*, y) + u \tag{5.54}$$

where, for YTS participants, one obtains[30]:

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[28] See the discussion of the identification of the bivariate probit model in chapter four.

[29] I continue to employ α and β to describe the parameter vectors associated with the determinants of YTS participation and employment respectively, although obviously their form will vary with the explanatory variables introduced into the YTS participation and employment equations.

[30] As in chapter four, I use the term Φ() to refer to both the univariate and bivariate normal distributions. The number of arguments of the function should, I hope, be sufficient to distinguish between them.

$$E(\varepsilon' | w^* > r^*, y = 1) = \frac{\phi(X\beta)\Phi\left(\frac{X(\alpha - \rho_{u\varepsilon}\beta)}{(1-\rho_{u\varepsilon}^2)^{1/2}}\right)}{\Phi(X\beta, X\alpha; \rho_{u\varepsilon})} \tag{5.55}$$

$$E(\upsilon | w^* > r^*, y = 1) = \frac{\phi(X\alpha)\Phi\left(\frac{X(\beta - \rho_{u\varepsilon}\alpha)}{(1-\rho_{u\varepsilon}^2)^{1/2}}\right)}{\Phi(X\beta, X\alpha; \rho_{u\varepsilon})} \tag{5.56}$$

and, for non-participants, one has:

$$E(\varepsilon' | w^* > r^*, y = 0) = \frac{\phi(X\beta)\Phi\left(\frac{-X(\alpha - \rho_{u\varepsilon}\beta)}{(1-\rho_{u\varepsilon}^2)^{1/2}}\right)}{\Phi(X\beta, -X\alpha; -\rho_{u\varepsilon})} \tag{5.55'}$$

$$E(\upsilon | w^* > r^*, y = 0) = -\frac{\phi(X\alpha)\Phi\left(\frac{X(\beta - \rho_{u\varepsilon}\alpha)}{(1-\rho_{u\varepsilon}^2)^{1/2}}\right)}{\Phi(X\beta, -X\alpha; -\rho_{u\varepsilon})} \tag{5.56'}$$

Estimation of the joint probability that an individual participated on YTS and was in employment in the Spring 1986 by bivariate probit allows the calculation of the terms given by (5.55) and (5.56) for YTS participants and (5.55') and (5.56') for non-participants. These terms are then introduced into the wage equation to permit the unbiased estimation of the principal parameters of interest in the determination of earnings potential, as well as providing estimates of the covariance terms $\sigma_{u\varepsilon}$, and $\sigma_{u\upsilon}$, which are estimated as two additional parameters in the equation[31]. The reasoning offered above suggests that the covariance between the error terms in the wage and employment equations is likely to be positive. The direction of the bias in the estimate of the effect of YTS participation is likely to have the opposite sign. This is because it is expected that YTS tended to raise earnings potential

[31] This two-stage procedure is an extension of the well-known correction for sample selection bias suggested by Heckman (1979). Tunali (1986) employs this type of double selection procedure in analysing the migration decision of individuals. One could, in principle, estimate the wage equation and the correction terms simultaneously by maximum likelihood. This would, however, involve the evaluation of trivariate normal integrals and is not undertaken here

(human capital effect) lower the reservation wage (preference formation and erroneous expectations effects)[32], and raise the chances of receiving a job offer (job offer effect). Since, the size of the bias is inversely related to the probability of observing the individual in employment, and since YTS participation is expected to raise this probability, and therefore reduce the bias, the measured effect of YTS on earnings potential derived from an uncorrected estimate of wages will be biased downwards.

On the other hand, the direction of the bias arising from non-random YTS participation has the same sign as the covariance between the error terms in the wage and YTS participation equations. Suppose that YTS participants were more motivated than non-participants, with such motivation tending to raise their potential productivity in the eyes of prospective employers. If this motivation was not captured by the other explanatory variables, it would manifest itself as a positive correlation between the error terms in the wage and YTS participation equations. This unobserved motivation would *raise* the observed wage of YTS participants and, therefore lead to an overestimate of the effect of YTS on wages if non-random YTS participation was ignored. Alternatively, the converse might be true. YTS participants might be particularly unmotivated with respect to non-participants. In this case one would expect a negative correlation and, therefore, an underestimate of the effect of YTS participation on wages. Whichever is the case, the sign of the bias will be the same as the sign of the covariance term. The sign of the covariance terms therefore provides an indicator of the direction of bias arising from YTS participation.

In reporting the results several variants of the wage equation are presented. Firstly, the equation was estimated with and without controls for sample selection bias and with and without the introduction of terms to control for differences in job characteristics. This produces four forms of the equation. To avoid confusion in the reporting the results, it is worth briefly outlining them here. Specifically, denoting by λ_e and λ_y the conditional expectations of the error terms from the

[32] As was noted in section 5.1.4, YTS would also have two positive influences on the reservation wage, through the increased chances of obtaining a job offer and the higher level of earnings potential. However, so long as the elasticity of the reservation wage with respect to the expected wage (η), and the parameter on the job offer probability (μ) are both less than one, the overall effect of these factors in the determination of employment will be positive, and, therefore, the effect of YTS on wages will be unequivocally underestimated in the uncorrected equation.

employment (defined by (5.55) or (5.55') as appropriate) and YTS participation equations (defined by (5.56) or (5.56') as appropriate) respectively, results are reported for the following models[33]:

$$w = X_w\beta_w + \gamma_w y + u \tag{5.57}$$

$$w = X_w\beta_w + \gamma_w y + \sigma_{ue}\lambda_e + \sigma_{uy}\lambda_y + u \tag{5.57'}$$

$$w = X_w\beta_w + \gamma_w y + X_J\beta_J + u \tag{5.58}$$

$$w = X_w\beta_w + \gamma_w y + X_J\beta_J + \sigma_{ue}\lambda_e + \sigma_{uy}\lambda_y + u \tag{5.58'}$$

Where X_J and represent job characteristics with associated parameter vector β_J. It will be observed that the job search model implies that all the variables in the wage equation must also appear in the criterion equation. Thus, one should not introduce terms to control for job characteristics, hours worked and so on in the wage equation since these are only observed for those in employment. Two justifications for the of the models given by (5.58) and (5.58') may be offered. Firstly, the observed wage in the Spring 1986 is not necessarily the starting wage which was accepted. Secondly, the introduction of terms to control for job characteristics may be justified on the grounds of compensating variations. That is, jobs differ in rather more than the wage. Controlling for job characteristics takes this into consideration. In what follows, I report results for wage equations estimated both with and without job characteristics. Having criticised the Willis & Rosen (1979) model for a not entirely dissimilar procedure in chapter three, I would not place too much emphasis on the estimates including job characteristics. Their inclusion allows some consideration of other factors influencing the wages of young people, but, above-all, ensures that the measured YTS "effect" on wages is not due to differences in job characteristics, and, in particular, on-going training.

Secondly, wage equations were estimated separately for YTS participants and non-participants. This allows further consideration of the effect of YTS on wages. Thus equations of the form:

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[33] Once again, the values of the parameter vectors, β_w, γ_w and β_J, the estimates of the two covariance terms, σ_{ue}' and σ_{uy}', and the error term u will vary according to the form of the equation estimated. They are presented here using the same terminology in each case, since the notional parameters being estimated are the same. However, The estimates produced using equations (5.57) and (5.58) will be biased estimates of the true parameter vector if, as is likely, the conditional expectation of the error term is not zero.

$$w = X_w\beta_{w1} + \sigma_{u\varepsilon}\lambda_\varepsilon + \sigma_{u\upsilon}\lambda_y + u_1 \tag{5.59}$$

for YTS participants, and,

$$w = X_w\beta_{w2} + \sigma_{u\varepsilon}\lambda_\varepsilon + \sigma_{u\upsilon}\lambda_y + u_2 \tag{5.59'}$$

for non-participants were also estimated[34]. In order to test the significance of the differences between the effect of individual characteristics on wages for YTS participants and non-participants, the following single wage equation with a full set of YTS interaction dummies was also estimated:

$$w = X_w\beta_w + yX_w\beta_y + \sigma_{u\varepsilon}\lambda_\varepsilon + \sigma_{u\upsilon}\lambda_y + u \tag{5.60}$$

This produces a direct test of the significance of differences in the effects of individual characteristics on wages for YTS participants and non-participants. The purpose of estimating this form is to allow further insights into the mechanisms underlying the "human capital" effect (or rather it's absence as will be seen below).

Similar procedures were used for the estimation of "expected" and reservation wages. The "expected" wage equation, equation (5.47) must be replaced by:

$$w_e = w_p + M + \sigma_{u'\varepsilon}E(\varepsilon' \mid w^* < r^*, y) + \sigma_{u'\upsilon}E(\upsilon \mid w^* < r^*, y) + u' \tag{5.61}$$

with:

$$E(\varepsilon' \mid w^* < r^*, y = 1) = -\frac{\phi(X\beta)\Phi\left(\dfrac{X(\alpha - \rho_{u\varepsilon}\beta)}{(1-\rho_{u\varepsilon}^2)^{1/2}}\right)}{\Phi(-X\beta, X\alpha, -\rho_{u\varepsilon})} \tag{5.62}$$

[34] It will be observed that the form of lambda terms vary according to whether the person participated or YTS or not. The lambda terms in (5.59) represent the conditional expectations of the error terms from the employment and YTS equations respectively given by (5.55) and (5.56). Whilst the terms in (5.59') represent the corresponding terms for non-participants defined by (5.55') and (5.56').

$$E(\upsilon \mid w^* < r^*, y = 1) = \frac{\phi(X\alpha)\Phi\left(\frac{-X(\beta - \rho_{u\varepsilon}\alpha)}{(1-\rho_{u\varepsilon}^2)^{1/2}}\right)}{\Phi(X\beta, X\alpha; \rho_{u\varepsilon})} \tag{5.63}$$

for YTS participants and:

$$E(\varepsilon \mid w^* < r^*, y = 0) = -\frac{\phi(X\beta)\Phi\left(\frac{-X(\alpha + \rho_{u\varepsilon}\beta)}{(1-\rho_{u\varepsilon}^2)^{1/2}}\right)}{\Phi(-X\beta, -X\alpha; \rho_{u\varepsilon})} \tag{5.62'}$$

$$E(\upsilon \mid w^* < r^*, y = 0) = -\frac{\phi(X\alpha)\Phi\left(\frac{-X(\beta + \rho_{u\varepsilon}\alpha)}{(1-\rho_{u\varepsilon}^2)^{1/2}}\right)}{\Phi(-X\beta, -X\alpha; \rho_{u\varepsilon})} \tag{5.63'}$$

for non-participants. Denoting, as before, the correction terms for non-random (un)employment determination ((5.62) or (5.62') as appropriate) and YTS participation ((5.63) or (5.63') as appropriate) by λ_e and λ_y respectively, the full results for equations of the form:

$$w_e = X_w(\beta_w + \beta_M) + (\gamma_w + \gamma_M)y + u'' \tag{5.64}$$

$$w_e = X_w(\beta_w + \beta_M) + (\gamma_w + \gamma_M)y + \sigma_{u\varepsilon}\lambda_e + \sigma_{u\upsilon}\lambda_y + u'' \tag{5.64'}$$

are reported. It will be observed that these equations differ from the more general form employed above in as much as the same variables influencing earnings potential are posited as influencing errors in expectations. This allows a simple test of the hypothesis that E(w) = E(w_e). That is, that there are no systematic errors in the formation of expectations. To implement this test, equations (5.57') and (5.64') were combined to produce a regression of the form:

$$\tilde{w} = X_w\beta_w + \gamma_w y + \sigma_{\tilde{u}\varepsilon}\lambda_e + \sigma_{\tilde{u}\upsilon}\lambda_y + \tilde{u} \tag{5.65}$$

with $\left.\begin{matrix}\tilde{w}=w\\ \tilde{u}=u\end{matrix}\right\}$ *iff* $e=1$

and $\left.\begin{matrix}\tilde{w}=w_e\\ \tilde{u}=u^{1}\end{matrix}\right\}$ *iff* $e=0$

An F-test of the pooling restriction is a test of the hypothesis that $\beta_M+\gamma_M=0$. That is, refutation of the null hypothesis in this context would imply that there *were* systematic differences between the wage "expectations" of the unemployed and the wages of the employed, which, given the reasoning outlined above, might be attributed to errors in the formulation of wage "expectations" due to incomplete information. Further, combined wage and "expected" wage equations were also estimated separately for YTS participants and non-participants. That is, equations of the form:

$$\tilde{w}=X_w\beta_{w1}+\sigma_{u\varepsilon}\lambda_e+\sigma_{\tilde{u}_1 v}\lambda_y+\tilde{u}_1 \qquad (5.66)$$

for participants, and,

$$\tilde{w}=X_w\beta_{w2}+\sigma_{u\varepsilon}\lambda_e+\sigma_{\tilde{u}_2 v}\lambda_y+\tilde{u}_2 \qquad (5.66')$$

for non-participants were estimated. This tests the accuracy of wage "expectations" separately for YTS participants and non-participants.

As regards the estimation of reservation wages, two different forms of the equation were estimated. Firstly, the following form derived from the static labour supply model outlined in section 5.1.3 was estimated (with and without correction terms defined by (5.62) or (5.62') and (5.63) or (5.63') as appropriate):

$$r=X_r\beta_r+\gamma_r y+v \qquad (5.67)$$

$$r=X_r\beta_r+\gamma_r y+\sigma_{v\varepsilon}\lambda_e+\sigma_{vv}\lambda_y+v \qquad (5.67')$$

Secondly, the modifications suggested in section 5.1.4 were introduced to produce the following forms (with and without correction terms):

$$r = X_r\beta_r + \eta X_w(\beta_w + \beta_M) + \mu X_p\beta_p + \left[\gamma_r + \eta(\gamma_w + \gamma_M) + \mu\gamma_p\right]y + \nu' \qquad (5.68)$$

$$r = X_r\beta_r + \eta X_w(\beta_w + \beta_M) + \mu X_p\beta_p + \left[\gamma_r + \eta(\gamma_w + \gamma_M) + \mu\gamma_p\right]y + \sigma_{v\varepsilon}\lambda_\varepsilon + \sigma_{vu}\lambda_y + \nu' \qquad (5.68')$$

Obviously, although expressed in terms of the underlying variables and their parameters, in the empirical estimation, only one composite parameter is identified for each explanatory variable[35]. As before separate equations were estimated for YTS participants and non-participants respectively, giving the forms:

$$r = X_r\beta_{r1} + \eta_1 X_w(\beta_{w1} + \beta_{M1}) + \mu_1 X_p\beta_{p1} + \sigma_{v\varepsilon}\lambda_\varepsilon + \sigma_{vu}\lambda_y + \nu_1' \qquad (5.69)$$

for YTS participants, and,

$$r = X_r\beta_{r2} + \eta_2 X_w(\beta_{w2} + \beta_{M2}) + \mu_2 X_p\beta_{p2} + \sigma_{v\varepsilon}\lambda_\varepsilon + \sigma_{vu}\lambda_y + \nu_2' \qquad (5.69')$$

for non-participants.

Finally, it was noted above that, given the form of the employment and YTS equations, a parameter on a YTS participation dummy would not be identified in the bivariate probit model. It is also the case that the cross equation covariance between reservation (5.68') and observed wages (5.57') is not identified since one either observes the reservation wage or the realised wage, never both. In order to compare the effect of YTS on employment with the difference between the parameters on YTS participation in the wage and reservation wage equations, some rather ad hoc manipulation was employed. Firstly, the effect of YTS participation on the employment probability was calculated using the bivariate model at mean values of the sample. This was then employed to

[35] On the other hand, even though the reservation wage equation (5.69') contains the same variables (apart from the YTS dummy) as are in the employment and YTS participation equations, since the latter enter non-linearly, all the (composite) parameters are identified in the equation.

derive an implied parameter on YTS participation for the employment equation. The implied parameter being calculated as the value of the parameter on YTS participation which would have produced the same shift in the employment probability estimated by an univariate probit model with the inclusion. That is, by setting the effect of YTS on employment calculated using the bivariate model:

$$\frac{\Phi(X\beta, X\alpha; \rho_{\varepsilon v})}{\Phi(X\alpha)} - \frac{\Phi(X\beta, -X\alpha; -\rho_{\varepsilon v})}{\Phi(-X\alpha)} \tag{5.70}$$

equal to the equivalent effect measured by the univariate model:

$$\Phi(X\beta + \gamma) - \Phi(X\beta) \tag{5.70'}$$

one may obtain an estimate of γ. The most obvious point at which to calculate this estimate is at sample mean values of employment and YTS participation probabilities. In order to check the existence of an effect of YTS on the offer probability, this estimate was then compared with an estimate of the difference between the effect of YTS on wages (given by the coefficient on YTS in the wage equation (5.57')) and the effect of YTS participation on the reservation wage (given by the coefficient on YTS in the reservation wage equation (5.67')). This provides an, albeit informal, check on the existence of an offer probability effect of YTS. It was noted above that, if YTS had no influence on the probability of receiving a job offer, the parameter on YTS participation in the employment equation would be equal to the difference between the parameters on YTS participation in the wage and reservation wage equations. Since, in the case in which YTS participation had no role to play in increasing the probability of a wage offer, the coefficient on YTS in the employment equation (5.50') should be equal to the difference between the coefficients in the wage and reservation wage equations, this procedure provides an informal check on the existence of a job offer effect.

5.2: Previous Studies of YTS and Wages

Before proceeding to the empirical implementation of the model, it is worth briefly reporting the results found in previous studies. In addition to the analyses of Main & Shelley (1990, hereafter M&S) and Whitfield & Bourlakis (1990, 1991, hereafter W&B) which consider the effect of YTS on both employment and wages, Dolton, Makepeace & Treble (1994a, hereafter DMT2, and 1994c, hereafter DMT3) have analysed the effect of YTS on wages[36]. Main (1987a) considers the issue of the realism of the wage expectations of the unemployed.

W&B estimate a wage equation of the form of (5.1) above for young people in employment in February 1987 who reached minimum school-leaving age during the academic year 1983/4. They find that YTS had a small but statistically significant negative effect on the wages of participants. Although they don't report the results, they say that terms introduced to correct for non-random YTS participation (i.e. of the form given by 5.6, 5.6') were not statistically significant and did not "significantly" alter the results. W&B are lead to conclude (1991, p. 53) that,

> "There is no strong evidence on...why YTS participants earn less than non-participants," (W&B, 1991, p.53)

they also suggest that to answer this question, one requires,

> "Further research using more detailed information on training, scheme-participation, youth wages and YTS selection procedures than is currently available." (W&B, 1991, p.53)

The considerations outlined above suggest that the model estimated by W&B is misspecified, ignoring the truncation of the earnings distribution. That is, whilst they say that they found no evidence of bias arising from non-random YTS participation, W&B do not consider the possibility of bias arising from non-random employment determination. Including such considerations provides a

[36] Also worth mentioning is DMT1 (1993) which provides an overview of the results of analyses of the effect of YTS on employment probability and wages.

plausible interpretation of the negative effect of YTS without recourse to ulterior extra sample information.

M&S analyse the wages in April 1986 of employed Scottish school-leavers who left school during the academic year, 1983/4. They report the results of estimating an equation of the form of (5.1) without correction terms, and of the form of (5.2) with correction terms for non-random YTS participation. In the uncorrected estimate, they find that YTS participation[37] had a small but statistically significant negative influence on the wages of young people, reducing wages by around 6-8 per cent.

The estimates of the effect of YTS including terms to control for sample selection bias modifies these conclusions. Estimating separate wage equations for YTS participants and non-participants, they find a statistically significant correction term in the non-participant equation whilst the corresponding term in the wage equation of participants is not statistically significant. Although, employing separate equations for participants and non-participants leaves the effect of YTS implicit, M&S report the estimated earnings (and associated 95% confidence intervals) of a number of ideal types of young people with and without YTS participation. The reported confidence intervals indicate that the difference is never statistically significant at 5%. In interpreting these results M&S suggest that,

> "Lack of statistical precision, reflected in wide confidence intervals, prohibits any precise interpretation of these results," (M&S, 1990, p.510),

going on to conclude that,

> "The lack of precision in the estimates of expected wages....reflects, in part, the difficulty in estimating wage equations for young people.....It would seem that the most that can

[37] In practice, M&S employ three terms to represent YTS participation, "Ever on YTS" which is comparable to the variable employed here, "Completed YTS", and "YTS job". The latter variable indicates whether or not the young person was kept on in employment by the YTS sponsor. Given the periodic nature of the "diary questions" in the Scottish School-leavers survey employed by M&S, it is not clear how the variable "Completed YTS" is defined. They themselves note (note 6, p. 499) that the variable might miss some young people who had completed the programme, although, in the published paper, no further information is given. The inclusion of three terms slightly complicates the interpretation. M&S employ the two extra terms with the expectation that completing YTS would allow a greater accumulation of specific and general human capital, whilst being kept on by the YTS sponsor should enhance the value of firm specific human capital obtained during participation on the scheme. In the event, the results are diametrically opposed to the a priori expectations, the negative effects of YTS being felt only by completers and those kept on after the scheme by the same employer.

be said is that there is no statistically significant evidence that youth wages are higher or lower after participation on YTS."

Once again, I would beg to differ from these conclusions. Whilst it is undoubtedly true that introducing a correction term for non-random YTS participation implies the addition of a non-linear function of the explanatory variables already contained in the equation. This is likely to reduce the precision of the estimated coefficients due to correlations between the correction term and the other variables, however, two points should be added. Firstly, I would suggest that, in ignoring the truncation of the earnings distribution implied by non-random employment determination, the model is once again misspecified[38]. Secondly, the inclusion of an explicit job-search theoretical framework allows the interpretation of the effect of YTS with and without controls for non-random YTS participation in terms of the separate "human capital", "reservation wage" and "job offer" effects. In chapter four above, it was found that the unobserved factors determining YTS participation are correlated with unobserved factors influencing the probability of being in employment. This implies that the term introduced to control for non-random YTS participation is, to some extent, picking up the effects of non-random employment determination. Thus, the negative effect of YTS might be interpreted in terms of the predominance of the "reservation wage" and "job offer" effects, whilst, the absence of a statistically significant effect in either direction once sample selection is "controlled for", is consistent with the idea that the "human capital" effect was weak or null. Without explicit modelling of these issues, however, such considerations remain speculative.

The third pair of analyses to be considered here were undertaken by DMT and reported in DMT2 and DMT3. The two studies analyse the effects of the two-year YTS on the wages of young people in England & Wales who reached minimum school-leaving age during the academic year 1985/6 and who were employed in March 1989. In DMT2, the authors consider the effects of YTS by dividing up young people into seven categories according to the type of training received: no training; no training and some post-16 education; YTS participation but no other training; off-the-job training, but neither an apprenticeship nor YTS participation; some off-the-job training, no

[38] It is interesting to note that, in another paper (Main, 1987b), Main provides an underlying theoretical framework which justifies the introduction of sample selection terms to control for the non-random nature of employment determination in a model of wage determination. In that paper, however, he is not concerned with the effects of government training programmes on wages.

apprenticeship, but with YTS participation; apprenticeship without YTS; and, apprenticeship with YTS participation. They estimate separate wage equations for males and females, introducing six dummies to represent the different training categories, with the no training group providing the base. They also introduce a sample selection term to control for non-random "labour-force participation"[39], however this term is not statistically significant in the reported specification (table 9.4, pp. 272-4). They suggest that,

> "YTS lowers earnings for women but, if anything, raises earnings for men," (DMT2, p.275).

whilst it is possible to concur with the first part of this statement, at least in their reported specification, there is no support for the second. In pairwise comparisons of training group 3 with 1, 5 with 4, and 7 with 6, the results suggest[40] that there is a statistically significant negative effect of YTS on wages for females, but no statistically significant effect (either positive or negative) of YTS on the wages of young males.

In their subsequent analysis (DMT3), DMT estimate separate wage equations for males and females and for each of the seven training "regimes". In this paper they introduce sample selection terms to control for the separation of young people into each of these seven groups. In order to do so, they estimate a multinomial logit selection equation[41]. The results produced are very similar to the earlier analysis. The overall impression gained is that YTS had a statistically significant negative effect on the earnings of females. For males, although the "effect" of YTS was almost always negative, this effect was not generally statistically significant[42]. It might be observed that DMT3

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[39] One can only assume that they mean non-random employment determination, rather than the more traditional interpretation of labour force participation as referring to labour force participants (both employed and unemployed).

[40] I base my conclusions on the reported results. Strictly speaking, to construct confidence intervals for the latter two comparisons, one requires the unreported covariance of the parameter estimates as well as the reported standard errors.

[41] One might question the appropriateness of the multinomial logit in this context. As is well known, such a model implies the independence of irrelevant alternatives. It would perhaps be more sensible to model the selection using the conditional logit model which, nests the multinomial logit as a special case and does not impose the "independence" assumption a priori. Amemiya (1981) provides an excellent treatment of this and other issues in the estimation of multinomial probability models.

[42] Comparisons are complicated by the separate estimation of wages for the different groups. The results vary somewhat across individual characteristics. It would perhaps be more accurate to say that (for both males and females) where the effect was statistically significant, it was always negative.

does not report the regression results so that little can be said about the actual specification adopted or, perhaps more importantly, the statistical significance of the rather complicated selection terms.

Finally, mention should be made of the study by Main (1987a). Using data on the labour market experiences of Scottish young people who were in the labour market in the Spring 1985 and who had left school during the academic year 1983/4, Main tests the proposition that the "expected" wages of the unemployed are formed on the same basis as the wages of the employed. To do this, he estimates separate wage and expected wage equations for the employed and unemployed, including a sample selection term to control for non-random employment determination. He then estimates a pooled regression which allows the use of an F-test to determine whether differences in the coefficients produced by the two equations are statistically significant. He finds that the expected wage equation of the unemployed is significantly different from the wage equation for the employed. He also finds that there is no statistical difference in the wage expectations of the unemployed and those on YTS. One interesting characteristic of the results is that the statistical difference between wage expectations of the unemployed and the wages of the employed is due to wage expectations being **below** those of the employed. That is, the young unemployed appear to have had wage expectations which were too low with respect to their personal characteristics. The effect of YTS, although not statistically significant, was to raise wage expectations. One possible explanation of this lies in the absence of any variables to represent the duration of various labour market experiences. For example, it may be that a young person who was continuously unemployed after leaving school, might be aware that he or she could not expect to earn the same income as a similar young person who had been continuously employed since leaving school, due to the loss of human capital during unemployment and the absence of any increment to earnings gained through the accumulation of work experience. Certainly, taken at face value, the findings are not in line with the proposition that young people's wage expectations were too high. Although Main provides some slight (but not statistically significant) evidence that YTS was making young people's pay "more realistic", since these expectations were too low to begin with, the direction of this effect was the opposite of that intended by Mr. Nigel Lawson[43].

[43] See the quote on p. 101.

Studies of the impact of YTS have thus tended to find a small negative effect, or no effect at all according to whether sample selection bias is controlled for. DMT, using a later cohort and a larger sample size[44], find a negative effect of YTS on the wages of females even in the presence of controls for sample selection bias. None of the studies, however, take into account the presence of both sample selection bias due both to non-random YTS participation **and** non-random employment determination. In as much as unobserved factors determining the probability of finding employment are correlated with those determining YTS participation, the sample selection terms introduced to control for non-random YTS participation, may also be picking up some of the "employment selection" effect. The lack of an underlying theoretical model prevents a coherent treatment of the selection problem, as well as impeding an interpretation of what is being found. W&B offer a series of possible explanations which, however, they are unable to test. M&S attribute their results to the existence of "statistical problems" whilst DMT offer no interpretation at all of their findings.

In the following two sections, I outline and estimate an empirical model which takes into account sample selection effects from both YTS participation and employment determination. The inclusion of the explicit modelling of the reservation and "expected" wages of the unemployed absent from previous studies further enhances the analysis and provides some further insights into the mechanisms through which YTS was operating.

5.3: Empirical Specification

The dependent variables employed here are the natural logs of respectively, the reported weekly wages of those in employment, and, the reported weekly reservation and "expected" wages of the unemployed. The basis of the sample is similar to that used for the analysis of employment determination in chapter four. Specifically, all those who reported themselves as being in full-time employment or as unemployed, full-time at home or doing something else in the Spring 1986. The estimation includes those reporting both wages and hours worked (86% of the employed), whilst the

[44] The sample base of YCS3 (the third Youth Cohort Study) was 21,087. 9,328 young people replied to all three sweeps. DMT2 (and presumably also DMT3) employs a sample of 2202 employed young men and 2560 employed young women.

reservation and "expected" wage equations are estimated for all those reporting both of these variables in a consistent manner[45] (75% of the "unemployed"). As before, no attempt is made to account for panel attrition. It may be noted that hours are introduced as an explanatory variable. That is, it is assumed that hours are not chosen by young people, but rather constitute one of the job characteristics which are exogenously given.

Table 5.1 provides descriptive statistics on the variables used[46]. Figures are provided separately for the four different groups considered. It may be noticed that observed, reservation and "expected" wages are all lower for YTS participants, although, obviously this does not control for other factors. It will also be observed that the mean of "expected" wages is higher than that of realised wages both for YTS participants and non-participants. Turning to the other explanatory variables, once again these are collected into different groups to clarify the exposition. It should be noted that the final group labelled "employment variables" represent factors which are introduced into the employment equation (and consequently into the reservation wage equation) but which are not included in the wage and "expected" wage equations. The exclusion of these variables from the wage equation was determined by their lack of statistical significance rather than by the identification requirements. However, restricting the number of explanatory variables obviously does allow the more precise identification of certain key variables which might be obscured by problems of multicollinearity. In particular, the inclusion of both adult regional wage and unemployment rates leads to a statistically insignificant coefficient on the (natural logarithm of the) weekly wage-rate. Since, for obvious reasons, unemployment and wage rates are likely to be highly negatively correlated, an explanation of this lack of statistical significance might more reasonably be sought in this correlation rather than by attributing no role to regional wage rates.

Returning to the variables in the wage equation, the first group represent, as before, indigenous characteristics. The first two of these are expected to have a negative influence on wages in employment reflecting the poorer job opportunities available to those from ethnic minorities and those with disabilities, however, in the uncorrected estimation at least, in as much as reservation wages may vary across these groups this conclusion may be mitigated by higher reservation wages.

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[45] One person was excluded due to the reporting of a reservation wage which was higher than the "expected" wage.
[46] The variables are described briefly in the text. For full definitions and sources, see the data appendix at the end of the thesis.

As regards females, the fact that the adult wage rate is subdivided by sex implies that the coefficient for this group may be positive. This is because, due to the lower average skills levels in female occupations, the juvenile wage is likely to be closer to the adult wage, not because females are likely to have a higher earnings potential.

The second group concerning school experience are intended to further capture individual characteristics. Work experience at school might be expected to raise wages through its effect on human capital formation. Truancy is intended to reflect motivation, and therefore one might find a dual effect as before. The effect on earnings potential is likely to be negative, however, this may be mitigated in the uncorrected estimates, in as much as people with lower motivation are likely to have higher reservation wages. Exam results, represented here by the ILEA score, are likely to have a positive effect on wages, reflecting as they do (perceived or real) differences in potential productivity.

One family background variable, indicating whether or not the individual's father had a non-manual occupation, is included to take account of the influence of social class. Whilst the regional average adult weekly wage subdivided by sex is included to reflect general differences in the levels of remuneration in the area. The results are discussed in detail below, it may be noted, however, that a number of variables reflecting family background were experimented with, all of which were singularly unsuccessful in explaining differences in wages.

Variables are also introduced to take account of the intervening labour market experience. Specifically, terms are included representing early employment experience, and the duration of unemployment and further education. Human capital levels are likely to fall with unemployment duration and rise with the duration of employment. Unemployment duration in combination with early employment experience (EMPLOYED IN SEPTEMBER 1984) should pick up both of these aspects, although, given the length of time under consideration, their effects may not be very pronounced. Further education would, in the long run, tend to raise earnings and reservation wages, however, the observation regarding the time scale is further reinforced here. The inclusion of these variables is principally motivated by the desire to ensure that the measured YTS "effect" is not simply picking up other aspects of intervening labour market experience.

As regards the job characteristics included in the wage equations, variables are introduced to control for the number of hours worked, whether the person had changed jobs over the period 1984-86, self-employment, non-manual employment, whether the job was an apprenticeship, or the job involved some on-the-job training (considered long if it lasted for more than a month). The three variables here are considered independently. That is, the impact of an apprenticeship is comprised of all three of these variables. Also included are dummy variables representing whether or not the job involved the supervision of others and whether it was temporary or not. Additional dummy variables are included to take into account the characteristics of the employer, namely, whether the firm employed more than twenty-five workers and its one digit SIC.

As regards the estimation of "expected" wages, the explanatory variables employed in the wage equation are used. On the other hand, the estimation of reservation wages takes a slightly different form. The static labour supply model includes the same explanatory variables employed for the wage equation with the exception of experience variables, whilst the job search motivated estimates include, in addition, all the variables entering the employment and YTS participation equations. The specification of these is derived from the specification adopted in the previous chapter with the addition of the adult weekly wage-rate and the duration variables.

5.3: Results

5.3.1) Wages

Table 5.2 produces the results of estimating the equations given by (5.57), (5.57'), (5.58) and (5.58'). Full results for the bivariate probit estimation of employment determination and YTS participation are given in the appendix to this chapter. The first two columns in the table present uncorrected estimates without (5.57) and with (5.58) controls for job characteristics. The third and fourth columns present the corresponding estimates (5.57' and 5.58') including correction terms of the form defined by (5.55) and (5.56) for YTS participants and by (5.55') (5.56') for non-participants. The equations are estimated by OLS with corrected standard errors[47].

47 Tunali (1986) gives the precise form of the correction.

The point of central importance emerging from the estimation is that YTS participation has a statistically significant negative influence on wages when no account is taken of sample selection. Once correction terms are introduced, this negative influence disappears. This is consistent with YTS having a negative influence on wages through the lowering of reservation wages and the raising of the probability of receiving a job offer. Estimation without sample selection controls comprises "reservation wage", "job offer" and "human capital" effects of YTS. Once controls for sample selection are introduced, the coefficient on YTS participation is purged of (direct and indirect) "reservation wage" effects as well as the direct influence of the job offer probability. This suggests that there was, at least in the time scale considered here, no "human capital" effect. That is, no raising of potential wages through the enhancement of individuals human capital.

As regards the correction terms, it may be noted that although the individual t-ratios are not significant, an F-test on the joint significance of the terms gives values of 8.98 (without job characteristics) and 17.25 (with job characteristics) which is significant at 1%[48]. Thus, one may reject the hypothesis that both terms are equal to zero. The estimated covariance between the errors in the employment and wage equations is, in both cases, positive, whilst the corresponding term for the YTS and wage equations is negative. Both of these effects produce a downward bias on the YTS coefficient in the uncorrected equation. Thus, it may be concluded that the negative effect of YTS participation on wages when sample selection is not taken into account is due to the negative (direct and indirect) effect of YTS on the reservation wage and its positive influence on the job offer probability as well as being caused by YTS participants having unobserved characteristics (such as a lack of motivation) which were negatively related to earnings potential. On the other hand, the lack of individual statistical significance of the covariance terms suggests, however, that one should not place too much stress on the point estimates. Certainly it is not possible to distinguish between the effects of non-random employment determination and non-random YTS participation, far less, as it stands, say anything about the relative importance of the effects of YTS on preference formation, erroneous expectations and the job offer probability.

It may be observed that being female has a significant positive influence on wages. As noted above, this may be attributed to the lower differential between adult and juvenile female wages.

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48 The critical F-value in both cases is 4.61 (with 2 and 1927 or 1910 degrees of freedom).

There is slight evidence that being disabled reduced wages although this effect is not statistically significant at conventional levels. On the other hand, belonging to an ethnic minority appears to raise earnings. Indeed, the coefficient for ethnic minorities is positive and always significant albeit at a 10% significance level. That is, the positive influence on wages for this group, for which there is some evidence, cannot be attributed to higher reservation wages using the interpretation of the correction terms suggested above. One possible explanation is that ethnic minorities tend to be concentrated in cities (and above all in London[49]) where, ceteris paribus, wages are higher, even though, the inclusion of the regional adult wage should control for this to some extent.

Serious truancy has a positive and statistically significant effect on wages with and without correction terms. Occasional truancy, on the other hand appears to have no significant effect. The ILEA score has a small positive influence on wages, although this effect tends to be weaker when job characteristics are taken into consideration, suggesting that exam success was important also in determining the type of job attained.

The variable reflecting social class (non-manual father) is positive but never statistically significant. This contrasts strongly with the results concerning employment determination. In chapter four it was shown that social class was an important determinant of the probability of finding work, even taking into account indicators of ability. Thus, it would appear that social class, or, more generally parental background, is important in determining employment but not wages.

The labour market experience variables are not generally statistically significant, however, as noted above, their inclusion is important to ensure that the coefficient on the YTS participation dummy was not picking up other aspects of labour market experience. It is interesting to note, however, that the coefficient on the (natural logarithm of the) duration of further education is negative in both the uncorrected equations (and significant at 10% in the equation including job characteristics) becoming positive, albeit not statistically significant, in the corrected equations. This might be attributed to either the higher probability of receiving a job offer or the lower reservation wages of those continuing in further education.

It may be noted that the inclusion of job characteristics increases substantially the significance of the regression. It is interesting to observe that the coefficient on the natural logarithm of hours

49 4% of Londoners report themselves as coming from an ethnic minority as opposed to 2% of the sample as a whole.

worked is significantly less than one, implying that wage-rates fell with the length of the working day. This finding is not consistent with an utility maximising model in which individuals choose jobs and hours, providing some support for the (implicitly assumed) exogenously determined hours. As regards the other variables, it may be noted that an apprenticeship significantly reduced wages. This is important, in as much as the inclusion of this term, and the other training terms ensures that the negative effect of YTS participation is not to be attributed to ongoing training. It may also be noted that working for a large firm had a strong positive effect confirming the picture provided by, for example, Main & Reilly (1993) of significant differences in wages by firm size.

In order to investigate the role of YTS in more detail it is useful to consider a model of the form of (5.59,5.59') above. That is, the estimation of wages separately for YTS participants and non-participants. Table 5.3 reproduces the results of this exercise. To derive tests of significance on the individual coefficients, a model of the form of (5.60) was also estimated[50]. Full results of this equation are reported in the appendix to this chapter, coefficients which were found to be statistically significant at a 10% significance level are reported in bold letters in table 5.3. An F-test of the significance of differences between the two equations produces a value of 2.30 which is significant at 1%[51].

The first column of table 5.3 reports the results of estimating equation (5.59') for non-participants. The second column reports the coefficients from the wage equation (5.59) estimated for YTS participants. The striking feature of the results is the fact that the constant term in the participants' equation significantly (at 10%) **greater** than the corresponding term in the non-participants equation. The reason for this may be sought in the difference in the coefficient on the log of adult weekly wages. The earnings of young people who participated on YTS are much less responsive to adult earnings than non-participants. In the separate equations the difference is of the order of 13 percentage points in the elasticity of earnings with respect to adult wages. Estimating an equation of the form of (5.60), increases this estimated difference to 23 percentage points (table

[50] The difference between this procedure and the separate estimation of the wage equation for participants and non-participants is that the former imposes the restrictions that the error variance in the wage equation and the estimated error covariance terms are the same for YTS participants and non-participants.

[51] The critical value of the F-test at 1% with 16 and 1911 degrees of freedom is 2.00. It will be observed that for the F-test to be valid, the variance of the error terms from the two equations must be equal. An F-test of the difference between the error variances produces a value of 1.07. The critical value with 890 and 1051 degrees of freedom is 1.08. Therefore the null hypothesis of the equality of error variance is not rejected.

A5.2). Also significant are the differences between the coefficients on the ILEA score and on the dummy variable representing a non-manual father. Exam performance appears to be have a significantly greater positive impact on wages for YTS participants, whilst having a non-manual father seems to reduce the wages of participants but not those of non-participants. In the case of both these variables, however, the size of the estimated difference is much smaller than for the intercept and the coefficient on the adult wage-rate, indicating that differences in the responsiveness of wages to this variable for participants and non-participants was relatively unimportant.

One possible interpretation of this result is that, on the one hand YTS was channelling young people into lower paid jobs with a low responsiveness to the adult wage, producing the smaller elasticity with respect to the adult wage. This was made possible through the work socialisation or preference formation effect of YTS. On the other hand, given that YTS participants tended to be located in the lower paid occupations, they did gain some relative advantage out of human capital accruing to them on the scheme, leading to the positive difference in the intercepts (reinforced by the benefits of good exam performance). The net effect of these two opposing influences, reflected by the pooled regression with a YTS dummy, is nil. Such an interpretation goes rather beyond the simple underlying job search framework adopted here. In order to model this more subtle type of effect, one would require a more detailed analysis of the selection mechanism, perhaps along the lines of that adopted by DMT. I would suggest, however, that the appropriate selection mechanism would be concerned with distinguishing between types of occupation, in addition to the employment/unemployment dichotomy, rather than forms of training regime per se. The problem with such an analysis is that, in order to derive reasonable results, one would require a rather larger sample size than is available here. One wonders, indeed, whether even the later youth cohort studies would be sufficiently large to derive statistically significant differences between groups.

Turning to the other explanatory variables, one may note that the coefficient on DISABILITY and BLACK actually increases for YTS participants, although the difference is not statistically significant. This, perhaps, represents the other side of the coin of the findings regarding employment prospects. It was shown above, in chapter four, that young blacks or disabled people received no positive increase in the chances of finding work as a result of participating on YTS. Here, the results suggest that if they managed to get over the barrier of finding a job their earnings

did actually increase. Obviously, not too much weight should be attached to this observation given the lack of statistical significance.

5.3.2) Reservation and "Expected" Wages

I turn now to explicit consideration of reservation and "expected" wages[52]. Table 5.4 presents the results of estimating corrected and uncorrected "expected" wage equations. The first column gives the results of estimating equation (5.64) for all the unemployed introducing a YTS participation dummy. The second reports the results of the corrected equation (5.64'). As noted above, the specification is the same as that used for the wage equation. The sample selection terms are jointly significant, the F-value being 8.06 (the 1% critical value being 4.61 as before). The principal result of note arising from the corrected equation is that the value of the YTS coefficient falls, although it is no longer statistically significant. This is quite the opposite of the effect on wages and its cause may be sought in the estimated covariances between the wage equation and the employment and YTS equations respectively. It will be observed that the covariance term from the former is negative, whilst it is positive in the latter case. As noted above, the sign of both of these covariance terms suggest that the effect of YTS on "expected" wages is overestimated in the uncorrected equation. Thus, there is some slight evidence of an "erroneous expectations effect" of YTS on "expected" wages.

To investigate this issue further, equations (5.65), (5.66) and (5.66') were estimated. That is, in an attempt to distinguish between the hypothesis that the statistical insignificance of the YTS coefficient in the corrected was due to the non-existence of the effect and the alternative that YTS was, by making young people's wage "expectations" more realistic was having a negative influence on "expected" wages, but that collinearity (i.e. Main's "statistical problems" noted above) between the correction terms and YTS participation was preventing the effect to be identified with precision. Thus, the hypothesis that systematic component of the wage "expectations" of the unemployed were not statistically different from the wages of the employed was tested. Firstly, using all young people in the sample, and, secondly, considering the hypothesis separately for YTS participants and non-participants. I do not report the full results suffice it to say that for the entire sample an F-test of the

[52] That is, the wages that young unemployed people said they expected to earn in their next job.

pooling restriction gives a value of .94, which is not statistically significant[53]. On the other hand, when pooled "expected"/realised wage equations (5.66) and (5.66') are estimated separately for YTS participants and non-participants, one finds that whilst, for YTS participants the pooling restriction is not rejected[54], for non-participants it is. The value of the F-test in the latter case is 2.30 which may be compared to the critical 1% value of 2.00 (with 16 and 1253 degrees of freedom). I interpret these results as support for the argument that YTS participation, by reducing the erroneously formed wage expectations, did have a role to play in making young people's wage "expectations" "more realistic", although identification of the effect in the "expected" wage equation is impeded by collinearity between the correction terms and the YTS participation dummy. This interpretation is supported also by the direction of the bias in the YTS effect in the uncorrected estimates. That is, correction of sample selection bias leads to a *reduction* of the coefficient on YTS participation in the "expected" wage equation (5.64'). I leave the reader to judge how reasonable are these conjectures.

As regards the estimates of the reservation wage, I present the full results of two basic specifications in Table 5.5 both without and with corrections for sample selection bias. The first column reports the results of the static labour supply model given by (5.67) with only a limited set of explanatory variables whilst the second column reports the results of a reduced form version of the job search motivated reservation wage equation given by (5.68). The third and fourth columns report the results of the corrected estimates of the two models given by (5.67') and (5.68'). An F-test of the joint significance of the sample selection terms gives values of 6.40 for the static model and 13.28 for the job search model. Both of these are significant at a 1% level[55].

It will be observed that the effect of YTS on reservation wages is negative and statistically significant in the uncorrected estimates. In the corrected static model (column three) the effect remains statistically significant whereas in the job search model with its sounder theoretical base the significance disappears. With regard to the latter estimates, it is worth noting that only one of the entire vector of coefficients (on serious truancy) is individually statistically significant. Clearly, the problems of multicollinearity arising in the case of the corrected estimates of "expected" wages are compounded here by the necessity of including all the explanatory variables in complete model in the

[53] The critical value at a 5% significance level is 1.64 with 16 and 2419 degrees of freedom.
[54] The value of the F-test is 1.43, the critical 5% value being, as before, 1.64 (with 16 and 1134 degrees of freedom).
[55] The 1% critical value is 4.61 with 2 and 495 or 481 degrees of freedom.

reservation wage equation. On the other hand, in the model given by (5.68') reported in column four, the signs of the covariance terms conform to the prior expectations, both implying an overestimate of the effect of YTS in the uncorrected estimation. Once again, given the lack of individual statistical significance one should not place too great an emphasis on this result. However, one may make some progress by estimating separate reservation wage equations for YTS participants and non-participants given by (5.69) and (5.69'). An F-test represents, as before, a test of the hypothesis that the systematic component of reservation wages of YTS participants was not significantly different from those of non-participants. The F-test in this case produces a value of 1.67 which allows the refutation of the null hypothesis (no difference between the coefficients) at a 5% level of significance (the critical value is 1.52 with 27 and 454 degrees of freedom), but not at 1% (the critical value is 1.79). Thus, there is some weak support for the idea that YTS participation did have a role to play in the reduction of reservation wages. The precision of the estimate, however, is impeded in the reduced form estimates due to multicollinearity amongst the explanatory variables (including the correction terms).

Thus, the estimation of the "expected" and reservation wages of the unemployed with corrections for non-random employment determination and YTS participation provide some evidence to support the notion that YTS did have a role to play in reducing errors in the formation of wage "expectations" and reducing the reservation wages and of the unemployed. The model outlined above, in section 5.1.4, suggests that part of the reduction in reservation wages is, in itself, to be attributed to reduced wage "expectations".

The final issue to be considered, albeit in a rather informal manner, is the question of the job offer probability. Estimation of the implied parameter on YTS in the estimation of the employment equation (5.50') using the methodology outlined in section 5.1.5, produces a value of .36, whereas subtraction of the coefficient on YTS in the reservation wage equation (5.67') form the coefficient on YTS in the wage equation (5.57') produces a value of .13. The estimate of the parameter on YTS participation is thus nearly three times the size of the parameter derived from the combination of the wage and reservation wage equations[56]. Thus, one has some evidence (which, it must be emphasised,

[56] It might be observed that this is, if anything a conservative estimate of the parameter on YTS in the employment equation. Using the results of the switching bivariate probit model of YTS participation and employment determination reported in chapter four, table 4.5, to derive the estimate, produces, for an average individual, an implied parameter of .68.

is, given the nature of model estimated necessarily rather informal) to support the idea that YTS participation enhanced the prospects of receiving a job offer, which in turn would tend to reduce the realised wage of young YTS participants when no account was taken of sample selection bias.

5.4: Conclusions

In this chapter I have examined the question of the impact of YTS on wages. In particular, estimating wage, reservation and "expected" wage equations it was found that YTS had a negative impact on earnings when no account was taken of non-random employment determination and YTS participation. This effect disappears when these factors are taken into consideration.

The results are qualitatively similar to those of M&S and W&B although the model goes rather beyond both of these in allowing for two sources of sample selection bias and in explicitly considering the source of the negative YTS wage effect. W&B find a small negative impact of YTS participation on wages, however, they do not present results corrected for sample selection bias. M&S find a small negative impact as well, however, this effect disappears when account is taken of non-random YTS participation. On the other hand, DMT find a negative effect on the wages of female participants even taking into account sample selection bias. In as much as none of these studies take into account sample selection bias arising from both non-random YTS participation and non-random employment determination, it was argued above that the models are misspecified. The simple job search framework proposed here also allows a coherent interpretation of the results to be offered. Whilst M&S suggest that "the lack of precision in the estimates....reflects, in part, the difficulty in estimating wage equations for young workers," the analysis presented here, in the context of a simple job search model may be given a different interpretation. That is, the introduction of rudimentary theoretical considerations absent from the M&S, W&B, DMT2 and DMT3 allowed three (principal) possible effects to be identified. A positive "human capital" effect and negative "reservation wage" and job offer effects. The principal conclusions to be drawn from the results presented here are, firstly, that sample selection bias due to non-random employment determination and/or non-random YTS participation was present. Secondly, the "human capital" effect of YTS

participation due to the increased productivity of young people who participated on the scheme was negligible or non-existent.

Rather more tenuous conclusions might be offered regarding the source of sample selection bias and, therefore, by implication the causes of the enhanced employment probabilities of YTS participants. Whilst the absence of a "human capital" effect implies that increased potential productivity arising from the training component of YTS, since it was effectively non-existent, is definitely not the cause of the increased employment probability due to YTS participation. On the other hand, distinguishing between the "preference formation", "erroneous expectations" and "job offer" effects of YTS proved to be more difficult. Tentative evidence of the existence of these effects has been presented, however, no attempt was made to distinguish between their influence on sample selection. Indeed, to do so would require a structural model rather than the reduced form presented here.

Thus, the findings presented here are consistent with the suggestion that YTS "enhanced" the employment prospects of young people in terms of raising their chances of finding employment through an increase in the probability of receiving a job offer and through the lowering of reservation wages. The latter effect being composed of a direct "preference formation" effect and an indirect effect due to the increased realism of participants' wage "expectations. On the other hand, YTS did nothing to raise participants wages through the enhancement of their human capital.

Table 5.1: Descriptive Statistics (standard deviations of continuous variables in brackets).

	EMPLOYED				UNEMPLOYED			
	YTS (n=891)		NO YTS (n=1052)		YTS (n=275)		NO YTS (n=233)	
WAGE	55.5	(15.6)	63.1	(19.7)	-		-	
RESERVATION WAGE	-		-		46.1	(11.6)	51.6	(15.0)
EXPECTED WAGE	-		-		61.7	(16.0)	69.2	(20.4)
INDIGENOUS CHARACTERISTICS								
DISABILITY	.02		.02		.05		.05	
BLACK	.01		.02		.04		.03	
FEMALE	.51		.51		.52		.54	
SCHOOL EXPERIENCE								
WORK EXPERIENCE AT SCHOOL	.34		.36		.30		.27	
SERIOUS TRUANT	.13		.15		.29		.35	
OCCASIONAL TRUANT	.39		.37		.36		.33	
ILEA SCORE	20.1	(11.1)	23.8	(12.7)	13.2	(9.82)	15.7	(13.5)
FAMILY BACKGROUND								
OWNER OCCUPIER	.65		.69		.49		.48	
LABOUR MARKET								
ADULT WEEKLY WAGE-RATE	166.1	(36.6)	170.9	(40.0)	161.8	(34.9)	164.4	(34.9)
EXPERIENCE 1984-86								
EMPLOYED SEPTEMBER 1984	.04		.48		.03		.20	
DURATION OF UNEMPLOYMENT	.84	(1.87)	1.02	(2.34)	6.43	(3.93)	9.00	(6.03)
DURATION OF FURTHER EDUCATION	.62	(2.29)	3.90	(4.98)	.43	(1.92)	3.58	(5.00)
JOB CHARACTERISTICS								
HOURS WORKED	39.7	(4.78)	39.9	(5.29)	-		-	
JOB CHANGED	.11		.15		-		-	
NON-MANUAL JOB	.44		.51		-		-	
SELF-EMPLOYED	.02		.01		-		-	
APPRENTICESHIP	.20		.18		-		-	
ON-THE JOB TRAINING	.51		.57		-		-	
LONG ON-THE-JOB TRAINING	.32		.34		-		-	
JOB SUPERVISORY	.13		.15		-		-	
LARGE FIRM	.50		.58		-		-	
TEMPORARY JOB	.06		.06		-		-	
INDUSTRY:								
ENERGY (1)	.01		.02		-		-	
MINERALS (2)	.03		.04		-		-	
METALS & OTHER MAN.(3,4)	.24		.25		-		-	
BUILDING & BANKING (5,8)	.19		.21		-		-	
TRANSPORT (7)	.04		.04		-		-	
OTHER SERVICES (9)	.15		.16		-		-	
NOT STATED	.07		.06		-		-	

Table 5.1 continued: Descriptive Statistics

	EMPLOYED				UNEMPLOYED			
	YTS (n=891)		NO YTS (n=1052)		YTS (n=275)		NO YTS (n=233)	
EMPLOYMENT VARIABLES								
PART-TIME JOB AT SCHOOL	.56		.67		.44		.48	
OWNER OCCUPIER	.65		.69		.49		.48	
FATHER IN FULL-TIME JOB	.80		.84		.63		.63	
FATHER IN PART-TIME JOB	.01		.01		.01		.03	
FATHER UNEMPLOYED	.08		.05		.20		.15	
NON-MANUAL MOTHER	.31		.41		.19		.27	
UNEMPLOYMENT RATE	10.84	(3.44)	9.99	(3.29)	11.81	(3.56)	10.80	(3.33)
LONDON	.06		.13		.03		.08	
SOUTH EAST	.17		.27		.06		.12	
NORTH AND MIDLANDS	.60		.44		.73		.61	
WALES	.04		.04		.09		.06	

Table 5.2: Corrected and Uncorrected Wage Equation. The dependent variable is the natural log of weekly wages. (t-ratios in brackets)

	UNCORRECTED ESTIMATES		CORRECTED ESTIMATES	
	WITHOUT JOB CHARACTERISTICS	WITH JOB CHARACTERISTICS	WITHOUT JOB CHARACTERISTICS	WITH JOB CHARACTERISTICS
INTERCEPT	-.49 (-1.32)	-1.40 (-3.37)	-.81 (-1.73)	-1.68 (-3.73)
INDIGENOUS CHARACTERISTICS				
DISABILITY	-.05 (-1.28)	-.06 (-1.56)	-.05 (-1.27)	-.06 (-1.58)
BLACK	.07 (1.67)	.07 (1.67)	.08 (1.81)	.07 (1.78)
FEMALE	.30 (9.53)	.26 (8.52)	.32 (8.89)	.27 (8.14)
SCHOOL EXPERIENCE				
WORK EXPERIENCE AT SCHOOL	.01 (1.12)	.01 (.84)	.01 (1.16)	.01 (1.03)
SERIOUS TRUANT	.05 (2.70)	.04 (2.37)	.05 (2.67)	.04 (2.29)
OCCASIONAL TRUANT	.01 (1.03)	.01 (.71)	.01 (1.04)	.01 (.64)
Log(ILEA SCORE)	.02 (2.79)	.01 (2.08)	.02 (2.62)	.01 (1.98)
FAMILY BACKGROUND				
NON-MANUAL FATHER	.01 (.96)	.02 (1.37)	.02 (1.13)	.02 (1.55)
LABOUR MARKET				
Log(ADULT WEEKLY WAGE-RATE (£))	.86 (12.32)	.78 (12.21)	.89 (11.07)	.82 (11.14)
EXPERIENCE 1984-86				
EMPLOYED SEPTEMBER 1984	.00 (.15)	.00 (.23)	.01 (1.29)	.08 (1.10)
Log(DURATION OF FURTHER EDUCATION (months))	-.01 (-.80)	-.01 (-1.69)	.03 (1.01)	.02 (.53)
Log(DURATION OF UNEMPLOYMENT (months))	-.00 (-.25)	-.01 (-1.11)	.12 (.37)	-.01 (-.20)
YTS	-.10 (-5.38)	-.08 (-4.75)	.02 (.19)	.01 (.11)
JOB CHARACTERISTICS				
Log(HOURS WORKED)	-	.31 (7.12)	-	.31 (7.16)
JOB CHANGED	-	.06 (3.99)	-	.06 (3.95)
NON-MANUAL JOB	-	.04 (3.19)	-	.04 (3.22)
SELF-EMPLOYED	-	.12 (2.61)	-	.12 (2.68)
APPRENTICESHIP	-	-.11 (-6.51)	-	-.11 (-6.54)
ON-THE JOB TRAINING	-	.05 (3.55)	-	.05 (3.59)
LONG ON-THE-JOB TRAINING	-	-.04 (-2.62)	-	-.04 (-2.67)
JOB SUPERVISORY	-	.05 (3.01)	-	.05 (3.06)
LARGE FIRM	-	.14 (12.78)	-	.14 (12.86)
TEMPORARY JOB	-	.06 (2.61)	-	.06 (2.59)
INDUSTRY:				
ENERGY (1)	-	.19 (4.07)	-	.20 (4.08)
MINERALS (2)	-	.15 (4.76)	-	.14 (4.77)
METALS & OTHER MAN.(3,4)	-	.08 (5.27)	-	.08 (5.26)
BUILDING & BANKING (5,8)	-	.06 (3.74)	-	.06 (3.77)
TRANSPORT (7)	-	.11 (3.79)	-	.11 (3.83)
OTHER SERVICES (9)	-	.02 (1.31)	-	.02 (1.33)
NOT STATED	-	.07 (2.98)	-	.07 (3.03)
EMPLOYMENT CORRECTION TERM	-	-	.00 (.07)	.02 (.28)
YTS CORRECTION TERM	-	-	-.07 (-1.18)	-.05 (-.98)
Adjusted R-Squared	.14	.30	.14	.30
n	1943	1943	1943	1943

Notes: 1)The first two columns of the table show the results of estimating models given by (5.57) and (5.58) without the addition of correction terms. The first column presents the results for estimation without job characteristics, the second includes them.

2) Columns three and four present the results (without and with job characteristics respectively) of estimating the models given by (5.57') and (5.58') with the correction terms as specified by (5.55) and (5.56) or (5.55') and (5.56') as appropriate.

3) Full results for the bivariate probit model of YTS participation and employment determination used to calculate the correction terms are given in an appendix to the chapter (table A5.1). The precise form is derived from the theoretical model. It might be observed that the equations are "reduced forms" in as much as both YTS and employment equations contain the same variables, the effect of YTS being left implicit. It should also be noted they there form is derived from an index function of the type implied by (5.50). That is, all the variables entering the wage and/or reservation wage equations (without job characteristics) are entered with the addition of other variables thought to affect the chances of receiving a job offer but not the wage variables.

4) F-tests on the joint significance of the selection bias correction terms produce values of 8.98 (without job characteristics) and 17.25 which are significant at a 1% level, the critical value, in both cases, being 4.61 ($F_{(2,1927)}$ and/or $F_{(2,1910)}$).

Table 5.3: Wage Equations estimated separately for YTS participants and non- participants, corrected for sample selection bias.The dependent variable is the natural log of weekly wages.
(t-ratios in brackets)

	NON-YTS PARTICIPANTS	YTS PARTICIPANTS
INTERCEPT	**-.88 (-1.62)**	**- .31 (-.31)**
INDIGENOUS CHARACTERISTICS		
DISABILITY	-.06 (-1.16)	-.04 (-.47)
BLACK	.06 (1.16)	.13 (1.50)
FEMALE	.33 (7.84)	.28 (3.17)
SCHOOL EXPERIENCE		
WORK EXPERIENCE AT SCHOOL	-.00 (-.23)	-.03 (-1.56)
SERIOUS TRUANT	.06 (2.62)	.03 (.98)
OCCASIONAL TRUANT	.29 (1.74)	-.01 (-.28)
Log(ILEA SCORE)	**.00 (.51)**	**.03 (2.89)**
FAMILY BACKGROUND		
NON-MANUAL FATHER	**.04 (2.10)**	**-.02 (-.67)**
LABOUR MARKET		
Log(ADULT WEEKLY WAGE-RATE)	**.93 (9.76)**	**.80 (4.11)**
EXPERIENCE 1984-86		
EMPLOYED IN SEPTEMBER 1984	.05 (.64)	.09 (.24)
Log(DURATION OF FURTHER EDUCATION (months))	.01 (.36)	.05 (.41)
Log(DURATION OF UNEMPLOYMENT (months))	.03 (.70)	-.01 (-.12)
EMPLOYMENT CORRECTION TERM	-.06 (-.76)	.07 (.40)
YTS CORRECTION TERM	-.03 (-.59)	-.08 (-.33)
Adjusted R-Squared	.13	.05
n	1052	891

Notes: 1) The table reports the results of estimating equations of the form of (5.59) and (5.59'). The sample selection terms are given by (5.55) and (5.56) or (5.55') and (5.56') as appropriate.
2) An F-test of the joint significance of the YTS interaction dummies produces a value of 2.30 which may be compared to the 1% critical value of 2.00 (16 and 1911 degrees of freedom).
3) Coefficients reported in bold letters are those for which the difference in the coefficient was found to be statistically significant at 10% using the model given by equation (5.60) in the text. Full results for this model are reported in the appendix to this chapter (table A5.2).

Table 5.4: Expected Wage Equation with and without correction terms.The dependent variable is the natural log of expected weekly wages.
(t-ratios in brackets)

	UNCORRECTED ESTIMATES	CORRECTED ESTIMATES
INTERCEPT	.32 (.35)	.61 (1.02)
INDIGENOUS CHARACTERISTICS		
DISABILITY	.02 (.38)	.03 (.49)
BLACK	.06 (1.03)	.06 (.98)
FEMALE	.15 (2.00)	.13 (1.58)
SCHOOL EXPERIENCE		
WORK EXPERIENCE AT SCHOOL	.03 (1.37)	.03 (1.14)
SERIOUS TRUANT	.08 (2.83)	.08 (2.76)
OCCASIONAL TRUANT	.03 (.97)	.03 (1.01)
Log(ILEA SCORE)	.01 (1.33)	.01 (1.17)
FAMILY BACKGROUND		
NON-MANUAL FATHER	.03 (.94)	.03 (.74)
LABOUR MARKET		
Log(ADULT WEEKLY WAGE-RATE)	.73 (4.16)	.67 (3.24)
EXPERIENCE 1984-86		
EMPLOYED IN SEPTEMBER 1984	-.01 (-.19)	-.05 (-.45)
Log(DURATION OF FURTHER EDUCATION (months))	.00 (.22)	-.01 (-.24)
Log(DURATION OF UNEMPLOYMENT (months))	.01 (.88)	.03 (.35)
YTS	-.08 (-2.94)	-.14 (-.89)
EMPLOYMENT CORRECTION TERM	-	-.03 (-.29)
YTS CORRECTION TERM	-	.04 (.43)
Adjusted R-Squared	.14	.14
n	508	508

Notes: 1) The first column reproduces the results of estimating an equation of the form (5.64). The second column reports the results of estimation of (5.64') with corrections for sample selection bias defined by (5.-62) and (5.63) or (5.62') and (5.63') as appropriate.

2) An F-test refutes the null hypothesis that both correction (covariance) terms are zero. The value of the test is 8.06 whilst the 1% critical value is 4.61.

Table 5.5: Reservation Wage Equations with and without correction terms. The dependent variable is the natural log of weekly reservation wages.
(t-ratios in brackets)

	Uncorrected Estimates		Corrected Estimates	
	Static Labour Supply Model	Job Search Model	Static Labour Supply Model Estimates	Job Search Model
INTERCEPT	.36 (.38)	-2.62 (-.43)	.27 (.28)	-3.68 (-.54)
INDIGENOUS CHARACTERISTICS				
DISABILITY	-.04 (-.86)	-.06 (-1.06)	-.05 (-.90)	-.03 (-.43)
BLACK	.00 (.00)	-.02 (-.33)	-.00 (-.02)	-.02 (-.23)
FEMALE	.12 (1.49)	.31 (.66)	.12 (1.55)	.39 (.74)
SCHOOL EXPERIENCE				
WORK EXPERIENCE AT SCHOOL	.03 (.99)	.02 (.74)	.03 (1.02)	.02 (.38)
SERIOUS TRUANT	.06 (2.09)	.06 (1.87)	.06 (2.05)	.07 (1.67)
OCCASIONAL TRUANT	.02 (.70)	.02 (.73)	.02 (.71)	.02 (.77)
Log(ILEA SCORE)	.01 (.74)	.01 (1.03)	.01 (.83)	.01 (.44)
FAMILY BACKGROUND				
NON-MANUAL FATHER	.01 (.24)	.01 (.22)	.01 (.29)	-.00 (-.03)
LABOUR MARKET				
Log(ADULT WEEKLY WAGE-RATE (£))	.68 (3.80)	1.33 (1.14)	.69 (3.81)	1.48 (1.10)
EXPERIENCE 1984-86				
EMPLOYED SEPTEMBER 1984	-	- .00 (-.08)	-	-.03 (-.08)
Log(DURATION OF FURTHER EDUCATION (months))	-	- .01 (-.07)	-	-.01 (-.07)
Log(DURATION OF UNEMPLOYMENT (months))	-	.01 (.67)	-	.08 (.35)
YTS	-. 09 (-3.75)	-.09 (-2.93)	-.09 (-2.97)	-.11 (-.20)
	-	-	-	-
EMPLOYMENT VARIABLES				
PART-TIME JOB AT SCHOOL	-	.00 (.18)	-	-.00 (-.06)
OWNER OCCUPIER	-	.03 (1.22)	-	.03 (.81)
FATHER IN FULL-TIME JOB	-	- .00 (-.03)	-	.00 (.12)
FATHER IN PART-TIME JOB	-	-.01 (-.11)	-	-.01 (-.06)
FATHER UNEMPLOYED	-	.04 (.97)	-	.06 (1.00)
NON-MANUAL MOTHER	-	-.01 (-.19)	-	-.01 (-.23)
Log(UNEMPLOYMENT RATE)	-	-.20 (-1.72)	-	-.18 (-1.33)
LONDON	-	-.20 (-.61)	-	-.27 (-.73)
SOUTH EAST	-	-.12 (-.96)	-	-.16 (-1.04)
NORTH AND MIDLANDS	-	.04 (.78)	-	.04 (.62)
WALES	-	.02 (.28)	-	.04 (.41)
EMPLOYMENT CORRECTION TERM	-	-	.01 (.35)	-.11 (-.32)
YTS CORRECTION TERM	-	-	- .00 (-.13)	.03 (.10)
Adjusted R-Squared	.14	.13	.14	.13
n	508	508	508	508

Notes: 1) The first and third columns report the results of estimating the static labour supply specification of the reservation wage equation given by (5.67) and (5.67') without and with sample selection correction terms (defined by (5.62) and (5.63) or (5.62') and (5.63') as appropriate) respectively. That is, the specification excludes variables thought to influence the reservation wage through the "expected wage" and the probability of receiving a job offer.

2) Columns two and four report the estimates for the uncorrected and corrected reduced form specification given by (5.68) and (5.68') respectively. That is, with the inclusion of all variables thought to influence the "expected wage" and the probability of receiving a job offer.

3) An F-test of sample selection bias gives a values of 6.40 for the static labour supply model and 13.28 for the job search motivated estimates. The critical 1% value in both cases is 4.61.

Table A5.1: Reduced Form Bivariate probit estimation of Employment and YTS participation employed for the sample selection correction.
(t-ratios in brackets)

	EMPLOYMENT	YTS PARTICIPATION
INTERCEPT	14.04 (.66)	2.55 (.13)
WAGE VARIABLES		
DISABILITY	-.52 (-2.02)	.01 (.03)
BLACK	-.06 (-.24)	-.24 (-1.01)
FEMALE	-1.20 (-.73)	-.11 (-.07à)
WORK EXPERIENCE AT SCHOOL	.01 (.13)	-.13 (-1.67)
SERIOUS TRUANT	-.28 (-2.56)	-.06 (-.60)
OCCASIONAL TRUANT	-.07 (-.70)	.08 (.99)
Log(ILEA SCORE)	.05 (1.31)	.03 (.94)
NON-MANUAL FATHER	.14 (1.31)	-.11 (-1.22)
Log(ADULT WEEKLY WAGE-RATE)	-2.25 (-.55)	-.45 (-.12)
EMPLOYED SEPTEMBER 1984	.14 (1.17)	-2.77 (-29.44)
Log(DURATION OF FURTHER EDUCATION)	- .07 (-1.67)	-1.08 (-26.69)
Log(DURATION OF UNEMPLOYMENT)	-1.07 (-23.69)	-.47 (-11.22)
EMPLOYMENT VARIABLES		
PART-TIME JOB AT SCHOOL	.08 (.91)	-.00 (-.04)
OWNER OCCUPIER	.04 (.46)	.11 (1.33)
FATHER IN FULL-TIME JOB	-.06 (-.46)	.13 (1.24)
FATHER IN PART-TIME JOB	-.18 (-.43)	-.65 (-1.85)
FATHER UNEMPLOYED	-.29 (-1.93)	.36 (2.51)
NON-MANUAL MOTHER	.06 (.60)	-.14 (-1.77)
Log(UNEMPLOYMENT RATE)	-.22 (-.55)	.38 (1.05)
LONDON	1.04 (.90)	-.12 (-.12)
SOUTH EAST	.70 (1.62)	.16 (.43)
NORTH AND MIDLANDS	.06 (.34)	.16 (.98)
WALES	-.27 (-.97ù)	.53 (2.18)
CORRELATION COEFFICIENT	-.24 (4.32)	
Restricted Log-Likelihood	-2941.25	
Unrestricted Log-Likelihood	-1513.59	
McFadden R-Squared	.49	
n	2451	

Table A5.2: Wage Equation with a full set of YTS interaction dummy variables and corrected for sample selection bias (MODEL 5.60). The dependent variable is the natural log of weekly wages.
(t-ratios in brackets)

	NON-YTS PARTICIPANTS	YTS PARTICIPATION DUMMIES (i.e. the difference in the parameters for YTS participants)
INTERCEPT	-1.08 (-2.06)	1.15 (1.67)
INDIGENOUS CHARACTERISTICS		
DISABILITY	-.06 (-1.26)	.04 (.43)
BLACK	.06 (1.15)	.07 (.69)
FEMALE	.35 (8.22)	-.00 (-.13)
SCHOOL EXPERIENCE		
WORK EXPERIENCE AT SCHOOL	-.00 (-.16)	.03 (1.34)
SERIOUS TRUANT	.06 (2.47)	-.02 (-.59)
OCCASIONAL TRUANT	.03 (1.70)	-.03 (-1.31)
Log(ILEA SCORE)	.00 (.58)	.03 (2.04)
FAMILY BACKGROUND		
NON-MANUAL FATHER	.04 (2.23)	-.07 (-2.21)
LABOUR MARKET		
Log(ADULT WEEKLY WAGE-RATE)	.96 (10.37)	-.23 (-1.66)
EXPERIENCE 1984-86		
EMPLOYED SEPTEMBER 1984	.07 (.93)	-.03 (.57)
Log(DURATION OF UNEMPLOYMENT(months))	.01 (.17)	.01 (.54)
Log(DURATION OF FURTHER EDUCATION(months))	.02 (.58)	.02 (.88)
EMPLOYMENT CORRECTION TERM	-.01 (-.09)	
YTS CORRECTION TERM	-.05 (-.93)	
Adjusted R-Squared	.14	
n	1943	

CHAPTER SIX: CONCLUSIONS

In this thesis I have looked at various aspects of young people's experience in and out of the labour market in the mid 1980's in England & Wales. The primary foci of interest were: factors influencing the school-leaving decision at sixteen; the impact of YTS participation on employment prospects; and, the effect of YTS on the wages and reservation wages of participants.

Chapter one provided an introduction to the evolution of the trends in the situation facing teenagers in the seventies and eighties. A brief review of explanations of youth unemployment concentrating on the relative importance of aggregate demand and youth wages was followed by a consideration of the policy response.

In chapter two, the principal data source, YCS was introduced and some issues surrounding its use were considered. The chapter also provided an opportunity to look at little closer at the experiences of young people in the period under consideration.

Chapter three considered factors influencing the school-leaving decision of sixteen year olds. The chapter provides a contribution, I hope, at both the theoretical and empirical levels. A fairly extensive consideration of previous studies of the question, and in particular a critical review of the seminal paper in the economic analysis of school-leaving by Willis & Rosen was followed by an empirical analysis. In both the literature review and the empirical results, grounds for criticism of the traditional human capital approach were found. The crucial difficulty with such models regards the typical assumption concerning the formation of expectations. In order to arrive at an estimable model, and without any direct evidence on expectations, one requires an assumption on the relationship between expectations and observed variables. The most usual approach has been to include, when available, an estimate of actual lifetime earnings to represent expectations. The problem with such an approach is that hypotheses concerning the adequacy of this proxy cannot be tested independently of hypotheses concerning the influence of expectations. The poor results produced by such models, therefore, may be attributed to two potential sources. Failure of the proxy to adequately measure expectations, and/or failure of the theoretical model to explain individual behaviour.

The results of chapter five might be brought into play at this point. It was shown there that the wage "expectations" of the unemployed who didn't participate on YTS were statistically different from the systematic component of the earnings of the employed. Thus, there is some evidence that actual earnings differ from "expected" earnings even early in ones "working" life. How much greater would one expect such a disparity to be when one considers "expected" earnings over a lifetime ?

The introduction of considerations regarding the introduction of unemployment and unemployment expectations into structural school-leaving models complicates things further. The approach of Kodde (1988) suggests a means of resolving these problems. That is, by way of a direct question concerning expectations. This simplifies things considerably since the model no longer requires the simultaneous determination of earnings, employment and school-leaving. Kodde's analysis remains somewhat ambiguous, however, in as much as the question asked of people did not explicitly make reference to lifetime earnings or employment prospects. One cannot therefore explicitly consider the issue of what exactly the expectations refer to. However, the analysis supports the idea that both unemployment and wage expectations have a role to play in the decision.

In the discussion of modelling issues, attention was also paid to the implications of introducing the role of government intervention in the youth labour market, and, in particular, the role of YTS in the decision. It was argued that the introduction of YTS was likely to alter the nature of the choice, ceteris paribus, raising the opportunity cost of staying-on in school. The picture is slightly complicated by the existence of displacement effects of YTS. That is, since, to some extent, YTS places replaced jobs which would have existed in any case, the considerations need to be slightly modified. In the case of displacement, YTS would actually lower the (short-run) opportunity costs of staying on in school, since, YTS positions provided a lower level of remuneration than "real" jobs.

In the absence of fuller information which might act as a basis for a structural model, the empirical section of the chapter reports the results of estimating a reduced form model of the choice. The principal innovation concerning the econometric estimation regarded the introduction of terms to test and control for the presence of heteroscedasticity in the estimates. Since, in the probit model, heteroscedastic errors affect the parameter estimates as well as their estimated standard errors, a treatment of the problem is important. The existence of standard options available in commercially

available packages (e.g. LIMDEP 6.0) to deal with the problem, at least in the case of the univariate model, mean that ignoring heteroscedasticity cannot be justified. In the event, the null hypothesis of homoscedasticity was rejected and consequently results for the heteroscedastic model were reported. It might be observed, however, that controlling for heteroscedasticity does not greatly change the size of the estimated effects of the explanatory variables.

Aggregate labour market variables (adult unemployment, youth unemployment and the ratio of adult non-manual to manual wages) were introduced to take some account of expectations, but clearly these do no adequately control for individual differences. The three variables were jointly significant and all have the expected signs, however, they were almost never individually significant. This suggests that, whilst expectations had some role to play, the poor quality of the variables employed to measure them, did not allow identification of the relative importance of these effects.

As regards other factors influencing the choice, the principal results of note reported in the chapter regard the role of social class in individuals' decisions. This role is substantial and statistically significant even controlling for ability and labour market variables. In the preferred model (model 5, table 3.3), having a professional father was found to raise the probability of staying on at school by 17 percentage points; having a father engaged in another non-manual occupation raised this probability by 12 percentage points; a non-manual mother implied an 8 percentage point increase; whilst, living in owner occupied accommodation increased the probability by 9 percentage points. Comparison with previous studies which analysed the decision during periods of relatively low unemployment suggested that the effect of social class has remained fairly constant in time. This was interpreted as additional evidence that class outweighs worsening labour market conditions in young people's choice. It was also suggested that the influence was too strong to be given a time-rate of preference interpretation. That is, it was suggested that familial background may play a role in the decision affecting both consumption and investment demand for education. Thus, social class is seen as affecting tastes for further education, but also as influencing the ability of young people to realise the potential gains from education. This contrasts strongly with the emphasis of papers from the human capital school (e.g. W&R) which consider familial background as having an influence on the decision entirely through its affect on the discount rate.

In chapter four, the impact of YTS on employment prospects was considered. Much attention was paid to modelling issues. In particular, it was suggested that the sample selection problem, often found to be present and influential in the determination of the effects of government programmes on wages, needs to be dealt with in the context of the analysis of the employment effects of YTS. After demonstrating that the Heckman correction procedure is not appropriate in the case of a non-linear probability model, the use of the bivariate probit model is proposed as a solution to the problem. Sample selection is found to be present and influential on the estimates obtained. This suggests that previous studies which do not deal with this issue may have estimated misspecified models.

In addition, some attention was paid to the identification of the differential impact of YTS on different types of individual. For this purpose, the chapter proposed an extension of the selected bivariate probit model of Van Praag & Van de Ven. The extension, which I call a switching bivariate probit model allows the explicit modelling of differential effects of YTS participation across different types of individual. Formal comparisons of the various models suggest that, in this case, the switching bivariate model is to be preferred.

Finally, at all stages of the modelling procedure attention was paid to the effects of heteroscedasticity on the estimates. In the case of the univariate model, the standard procedure employed in chapter three was adopted. For the bivariate and switching bivariate models a simple extension of the procedure is proposed and implemented. In all cases, heteroscedastic errors are found to be present.

In common with previous studies, it is found that participation on the scheme had, on average, a positive and statistically significant influence on the probability of finding employment. Using the univariate probit model, the estimated effect is of the same order as that found by Main & Shelley in Scotland and Whitfield and Bourlakis in England & Wales. It is also found that participation on the scheme did not remotely compensate for an initial lack of initial employment experience. That is, the scheme did not compensate young people for an initial failure to find employment. When the preferred switching bivariate probit model is estimated, this effect of YTS is found to be greater than that estimated by previous authors using the univariate probit model. On the other hand, the effect varies substantially across individuals. It is found that, in particular, ethnic

minorities and disabled people gained little or nothing from participation on the scheme, in terms of improved chances of finding work, and, therefore their relative disadvantage in the labour market was increased rather than reduced by participation on the scheme. On the other hand, females and truants seemed to do particularly well out of the scheme.

In chapter five, the analysis turns to the question of YTS and wages. This issue of the impact that participation on YTS had on the earnings of participants is of interest in itself but also helps to provide some insights into the mechanisms through which the effect of YTS on the probability of employment was operating. The introduction a simple job search model of employment determination, allows the identification of at least four possible mechanisms. These are identified as: the "human capital" effect - by increasing the level of human capital, the scheme might have raised participants' earnings potential and, consequently earnings in employment; the "direct reservation wage" or "preference formation" effect - by altering participants' relative preference for work as opposed to "leisure", the scheme may have reduced the reservation wage of participants; the "erroneous expectations" effect - by providing more and better information on the distribution of wage offers available in the labour market, the scheme may have allowed participants to form a more realistic (i.e. lower) estimate of the wage they might expect to receive given their individual characteristics; and, finally, the "job offer" effect - participation on the scheme may have raised the likelihood that a young person actually received an offer of a job. The presence of these different effects has implications for the estimation of the impact of YTS on the earnings of participants, and, on the interpretation of the positive employment probability effect of the scheme found in chapter four.

It was shown that, in the absence of controls for sample selection (truncation) bias, the measured effect of YTS on the realised earnings of those in employment will measure, not the effect of YTS on human capital, but rather a combination of all four of these effects. Introduction of controls for non-random employment determination in a wage equation for those in employment allows the identification of the "human capital" effect which proves to be zero. On the other hand, the separate estimation of wage equations for YTS participants and non-participants respectively provides some tentative evidence that, whilst YTS was pushing young people into lower paid

occupations, within those occupations, participants were able to gain a wage premium through human capital accumulation. The net effect being nil.

It is suggested that the "expected" wages of young people are likely to depend on both their earnings potential and on errors in the formation of these expectations. The combined estimation of the expected wages of the unemployed with the wages of the employed suggests that, for non-YTS participants, the "expected" wages of the unemployed are statistically distinguishable form the realised earnings of the employed whilst those of YTS participants are not. This suggests that the erroneous formation of expectations was present for non-YTS participants, with these errors being, to some extent corrected by YTS participation. Thus, there is some support for the idea that YTS did indeed have the effect of making participants wage expectations "more realistic".

The estimation of the effect of YTS on reservation wages was less conclusive. Three effects working through the reservation wage were identified in the theoretical part of the chapter. Through its influence on preference formation and in correcting errors in wage "expectations", YTS participation was likely to reduce the reservation wage, whilst any increase in the likelihood of receiving a job offer arising from participation on the scheme would tend to raise it. Unfortunately, it is not possible, in this framework to separately identify these three effects. The static labour supply model produces a negative and statistically significant effect of YTS participation even in the presence of controls for sample selection bias whereas the job search motivated estimates do not. Separate estimation of reservation wages for YTS participants and non-participants provides some slight evidence (statistically significant at a 5% significance level) that the reservation wages of participants was statistically distinguishable from those of non-participants.

As regards the probability of finding a job, it is shown that this will depend on both the difference between the (mathematical) expected values of the wage offer and the reservation wage, as well as on the probability of receiving an offer. Since the reservation wage depends also on the subjective expectations of individuals on the wage offer distribution, as well as on the probability of receiving an offer, all four effects are present in the employment determination equation. Taken as a whole, evidence was presented that the reduction of the "expected" and reservation wages of participants as well as the increase in the chances of receiving a job offer all have a role to play in determining the positive influence of YTS on employment probability.

To summarise, the findings of the chapter are that, firstly, YTS reduced the realised wages of participants who subsequently found employment. This reduction is attributable to changes in the expected and reservation wages of participants, as well as to an increase in the chances of receiving a job offer. Once controls for these factors are introduced, the negative effect of YTS disappears. At the same time, YTS had no appreciable effect on earnings through an increase in the level of human capital of participants. Some evidence was found that YTS participation had a depressing effect on the reservation and expected wages of participants, as well as raising the chances of being offered a job. It is suggested that all of these factors had a role to play in explaining the enhanced "employment prospects" of participants. Although, separate identification of the importance of these effects was not possible. Further analyses with more recent and better data might take up the issue of reconciling the findings of chapters four and five, as well as updating the findings presented here.

What then did YTS achieve ? To return to the aims of policy-makers identified in chapter one, it was suggest that YTS was, amongst other things, intended: to provide an effective transition from school to employment (Atkinson and Lawson, both quoted on p. 19); to increase the levels of participants' general human capital (HC papers, quoted on p. 19); to make young people's pay expectations more realistic (Lawson, p. 19); and, to provide work socialisation (Morrison, quoted on p. 21).

As regards the first of these, the issue was analysed in some detail in chapter four. It was found that, as a whole, YTS participation did increase, to some extent, the probability of finding employment, raising the probability of being in employment two years after reaching minimum school-leaving age by 21 percentage points for an average individual. On the other hand, two types of young person with disadvantages (the disabled and ethnic minorities) did not gain any statistically significant increase in the probability of finding work, suggesting that the scheme had the effect of widening gaps in opportunities for these groups. Furthermore, YTS participation did not, by any means, compensate young people for an initial lack of employment experience. Thus, at best, the effective transition was only partially achieved.

The analysis of chapter five suggests that the second aim was not achieved. Or, at least, that any increase in the level of human capital accruing to participants was not translated into an increase in their earnings. The analysis of chapter five also suggests that YTS participation did indeed lower

young people's wage expectations, rendering them "more realistic". There is also some support for the work socialisation role of YTS. It was suggested that through work socialisation YTS might have a direct negative effect on young people's reservation wages (i.e. the preference formation effect) although, in the results presented in the chapter it was not possible to disentangle the direct effect from the indirect effect working through wage "expectations".

The aims of YTS considered here form only a part of what policy-makers intended to achieve. Although the type of analysis presented in this thesis does not allow direct consideration of the wider issues, in conclusion, it might just be mentioned that, there has not been any appreciable reduction in unemployment as a result of widespread state intervention with micro-level policies. Unemployment is still hovering at around three million. On the other hand, the Conservative Party has won three consecutive general elections with unemployment at this level. Thus, if micro-level schemes have done little to reduce unemployment, it would appear that they may have helped in the political management of the problem.

APPENDIX: VARIABLE DEFINITIONS AND SOURCES

I present here full definitions of the variables employed in the analyses above, and references to the chapters in which they appear. The reference to the source of variables from the YCS provides information on the sweep in which they were asked and the number of the question on the questionnaire or, if they were obtained independently of the individual from the school records employed to identify potential respondents, this is stated. Thus, C1S1/P3Q2a means that the variable was derived from question 2a on page 3 of the questionnaire for sweep one and so on.

Variable	Definition	Source	Chapt
STAY ON	=1 if the young person replied that they were full-time at school or college at the time of the first sweep	C1S1/P4Q3	3
DISABILITY	=1 if yes to the question: Do you have a disability or handicap which would affect the type of work you could do or the sort of conditions you could work in ?	C1S2/P13Q4	3, 4, 5
BLACK	=1 if the person replied that they were of: a) Black/African/Caribbean; b) Indian; c) Pakistani; or, d) Bangladeshi origin. The alternatives (=0) were: White; None of these; or, I prefer not to say.	C1S2/P13Q6	3, 4, 5
GIRL	=1 if the person was female	School Records	3, 4, 5
PART-TIME JOB	=1 if yes to the question: "Did you do any of the following in the 4th or 5th years at school ? **Please tick either 'yes' or 'no' for each one**" under the reply: "a part time job e.g. a paper round or Saturday job".	C1S1/P1Q2	3, 4
WORK EXPERIENCE	=1 if yes to the question: "Did you do any of the following in the 4th or 5th years at school ? **Please tick either 'yes' or 'no' for each one**" under the reply: "a period of work experience (an unpaid job arranged through school for a short time)".	C1S1/P1Q2	3, 4
SERIOUS TRUANT	=1 if replied: "for weeks at a time", or, "for several days at a time", to the question: "Did you play truant in your 5th year at school ?"	C1S1/P1Q3	3, 4, 5
OCCASIONAL TRUANT	=1 if replied: "for particular days or lessons", or, "for the odd day or lesson", to the question: "Did you play truant in your 5th year at school ?"	C1S1/P1Q3	3, 4, 5
SIXTH FORM COLLEGE, GRAMMAR, COMPREHENSIVE (SIXTH FORM)	School type. Alternatives were: comprehensive to sixteen, secondary modern, and other.	School Records	3
ADVISED TO STAY BY FAMILY	=1 if ticked the box corresponding to,: "advised me to stay on", under the category, "family" , to the question: When you were about 16 and thinking whether to stay on at school or to leave, did any of these people advise you to stay on in full time education, and did any of them advise you to leave ? (there was also the possibility to reply, "No advice given").	C1S1/P3Q2	3

ADVISED TO STAY BY TEACHER	=1 if ticked the box corresponding to,: "advised me to stay on", under the category, "another teacher at school" , to the question: When you were about 16 and thinking whether to stay on at school or to leave, did any of these people advise you to stay on in full time education, and did any of them advise you to leave ? (there was also the possibility to reply, "No advice given").	C1S1/P3Q2	3
ADVISED TO STAY BY CAREERS SERVICE	=1 if ticked the box corresponding to,: "advised me to stay on", under the category, "someone from the Careers Service" , to the question: When you were about 16 and thinking whether to stay on at school or to leave, did any of these people advise you to stay on in full time education, and did any of them advise you to leave ? (there was also the possibility to reply, "No advice given").	C1S1/P3Q2	3
ILEA SCORE	Integer Index representing the respondents' grade score calculated as follows: 'O' level A B C D E 16+ A B C 2 3 4 5 CSE 1 2 3 4 5 SCORE 7 6 5 4 3 2 1	School Records	3, 4, 5
SIZE OF FAMILY	1 + number of brothers and/or sisters reported by respondent	C1S1/P11Q1	3
DAD PROFESSIONAL	This and the following five variables were derived from the question: "Please tell us about your parents' (or step parents') jobs. If they are not working at the moment please tell us about their most recent jobs. The replies elicited for father and mother separately were: a) What is the name of the job ? b) What kind of work do they do ? c) what sort of place or organisation do they work for (e.g. shop, factory, office, hospital, school etc.) ; d) are they self-employed ?.	C1S1/P11Q4	3
DAD OTHER NON-MANUAL	See above	C1S1/P11Q4	3
DAD NON-MANUAL	See above	C1S1/P11Q4	5
DAD SELF-EMPLOYED	See above	C1S1/P11Q4	3, 4
MUM NON-MANUAL	See above	C1S1/P11Q4	3, 4, 5
MUM SELF-EMPLOYED	See above	C1S1/P11Q4	3
DAD IN FULL-TIME JOB	This and the following two variables derived from the question: Which of the following apply to your parents (or step parents) to which replies were elicited separately for father and mother, the possible replies being: a) "in a full-time job"; b) "in a part-time job"; c) "unemployed"; d) "retired"; e) "doing full-time housework" ; and f) "something else (please describe)".	C1S1/P11Q3	4, 5
DAD IN PART-TIME JOB	See above	C1S1/P11Q3	4, 5
DAD UNEMPLOYED	See above	C1S1/P11Q3	3, 4, 5
OWNER OCCUPIER	=1 if replied "Owner occupied" to the question: Is the home you live in at the moment: a) "Rented from the Council"; b) "Rented privately"; c) "Owner occupied"; d) "Something else (please write in".	C1S1/P11Q5	3, 4, 5

EMPLOYED IN SEPTEMBER 1984	Derived from the diary question for September 1984, reply d). At the time of the first and second sweeps respondents were asked what they were doing in each month over the period September 1984-May 1985 (sweep 1) and May 1985-February 1986 (sweep 2). The possible categories were: a) out of work and registered at the Unemployment Benefit Office; b) out of work but not registered; c) on YTS; d) in a full-time job (over 30 hours a week); e) at school or sixth form college full-time; f) full-time at a College of Further Education; g) something else.	C1S1/P4Q1	4
YTS	Derived from the diary question from the two sweeps (see above). Includes all those replying at least once to category c).	C1S1/P4Q1 C1S2/P1Q2	4, 5
FURTHER EDUCATION	Derived from the diary question from the two sweeps (see above). Includes all those replying at least once to categories e) and/or f).	C1S1/P4Q1 C1S2/P1Q2	4
DURATION OF EMPLOYMENT	Derived from the diary question from the two sweeps (see above). = sum of the replies in category d).	C1S1/P4Q1 C1S2/P1Q2	5
DURATION OF FURTHER EDUCATION	Derived from the diary question from the two sweeps (see above). = sum of the replies in category e) and/or f).	C1S1/P4Q1 C1S2/P1Q2	5
DURATION OF UNEMPLOYMENT	Derived from the diary question from the two sweeps (see above). = sum of the replies in categories a) and/or b).	C1S1/P4Q1 C1S2/P1Q2	5
FULL-TIME EMPLOYMENT 1986	=1 if replied "in a full-time job (over 30 hours a week)" to the question asking what they were doing at the time of the second Rweep.	C1S2/P1Q2	4, 5
WAGE	Reply to the question: What is your weekly take-home pay after any stoppages but including bonuses or overtime ?	C1S2/P4Q3a	5
EXPECTED WAGE	Reply to the question: How much weekly take-home pay do you expect to earn in your next job ?	C1S2/P2Q4a	5
RESERVATION WAGE	Reply to the question: What is the lowest take-home pay you would consider [in your next job] ?	C1S2/P2Q4b	5
HOURS WORKED	Reply to question: How many hours do you usually work each week ?	C1S2/P4Q3b	5
JOB CHANGED	=1 if replied two or more to the question: Since August 1985 how many different employers have you worked for ? **Please do not include YTS; but if you have been self-employed please tell us about that.**	C1S2/P4Q1a	5
NON-MANUAL JOB	=1 if the job non-manual derived from the social class classification of the job	C1S2/p4Q2	5
SELF-EMPLOYED	=1 if gave the second answer to the question: Are you an employee or are you self-employed ?	C1S2/P4Q2b	5
APPRENTICESHIP	=1 if gave affirmative response to the question: Are you doing a recognised apprenticeship ?	C1S2/P4Q2d	5
ON-THE-JOB TRAINING	=1 if replied yes to the question: Do you get any training or instruction in your job either at work or somewhere else ?	C1S2/P5Q4a	5
LONG ON-THE-JOB TRAINING	=1 if replied, "longer than one month" to the question: How long do you expect training to last ?	C1S2/P5Q4b	5
JOB SUPERVISORY	=1 if replied yes to the question: Do you supervise other people or are you responsible for other people's work ?	C1S2/P4Q2e	5
LARGE FIRM	=1 if the replied "twenty-five or more" to the question: Including yourself, how many people work at the place where you work ?	C1S2/P4Q2g	5
TEMPORARY JOB	=1 if replied "the job is temporary to the question: Have you been taken on permanently or is the job temporary ?	C1S2/P4Q3c	5
INDUSTRY	Standard Industrial Classification of the job	C1S2/P4Q2f	5
LONDON	Standard Regional Classification	School Records	4, 5
SOUTH EAST	Standard Regional Classification	School Records	4, 5
NORTH AND MIDLANDS	Standard Regional Classification	School Records	4, 5
WALES	Standard Regional Classification	School Records	4, 5

YOUTH UNEMPLOYMENT	Median uncompleted duration of unemployment spell by region and sex, April 1984.	Calculated from DE Published figures	3
ADULT UNEMPLOYMENT	Annual average adult unemployment rate by region and sex 1984.	DE Published figures	3
UNEMPLOYMENT RATE	Annual average adult unemployment rate by region and sex 1986.	DE Published figures	4
NON-MANUAL/MANULA HOURLY WAGE RATE	Ratio of non-manual to manual gross hourly earnings subdivided by region and sex, 1984.	New Earnings Survey	3
ADULT WEEKLY WAGE-RATE	Average weekly wage-rate for all employees subdivided by region and sex, 1986.	New Earnings Survey	5

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